

A01-SY LKC LT In what ways can Lesson Studies, Variation Theory and Learning Studies help pre-service teachers to be better prepared for work?

Chairperson: *BRANTE Göran*,
Kristianstad University,
SWEDEN

Discussant: *John Elliott*,
University of East Anglia,
UNITED KINGDOM

Keywords:
teacher education, pre-
service teachers, lesson
study, variation theory,
learning study

Education is a complex and difficult work. It is an immense responsibility to take care of the society's young members and help them develop the necessary knowledge and required abilities essential for life in society. During the last centuries different theories and methods have been developed to help teachers to be prepared for the educational activity. Simultaneously we have seen that one problem for education and teachers is the gap between theory and practice, which perhaps has always been an issue. Two models to test and discuss teaching, learning and to accomplish a way to help learners are lesson and learning study. Lesson study is a method mostly used by experienced teachers to develop teaching regarding certain topics, to meet curriculum goals to help learners take initiative or develop certain learning prerequisites. Lesson studies are accomplished through research lessons in different forms, but all these build on teacher collaboration, self-critical reflection, and are in certain ways connected to demands from curriculum. Learning study, based on variation theory, is inspired from lesson study and design experiments. In learning studies researchers and teachers collaborate concerning targeted objects of learning and how to best help students to discern these. The theoretical base of variation theory guides teaching and learning, which focuses on the object of learning and how it should be varied, instead of focusing on the method or the context. Both models have shown positive results in practice. They definitely enhance teachers', researchers', and students' knowledge as well as develop learning and teaching. But in what way can they enhance pre-service teachers in their knowledge about their upcoming practice? If you have tools helping you to understand or handle the somewhat difficult and complicated situation at school, your ability to do this in a more powerful way increases. This has been shown in the results of several studies of lesson and learning study, but what aspects are critical to such an increase and in what way can these models or this theory also be used in teacher education?

Lesson Study In a school centered teacher education context

DUDLEY Pete,
Leicester University,
UNITED KINGDOM

Keywords:
Lesson study, school based
initial teacher education,
school to school support

In what ways can lesson studies, variation theory and learning studies help pre-service teachers to be better prepared for work? Many teachers in schools in England who take initial teacher trainee students on training placements struggle to know how best to support them. There is evidence that trainee mentors also tend to replicate practices with their charges that mirror those that were employed to support them when they were trainees (Edwards, 2003). The LS approach to teacher learning provides a structure which my research suggests can work well in enabling host schools and teachers to work effectively to support the learning not only of trainees placed with them but also of the mentors and host teachers in the school. Furthermore, with centre-based initial teacher education in England shrinking dramatically and pre-service increasing in school based provision, there is further potential for the use of LS in such contexts. LS can also provide an excellent vehicle for those students who wish to extend their graduate teacher qualification into masters' level studies in their induction year or beyond. The challenges lie principally with the leadership of the schools and colleges involved. This paper will set out models for making this work as well as outlining the nature of the main challenges that it faces.

Pre-service teachers' experiences of Lesson Study in a Singapore primary school

LIM Edmund,
Huamin Primary School,
SINGAPORE

Keywords:

Lesson study, pre-service
teacher development, primary
school

Lesson Study (LS) has been used to enhance the professional development and knowledge of teachers in Singapore and various other countries. LS also deepens teachers' understanding of students and their learning. In Singapore, LS is generally used as a school-based approach to professional development and pedagogical improvements by trained teachers. It is not extensively used for pre-service teacher development. Pre-service teacher development still follows the conventional approach of classroom observations by one or a few observers. Micro-teaching sessions and coaching are also used for pre-service training, though LS is not widely used for pre-service teachers. Nonetheless, LS can be a highly effective approach to teacher professional development for pre-service teachers. In certain cases, untrained contract teachers or pre-service teachers who were attached to schools were involved in LS efforts. This paper examines the experiences and learning of these pre-service teachers in a primary school that was engaged in LS. It also presents the benefits and implications of including LS as an approach to the development of pre-service teachers.

Learning to teach: Pre-service teachers' experience of Learning Study In Hong Kong

ZHANG Yuefeng,
Hong Kong Institute of
Education,
HONG KONG

Keywords:

Learning study; variation
theory; pre-service teacher
training; teacher professional
development

Learning study has been used to enhance teacher professional development in many cities and countries all over the world, including Hong Kong, Sweden, United Kingdom, Singapore and Brunei. Since Learning Study has been regarded as an effective approach for teacher professional development, it was introduced as a core course in the training programmes for pre-service teachers in the Hong Kong Institute of Education in 2007. This paper explores the impact of learning study on pre-service teacher professional development by looking into an English language learning study conducted by a group of pre-service teachers in Hong Kong. It reports how the pre-service teachers learned to teach via participating in Learning Study and discusses what challenges they had encountered in the process. The paper concludes with implications on the further development of learning study and its application in educational programmes for pre-service teachers.

A02-SY

LT22

The driving force behind critical discussion on teaching: Building a sustainable Lesson Study in practice

Chairperson: *MIZUNO*
Masao,
Nagoya City Sakuradai High
School,
JAPAN

Keywords:

Critical Discussion on
Teaching, Teacher
Professional Development,
Leading sustainable Lesson
Study

The purpose of this symposium is to investigate how learning community approach supports teachers to learn from each other, to design an effective teaching for promoting the students learning to construct knowledge, and to continue lesson study as a sustainable process for creating professional knowledge. Presenters employed quantitative and qualitative research methods such as case studies and lesson analysis for data collection. A Japanese school lessons are selected as a case study for analyzing the impact of lesson study in teacher research and learning level. A case of teachers' discussion after lesson in schools is selected for investigating how critical discussion of teachers influences changing teachers' mental model of teaching in practice. A case of learning community pathway for changing school is selected for analyzing the impact of lesson study on school reform and sustainable lesson study which is the key research area in today's Japanese schools. From this symposium it can be illustrated, 1) how Japanese students' cognitive abilities and emotional intelligence skills for building knowledge have been developed through expanding co-operative learning, 2) effect of institutional contexts on leading and sustaining lesson study among schools regionally, 3) impact of teachers discussion on their professional development and improving teaching, particularly expanding

learning community in school, 4) how teachers' discussion can be linked with students' learning especially in improving student communication ability.

Effects of institutional context on leading and maintaining Lesson Study: A case of Komaki city board of education

SAKAMOTO Atsushi,
Seijoh University,
JAPAN

Keywords:
Leading Lesson study,
Sustaining Lesson Study,
Board of Education

This research examined the effects of institutional context on leading and maintaining lesson study among schools regionally. Collaborative learning among teachers and students is facilitated by an educational policy that provides learning opportunities for teachers, and one that offers and supports evaluation methods, models of curricula, and so on (Akita, 2009; Shulman & Shulman, 2004). Darling-Hammond & Bransford (2005) noted that the vision of lesson is critical to the process by which teachers engage in collaborative learning within a community that includes individuals from the local region and members of the educational administration. However, little is known about the kind of administrative process that supports learning among children and teachers in the context of lesson study. Thus, this research analyzed a case in which a board of education led and maintained in-school lesson study involving schools in a region. The case under examination involved the Board of Education in Komaki City (150,000 people, 16 primary schools, nine junior high schools, 14,000 students). Students in this city get average scores on standardized tests. Because this city contains numerous factories, its schools contain many children of foreign workers from South America and Southeast Asia. Moreover, truancy is a major problem in some junior high schools. Thus, from 2005, the board started in-school lesson study in a junior high school as a pilot school. Three findings emerged from my analysis, which was undertaken from a dialogical perspective, of the policies of the Komaki City Board of Education. First, schools and boards of education learn about perspectives on teaching and collaborative learning from supervisors. The Komaki City Board of Education supported lesson study in a pilot school and promoted communication among teachers in this school. Second, the Board of Education outlined a vision for lesson study after teachers had shared the image of lesson (collaborative learning) and lesson-study style. This discussion supported teachers' collaborative learning through lesson study. Third, the Board of Education established a system by which schools were able to explore ways to improve their practice through lesson study and offered human and financial resources to promote in-school lesson study.

Impact of post-lesson discussion on teacher professional development and improving teaching

SOEJIMA Takashi,
Aichi Bunkyo University,
JAPAN

Keywords:
Learning Community, Post-
Lesson Discussion, Teacher
Professional Development

This presentation provides a deep argument about how post-lesson discussion influences on teacher professional development and improving teaching in school. Emphasis is placed here on how teachers learn from their students and from each other in building a learning organization called "school that learns". Traditionally post-lesson discussion in Japanese school provides practical knowledge and common language to share their practical knowledge for improving teaching. Observation notes, transcript of a lesson and other documents from a specific lesson such as photo, video of the whole lesson communication and students' activities are the main data for lesson analysis in post-lesson discussion. From this research it can be seen that atmosphere of post-lesson discussion influences the outcomes of the meeting, especially for improving teaching and teacher learning. This research provides the main points of effective post-lesson discussion from a case study in a Japanese school.

Enhancing teacher learning for promoting student understanding and communication ability

SUGIMAYA Tomoyo,
The Japanese School,
SINGAPORE

Keywords:

Lesson Study, Student
Communication, Teacher
Learning, Kyozaï Kenkyu

The new national curriculum standards started from last year in Japan. The main point of the new course of study is how teachers should change their methods of teaching to help students in improving their communication ability and to gain deeper understanding. This paper tries to analysis a case study of Japanese 6th grade lesson to show how teachers learning through lesson study and what is the impact of their learning on student thinking and understanding. Emphasis is placed here on Japanese approach of search and design teaching material (kyozai kenkyu) and set a specific learning task for an exact lesson. From this study it can be illustrated that the relationship between teachers search and design teaching materials and students' assignments is very important. Japanese teachers try to make sure that teaching materials have potential to encourage students to be active, engaged in communication with each other and to think on the learning task during the teaching- learning process. This presentation also provides Japanese ways of designing teaching which is based on students' viewpoints in a learning situation that discussion among students, group and whole class happen naturally and productively.

A03-SY LT23

Chairperson: *TAKAHASHI*
Akihiko,
Tokyo Gakugei University,
JAPAN

Keywords:

In-service, Pre-service,
Mathematics, School-based

Improving Mathematics teaching and learning through Lesson Study

During the past decade there has been growing worldwide interest in Japanese Lesson Study as a school-based model for teacher professional learning, with large-scale adoption and adaption of Lesson Study in the USA and many other countries. However, the mechanisms through which Lesson Study improves mathematics teaching and learning are not fully understood (Lewis, Perry & Murata, 2006), while many implementations outside Japan only focus on superficial aspects. The purpose of this symposium is to identify key elements of Lesson Study that can help teachers gain mathematical knowledge for teaching and expertise in teaching mathematics, as well as examine the ways in which Lesson Study can be translated for use in different cultures and adapted for use in multiple contexts. This symposium builds on the recent 12th International Congress on Mathematical Education (ICME-12) discussion group DG7: Improving Teacher Professional Development Through Lesson Study (see <http://www.icme12.org/sub/dg/Dgload.asp?tsgNo=07>). Three speakers and a discussant, all with first-hand research experience in Lesson Study, will explore key questions relating to the implementation of Lesson Study in varied contexts. The Chair (Akihiko Takahashi, US/Japan), a co-chair of the organizing team for the ICME-12 discussion group DG7, will introduce the symposium with a review of the issues taken up by the current symposium presenters, and a summary of the outcomes of the ICME-12 discussion group. Three speakers, Akihiko Takahashi (US/Japan), Koichi Nakamura (Japan), Naoko Katsumata (Japan), will then address key questions regarding the implementation and the mechanisms of Lesson Study in varied contexts. Makoto Yoshida (USA), an acknowledged international expert on Lesson Study, will act as the discussant and lead discussion from the floor. The symposium intentionally draws together Lesson Study researchers and practitioners from around the world and representing widely varying teacher education contexts. Presentations by the three speakers and the discussant will take a total of 45 minutes of the 90 minutes available, with the remaining time being spent on discussion and suggestions for directions for future research.

A Japanese approach for the effective implementation of a Mathematics curriculum - A case study examining the process of school-based Lesson Study at a public elementary school.

TAKAHASHI Akihiko,
Tokyo Gakugei University,
JAPAN

Keywords:

School-based, school administrator, in-service

In order to implement a new curriculum into every classroom, Japanese use lesson study as a vehicle for professional development and for establishing shared knowledge for effectively implementing the curriculum. Among various forms of lesson study, this chapter uses a case of school-based lesson study at a public elementary school (Grade 1 to Grade 6) in Tokyo to examine the process of implementation of the national curriculum, known as the Course of Study (COS). The study was conducted 1) to document how Japanese teachers and administrators in a public school work collaboratively to seek an effective implementation of the new curriculum through lesson study, and 2) to identify possible elements and construct a framework to seamlessly connect the curriculum, the teachers, and instruction.

During the 2011-2012 school year, from April, 2011 to December, 2011, the author visited the school more than ten times to observe and document lesson study activities. These activities included six research lessons and post-lesson discussions, some of the lesson planning sessions during summer break, and the school's public open house at the end of the second tier of the school research. Also, interviews were conducted by the author with the school's principal and the assistant principal, the chair of the school research steering committee, and the invited knowledgeable others who provide feedback and final comments during the post-lesson discussion. All these sessions and interviews were documented using an audio recorder and field notes.

The development of student teachers' reality of the Mathematics lesson: The germination of culture of Lesson Study

NAKAMURA Koichi,
Tokyo Gakugei University,
JAPAN

Keywords:

Student teaching, in-service

Lesson study and lesson is a cultural activity. For student teachers also, lesson study is a cultural activity. In order to understand the culture of lesson study, we will analyze and discuss the reality of lesson for student teachers. We will focus on the post lesson discussion in the lesson study. In the post lesson discussion, we talk about an event in the lesson and the relation of the event occurred in the lesson and the event in the lesson plan, and so on. Those topics of discussion are part of the reality of lesson for participants. In general a good teacher has rich reality of lesson. We will focus on the reality of lesson for teachers. We will present the framework to analyze the reality of lesson. This framework consists of three viewpoints, the event, the meaning of event, and, the background as mathematical and educational value. Then we analyze student teachers' reality of lesson in the post-lesson discussion. The data consists of two opportunities. The first one is pre-teaching practice and the second is post-teaching practice. Student teachers develop their reality of lesson through teaching practice. And their reality of lesson changes their character from the view points of event and the meaning of event. Reflecting student teacher's development of reality of lesson, we re-consider the reality of lesson and the culture of lesson study.

Changes in teacher beliefs: A study on African Mathematics teachers experiences in lesson observation and post lesson discussions.

NAOKO Katsumata,
Tokyo Gakugei University,
JAPAN

Keywords:

Africa, In-service, mathematics

Developing teacher's insight of mathematics lesson is important to enrich post-lesson discussion. How do mathematics teachers develop their insight of lesson evaluation? In this study, I focused on changing African teachers trainers' comments made on post-lesson discussions and their reflection journals with tracing teacher's belief. Through a 3 weeks training program in Japan, which mainly consists of mathematics problem solving oriented lesson observations and its post-lesson discussions, two typical opposite cases for

process of change were found. One case is that the teacher reduced his weight of belief in “students have to memorize and practice mathematical facts and roles for learning mathematics” compared with before and after the program. By analyzing his comment on post-lesson discussion and reflection journal, he might have reduced that belief as a result of evidence he found that children can construct their knowledge and concept of quantity per unit and express mathematical formula by themselves. On the other hand, the teacher who increased his weight of that belief might had been observing with interest for teachers’ behavior or role in problem solving oriented lesson rather than how children can construct mathematical concept through problem solving. It was also clear through this study that even though teachers observe the same lesson and join the same post-lesson discussion, learning experiences will be different based on what they were focusing on during lesson observation and how much they could interpret final commentator’s comments.

A04-SY LT24 Impact of Lesson Study on professional development of pre-school educators

Chairperson: *FOO Peggy*,
Marshall Cavendish Institute,
SINGAPORE

KANG Magdeline,
PAP Community Foundation
(Tg.Pagar - TiongBahru)
SINGAPORE

TAN Josephine,
PAP Community Foundation
(GeylangSerai), SINGAPORE

Keywords:

Professional Development;
Preschool educators; Content;
Pedagogical Content
Knowledge; Implementation.

The quality of teachers in the Singapore pre-school sector has gained much attention lately. Policy changes have been made to entry requirements of pre-school teachers and a Professional Development Framework (PDF) has been developed for kindergarten educators. This symposium focuses on the in-service professional development of pre-school educators. Conventionally, much of teachers’ training is set outside of the real-classroom context. However, the most effective professional development occurs when it’s “on-site, job embedded, sustained over time, centered on active learning, and focused on student outcomes” (Chappuis, 2007). A good example of such a job-embedded professional development tool is Lesson Study. Its intent is to provide deeper, ongoing and teacher-directed learning in order to create a self-sustaining professional learning community within and beyond the school. The speakers of this symposium come from three pre-school centres run by the Peoples’ Action Party Community Foundation (PCF). Two of them adopted Lesson Study for the first time in 2012. One centre participated in a Lesson Study research project funded by the Ministry of Community Development, Youth and Sports (MCYS). Each centre experienced a Lesson Study cycle which included• crafting a research theme• designing a lesson collaboratively• conducting two research lessons • completing the cycle with critical reflections and documentations Each speaker will share her Lesson Study journey and address two key questions: 1) How does Lesson Study impact the professional development of pre-school teachers? What are teachers’ changes in content and pedagogical content knowledge? 2) What are the areas of concern in the implementation of Lesson Study in a pre-school setting? The speakers will share their insights and learnings from the use of Lesson Study in their centres. Implications and ideas for the future development of Lesson Study in the pre-school sector will also be discussed.

A05-SY LT25 Strategies to enhance students' skills in oracy and sentence-writing in the Mother Tongue classroom

Chairperson: *LEE Kar Ping*,
Jurong Primary School,
SINGAPORE

Keywords:

Lesson Study; Primary
Mother Tongue; Oracy;
Sentence-writing

Students can develop better oracy and writing skills in the primary Mother Tongue classroom if they are provided with authentic experiences and appropriate scaffolding to make sense of these experiences. Three of our Professional Learning Teams engaged in Lesson Study to enhance our teaching and learning. Most of our Primary 2 students are not introduced to the structure of composition writing (which involves four elements). To ease the transition into Primary 3, our team used the situational approach strategy to introduce the structure of writing to our students. The situational approach was carried out using videos, where two students acted out the

roles in a scenario based on a picture stimulus. Through video viewing, students were guided to identify the four elements in writing and in turn, wrote complete sentences about the four consecutive pictures provided. The objective of using situational approach is to stimulate students' thinking and provide scaffolding in writing. To build the foundation of the Primary 3 students in oral conversation skills, another team came up with the solution of using the 5W1H approach based on the Social & Emotional Learning (SEL) framework. This is to provide scaffolding so that they are able to converse systematically during oral examinations. The objective of this project is to empower students to excel in their conversational skills. Another team realized that our students lack authentic real life experiences to make sense of picture stimuli used in formal oral assessments. Their lack of life experience affects the quality of their conversation and their confidence during oral exams. We also realized that students learn better when there is more interaction with learning resources, merely using the picture and paper method of teaching is simply not enough as we are not catering to the different needs of learners. We believe that they must experience the scenarios depicted in picture stimuli as vividly as possible. Hence, our team has attempted to bring the real life of the "outside" world "into" the classroom through self-produced videos so that students can learn the vocabulary used in various situations through observing their teachers enact similar situations. We hope that the use of such authentic resources to teach the skills and vocabulary needed in students' oracy and writing will help our students to become confident communicators.

A Lesson Study on enhancing students' sentence writing skills through situational approach

NGAN Wei Ling, ZHANG Sihan, PONG Hui Ling, SONG Rui, YUAN Meizhen, XIA Lingqin, LEE Kar Ping, Jurong Primary School, SINGAPORE

Keywords:
Lesson Study; Primary
Mother Tongue; Sentence
Writing; Situational Approach

The purpose of this study is to enhance the Primary 2 students' sentence writing skills using situational approach. Most Primary 2 students are not introduced to the structure of composition writing, namely the four elements. To ease the transition into Primary 3, our team used the strategy of situational approach to introduce the structure of writing to our students. The situational approach was carried out in the form of video where two students acted out the roles of the scenario based on the picture. Through video viewing, students were guided in finding the four elements in writing and in turn, wrote complete sentences on the four consecutive pictures given. The objective of using situational approach is to stimulate the students' senses and provide scaffolding in writing.

5W1H approach based on SEL framework to guide students in their conversational skills

HUANG YAN, HO Wei Lin, LEE Chin Fuong, CHIN Rosalind, LAU Kai Siong, Jurong Primary School, SINGAPORE

Keywords:
Lesson Study; Primary
Mother Tongue;
Conversational Skills; SEL

The purpose of this study is to build the foundation of the Primary 3 students in the oral conversational skills as the majority of the students are not well-equipped with the necessary skills. Students are not able to articulate their thoughts as they were not exposed to the relevant skills in Primary 2. Therefore, our team decided to work on this area to improve their oral skills and to boost their confidence. Our team came up with a solution which is to make use of the 5W1H approach based on Social & Emotional Learning (SEL) framework to guide our students in their conversational skills. This is to scaffold the learning for our students so that they are able to converse during oral examinations. The objective of this project is to empower students with the skills to excel in their conversational skills.

Using authentic real life experiences to enhance oracy skills

CHEW Shouye, TAN Lan Based on our members' combined experiences, we realized that our

Kim, TAN Siok Teng, CAI
Jiansheng
Jurong Primary School,
SINGAPORE

Keywords:
Lesson Study; Primary
Mother Tongue; Oracy Skills;
Authentic Experiences

students lack the authentic real life experience during the picture discussion and conversation components in their oral assessments. Their lack of experience affects the quality of their conversation and their confidence during the oral exams. We also realized that students learn better when there is more interaction between them and the materials; just relying on the picture and paper method of teaching is simply not enough as we are not catering to the different types of learners. Hence, with this in mind, we embarked on our research. In order for our students to be better equipped for their oral exams, we believe that they must experience the scenarios as close to real life as possible. Our team has decided to try and bring the “outdoors” to the “indoors”. We will be using videos that we have filmed on our own, so that the students can learn the vocabulary used in those situations by watching their own teachers in the same situation. It is therefore our hope that in using authentic materials to teach the skills and vocabulary needed in their oral exams, our students will become better and more confident speakers.

A06-SY LT26 Using Lesson Study in improving the quality of dissertation research in Biology Education

Chairperson: *SUSILO
Herawati,*
State University of Malang,
INDONESIA

Discussant: *ONO Yumiko,*
Naruto University of
Education, JAPAN

Keywords:
Lesson Study; Dissertation
Research; Biology Education

Lesson Study (LS) has never been used in educational research done by Biology doctorate students in Graduate Program State University of Malang before fiscal year of 2011/2012. Most of the students did quasi experimental research for writing their dissertations. In order to improve the quality of the quasi experimental research done by the doctorate students as well as to give them experience in how to implement LS before they graduate, LS was introduced to the students with the hope that they learn what is Lesson Study, why and how to implement Lesson Study in the classroom. One of the possibilities to implement LS is during the development of the teaching and learning materials. LS can then be introduced to the teachers who help the doctorate students in conducting teaching and learning processes using certain strategies during the experimental phase. Four doctorate students learnt how to implement LS during their dissertation research in fiscal year of 2011/2012. They present their experience in this symposium in two papers. One student implemented LS in developing Guided Inquiry Learning Model Integrated with Cooperative TGT that was implemented in the Elementary School Science Learning in Yogyakarta. Another student developed Inquiry-Based Learning Material that was implemented in Junior High School in Mataram. Another student developed Modified Jigsaw Cooperative learning materials that was implemented in the Senior High Schools in Denpasar, Bali. Yet another student developed NHT-Integrated Open Inquiry Learning materials that was implemented in the Senior High Schools in North Minahasa Regency. In general, they conducted workshops for teachers to introduce LS. Then through peer teaching the teachers are asked to give input on how to improve the quality of the lesson plans developed by the students to be used in the field as well as to train the teachers to teach biology using strategies chosen by the students during the experimental phase. The result of the studies show that the quality of the doctoral research can be improved and the doctorate students understand and experience how to use LS as a means to train teachers in teaching biology using certain innovative strategies.

Integrating Lesson Study in guiding students' dissertation research using Thiagarajana's 4D for teaching materials development

SUSILO Herawati,
State University of Malang,
INDONESIA

Most of the types of educational research done in the State University of Malang by doctorate students of Biology Department consist of three kinds of study, which are survey, developmental research and quasi experimental research. In developmental research, most students use Thiagarajan's 4D:

Keywords:
Guiding Dissertation
Research; Thiagarajan 4D;
Teaching Materials
Development

Define, Design, Develop, and Disseminate, but the last D, usually is replaced by a quasi-experimental research. The reason for using the quasi experimental research is that the result of the experiment can be generalized to a larger population. The aim of this paper is to describe how to integrate Lesson Study (LS) in the developmental research of the doctorate students' dissertations. As promoter of the students I proposed that they use LS in the "Develop" phase of the 4D. During this phase, the doctorate students develop the teaching and learning materials. They develop the syntax of the teaching and learning processes of the strategies chosen based on the theory and their own idea regarding the situation and condition in the field. Then they conduct a workshop inviting teachers to practice LS as well as learning to conduct the teaching learning processes using strategies chosen by the doctorate students to solve the problem. The teachers practice the teaching and learning processes through peer teaching. The teachers learn three steps of LS, which are Plan, Do, and See. During Plan, the teachers give inputs to the lesson plan; during "Do" the model teacher practice to use the strategies; during the "See" they all discuss what and how to improve the way the model teacher teach using the strategy. The LS is done for several materials before the experimental phase to make sure that the teachers are able to conduct the teaching and learning processes using strategies chosen by the students. The results is as follows: lesson plan that will be implemented during the experiment phase become more operational and appropriate because it is revised based on input given by the teachers; the experimental phase in the research can be done more appropriately because the teachers can conduct the syntax of the chosen strategies more skilfully.

The development of inquiry-based learning material through Lesson Study to improve Science learning achievement at elementary and junior high schools

RAMDANI Agus,
Mataram University,
INDONESIA
PRATIWI Pujiastuti,
Yogyakarta State University,
INDONESIA

YUWONO Cornelius,
KAWAWUNG Femmy Roosje

Keywords:
inquiry-based learning
material; lesson study;
science learning achievement

The paper describes the writer's experience in conducting research for dissertation, that is, developing inquiry-based learning materials through lesson study integrated with the 4-D Model of Thiagarajan, to enhance the science learning achievement of the students with different academic abilities. The 4-D Model consists of 4 stages, i.e. define, design, develop, and disseminate. Lesson study activities were commenced at the stage of 'develop'. In Indonesia, the steps of lesson study activities include plan, do, and see. In the current study, at the stage of plan, the researcher and teacher collaborator developed learning materials in the forms of syllabi, lesson plans, student's worksheets, and assessment tools. The learning strategies developed at the junior high school level were level 1, level 2, and level 3 inquiry. At the elementary school level, a learning strategy of level 1 inquiry combined with the TGT cooperative learning strategy. The developed learning materials were then tried out through peer teaching activities in order to obtain input and suggestions for the improvement of the teaching materials developed. The real teaching, which is at the stage of do, was conducted in the classroom after the learning materials had been completely developed. While a model teacher was teaching in the classroom, the other fellow teachers observed the teaching. The observation was mainly emphasized on how the students learned. Upon completion of the do stage, the stage of see (reflection) was performed in order to gain suggestions for the improvement of the learning material for the next teaching. The last stage of the 4-D model, disseminate, was carried out through a quasi-experiment. The results of the study provides invaluable experience, that is, the production of learning materials which were optimal in making the students learn by inquiring, increasing the teachers' motivation to conduct the instruction, and eventually increasing the students' science learning achievement. The results of the

quasi experiment showed that the implementation of inquiry-based learning could enhance the students' science learning achievement. The combination of inquiry-based and cooperative learning model could align the students of low academic ability with those of high academic ability at the elementary school level.

Implementation of Lesson Study in cooperative classes to improve the Biology cognitive learning of the senior high school students

YUWONO Cornelius,
Mahasaraswati
University of Denpasar,
INDONESIA
FEMMY ROOSJE
Kawuwung,
State University of Manado,
INDONESIA

Keywords:
Lesson Study; Cooperative
Class (Jigsaw, NHT), Biology
Cognitive Learning

This paper describes dissertation research done in 2011-2012 related to cooperative learning. Learning instruments was developed based on Thiagarajan's 4D Model. Lesson Study (LS) was done in Develop stage through workshop for the biology teachers of the tenth and eleventh grade students of Senior High School. In Indonesia, the LS activity steps include Plan, Do, and See. In "Plan" stage, the researcher collaborates with the biology teachers to develop syllabus, learning implementation design, working sheets, and assessment tools. The cooperative learning models, which are developed in the eleventh grade, are Aronson's Jigsaw, Slavin's Jigsaw II, and Modified Jigsaw, whereas for the tenth grade are Numbered Heads Together (NHT), Open Inquiry, and NHT-Integrated with Open Inquiry. The learning instruments have been tested through peer teaching in order to obtain more inputs and suggestions for improvement. The "Do" stage is held in the real class after the learning instruments has been improved. While the model teacher teaches, other teachers serve as observers on how the students study. During the reflection ("See") stage the observers give suggestions on how to improve further the learning materials as well as the implementation of teaching strategies. Results of the development are: better syllabus, learning implementation design, working sheets, and assessment, which are ready to be applied in quasi-experimental research as "Disseminate" stage of Thiagarajan's 4D Model. The teachers are more skilful in implementing the assigned strategies. Results of the research show that the average value of the gain score from pre-test to post-test at the cooperative class of Modified Jigsaw for lower academic capabilities students is better in improving biology cognitive learning than that of Aronson's Jigsaw, and Slavin's Jigsaw II. For the NHT cooperative class, the average value of the gain score from pre-test to post-test at the NHT cooperative class for lower academic capabilities students is better in improving biology cognitive learning than Open Inquiry and NHT-Integrated with Open Inquiry.

A07-SY LT27
Chairperson: *AHMAD Jumadi,*
Fengshan Primary School,
SINGAPORE

Keywords:
learning culture; pedagogical
content knowledge; results;
teacher professional
development

IDEAS for PLC @ Fengshan

I.D.E.A.S. The formation of the professional learning community (PLC) in Fengshan has been cited as one of the success factors for the positive trend of the school's PSLE results. With greater 'buy-in' by staff, even the non-core departments such as PE, ICT, NE-SS and PWB are also harnessing the synergy of team learning by using the PLC tools of lesson study and action research. Using assessment data to prioritise, teachers develop ideas in teams to address the identified areas of concern in teaching and learning. Cooperative Learning strategies, technology and other scaffolding structures are also deployed to enthuse and engage pupils. Once prototypes are developed, they are tested and evaluated. The curricular innovations are also assessed for alignment of the Theory-Practice nexus and the viability across different context/users to improve pupil learning outcomes. The school is guided by the Triangle of Success theory to help it sustain its efforts in PLC. Thus, with a school leadership's strong support, systems are in place to ensure teachers deepen their pedagogical content knowledge and that curricular innovations are adopted by all. For the symposia, two lesson study teams and an action research group will share how the process of I.D.E.A.S.

has enabled them to explicitly teach pertinent skills to their pupils effectively, enable knowledge-building amongst subject specialists and how the departments cascade new knowledge to all teachers.

Using Lesson Study as a tool to raise the quality of PE Lesson

*TAN Yew Heng, QUEK Sarah
Ruo Ying,
Fengshan Primary School,
SINGAPORE*

Keywords:
feedback, improve, critical,
reflect, demonstrate

The learning outcomes of pupils in the area of Physical Education (PE) have always been the area of contention where there is a lack of uniformity and consistency. This could be due to the lack of high quality PE lessons and effective teaching methods during lessons. This project aims to raise the quality of PE lessons so that the pupils will improve in skill acquisition and execution. PE teachers will gain more in-depth knowledge and effective teaching methods, which in turn, contributes to greater accountability in achieving the expected learning outcomes of pupils in the area of PE. At school level, there will be an improved culture of continuous improvement. The objective of the project is not to craft the perfect PE lesson but to employ Lesson Study protocols to seek continuous improvement “do- reflect- improve- do- reflect- improve” in the daily teaching and learning of PE.

An ICT action research project 2012 - How does the use Of 'Type with Me' help to improve pupil's composition writing skills?

*MAHAT Hazliana, MAHAT
Hafidah,
Fengshan Primary School,
SINGAPORE*

Keywords:
Self directed learning;
collaborative learning; Web
2.0 applications

Outside of open ended comprehension questions, writing is a perennial area for improvement (AFI). Even for students who are passing their writing examinations, there is a need to push them to fulfil their potential and stretch them to the fullest so that they may ascend the next level. However the teaching of writing presents its own sets of challenges and a top down instructional medium may not be the best way. There is thus a need to devise a teaching strategy that caters to different learning styles and leverages on students' interests in social media and collaborative ICT tools in order to create a learning environment that is at once both interactive and peer supportive. Before the introduction of Type With Me, composition lessons have always been dry and a bore to them. The thought of having to write 150 words have killed their enthusiasm to even try to write. Compositions that were handed in usually lack the flow, ie, introduction, body and conclusion. Type with Me is an online document collaboration tool which works in real time. In other words, Type with Me has allowed multiple people to work on the same document at the same time over the Internet. Real time collaboration could have many benefits such as brainstorming of ideas, text editing and communication through the usage of chat tools. Hence, our paper will focus on how does the use of an ICT collaborative tool is able to enhance pupils' writing skills.

Use of rubrics in enhancing content in composition writing (Chinese language)

*TAN Wee Su, WANG Ying
Ying*

Keywords:
Rubrics; Composition Writing;
Cooperative Learning; Peer
Assessment

Composition writing is a major hurdle for pupils when they are not well equipped with the necessary skills to deliver a well-structured composition, resulting in poor grades during composition examinations. This has thus initiated a study, by a group of Chinese teachers in 2011, to formulate a strategy to tackle the lack of content in pupils' composition writing. The aim of the study is to equip pupils with the knowledge to enhance content in their compositions through the use of rubrics. Based on the Lesson Study project done last year, the team decided to do a follow- up and target a different level (P4 instead of P5) and a different group of pupils (MA instead of HA) and improve on the rubrics in 2012. With this aim in mind, pupils are rigorously drilled in assessing different composition styles through a set of rubrics designed by the teachers. Through this set of rubrics, pupils will be able to understand the requirements of a good piece of composition. For example,

pupils will be able to analyze components that constitute a good introduction and ending and write a composition based on these components. Peer assessment and cooperative learning techniques such as think-pair-share are adopted to enhance learning. This study was carried out in two cycles. Refinements to the lesson plan were made to better cater to the pupils after each cycle.

B01-SY LKC Finding the critical features for learning. Improving teaching and learning by exploring the necessary learning conditions

Chairperson: *RUNESSON Ulla*, University of Jonkoping SWEDEN

Keywords
Teacher learning, student learning, object of learning, learning conditions, critical

Why do students fail to learn that which was intended? The point of departure taken in the studies presented here is that in order to learn something specific, students must be able to discern all its critical features. So, learning difficulties could come from not being able to notice or discern that which is necessary. In the studies reported in this symposium, to find out what these critical features might be, and how they could be implemented in the classroom, was the ultimate aim. A modified version of Lesson Study – Learning Study – was used. Just like Lesson Study, Learning Study is an iterative process of planning, observing, analyzing and revising the lesson. However, a specific theoretical framework is used as a guiding principle when analyzing student learning and classroom practice. In Learning Study, the object of learning hence, the capability one wants the learner to develop and student learning, are in focus. To find the critical features, it is necessary to go deeply into exploring the nature of the object of learning by asking questions like: “What does it imply to be able to understand/explain...?” “What is necessary to learn in order to be able to...?” However, identifying what the critical features might be cannot be derived from the subject matter alone. How students learn the specific object of learning is significant also. Therefore, student learning is carefully explored throughout the process. In this symposium we report three Learning Studies (two in science and one in mathematics) in which teachers jointly explored the critical features for learning. Common to the different studies was that the teachers refined and deepened their understanding of the critical features throughout the process. This developed understanding led them to improve the lesson. We will demonstrate that it is possible for teachers to gain a deep and developed knowledge about the critical features for student learning by systematically analyzing their teaching and students' learning and that these insights affect student learning outcomes

Understanding the concept of density

MAUNULA Tuula, JOAKIM Magnusson, University of Gothenburg SWEDEN

Keywords:
science education; concept of density; teacher development; learning study; variation theory

Over the last 10 years, Learning Study has been an arrangement for professional development of teachers at Ojersjo School in Sweden. It has become a teacher driven way of developing teaching and learning and since the start in 2003, altogether 22 studies in various school subjects have been accomplished, involving 32 teachers. This case was conducted in school year 7 and 8 (14-15 year old students) and dealt with the learning of the concept of density. The five teachers in the study are all experienced science teachers. This case focused on student learning and how the lessons developed from something quite unclear for both the students and the teachers, into something more distinct and successful. The study was conducted in a series of four lessons. Even though the lessons, at a superficial level, dealt with the same content, the way this was handled, in terms of patterns of variation changed radically. There was a profound improvement of the results of students' learning, comparing the first lesson with the last one. The study is an example of how Learning Study can help teachers develop understanding of what is critical for student learning of a specific learning object. The assessment of the students' understanding of density made the teachers change their way of comprehending the critical aspects of the learning object. This case will highlight the difficulties that teachers face when striving to understand the concept, as well as overcoming the difficulties to teach in a way that makes it possible for the students to learn, a common dilemma in a teacher's daily work.

Findings and actions - Chemistry teachers' knowledge production during Learning Studies

VIKSTRÖM Anna, Luleå
University of Technology,
SWEDEN

Keywords:
science education; concept of
density; teacher development;
learning study; variation
theory

This paper presents results from three learning studies carried out in grades 7 and 8 by six science teachers supervised by a researcher. The focus throughout all three studies was the concept of matter, with an overall aim of increasing the students' understanding of the particulate character of matter. It is well known within science education research that an understanding of the particulate character of matter is crucial for further understanding of a range of science phenomena. Variation theory served as a tool for the teachers' common knowledge development, and as a guiding principle in planning lessons and analysing test results. The teachers developed their ability to point out critical aspects, identify necessary conditions for students' learning, and enact their produced knowledge in teaching situations in a way that significantly improved the students' learning. Some of the findings made by the teachers concerned the importance of pointing out: (1) the empty space between atoms and molecules, foundational for a scientific and dynamic view of the concept of matter (frequently pointed out by using different kinds of models and through dialogue with the students), (2) the difference between matter and energy (the two concepts were contrasted when treated simultaneously in various contexts), (3) the difference between mass and density (highlighted in experiments and discussions about air and other gases), (4) the connection between the macroscopic level and the sub-microscopic level (when discussed simultaneously in experimental activities), (5) the difference between everyday language and language used in chemistry, as well as the qualitative difference between an answer at the macroscopic level and an answer at the molecular level (by using examples from student tests, and by discussing grade requirements). The results show that teachers in learning studies can become producers of knowledge that is relevant to classroom practice, and transform their findings into effective teaching actions in their daily work.

Exploring teachers' investigation of the object of learning: An analysis of A Learning Study about division

KULLBERG Angelika,
PERNILLA Martesson,
RUNESSON Ulla
University of Gothenburg
SWEDEN

Keywords:
science education; concept of
density; teacher development;
learning study; variation
theory

This paper investigates how teachers explore the object of learning in a learning study in mathematics. The object of learning depicts the capability that is learned by the learner. For each object of learning there are critical aspects that the learner needs to discern. The aim of the paper is to describe the meanings that the critical aspects have for the teachers at different stages in the learning study process. The study is a part of a larger study in Sweden investigating teachers' learning from learning studies (LGK-project). In this paper we report on the analysis of seven collaborative meetings, with four teachers and a researcher, from the point of view of how the critical aspects and object of learning are discussed using the framework of variation theory. The object of learning was that students in the 7th grade would understand that in a division, with a denominator between 0 and 1, the quotient becomes larger than the numerator. The study shows that the meaning of the critical aspects, identified by the teachers, changes for the teachers due to the discussion and analysis of the lessons. From at first being defined, they later become refined and more explicit as the teachers get deeper understanding of the object of learning. Furthermore, student learning is enhanced, most likely, by the changes made in the teaching due to the teachers' deeper understanding of the object of learning.

B02-SY LT22 Building successful Lesson Study communities

Chairperson:
CHNG Puay Keong,
Westwood Secondary School,
SINGAPORE

Keywords
Lesson Study; PLC;
Professional Development;
C2015; 21st Century
Competencies

A teacher's professional learning journey is an ongoing process of inquiry into, and reflection on their practice, punctuated by learning activities and programs designed to enhance their professional knowledge, skills, and attitudes. This process of growth and development provides opportunities for teachers to examine and challenge their assumptions about their role, experiment with teaching strategies and develop a deeper understanding of their subject content, the students they teach and how their students learn. The Professional Learning Community (PLC) has been identified as an initiative to support Westwood teachers' professional growth because PLC has been proven to be a major driving factor for teachers' growth and students' academic improvements. Lesson Study has been identified as the key collaborative tool to help teachers focus on developing student understanding through enhancing their curriculum design, instruction and assessment competencies. Currently, there is great focus on the 21st century skills that we should develop in students to prepare them for the roles they will play in the future. Curriculum 2015 also proposes that our students must be nurtured to become confident persons, self-directed learners, active contributors and concerned citizens. Using a thematic approach, the Learning Teams were able to connect and integrate many areas of the curriculum within a theme. This year, the research themes are categorised into three areas namely Values and Character Education, Student Centric Education and 21st Century Competencies, which could be seen as spheres of a student's interaction with the self and with others. This thematic approach allows learning to be more natural and less fragmented, and guides connected ideas to follow on easily. Community and leadership cannot occur if teachers remain isolated from each other. Westwood institutes guidelines and procedures that support teacher collaboration, risk taking, collegiality with other teachers as well as experts outside of the school environment, and teachers taking on leadership roles within, and outside of the school. Developing this community requires recognition that professional learning is a lifelong process that is best nurtured within the norms and culture of the school.

Cultivating students' understanding of climate change and its impacts

NYAM Ivy, LIM Cheng Xiang,
Westwood Secondary School,
SINGAPORE

Keywords
Climate Change; PETALS;
Authentic Task; Assessment
Rubric

Pupils' learning of climate change can be divided into four different stages: remembering, understanding, doing and being. The climate change lesson package was designed with the aim of helping students achieve both the understanding and doing stages in climate change education. The lesson study approach brought teachers from the various disciplines of science together in a collaborative effort to design and conduct a climate change lesson package which incorporates authentic tasks and aligns with the Ministry of Education's PETALS framework (Pedagogy, Experience of Learning, Tone of Environment, Assessment, Learning Content, Student-Centred). The study group, comprising of pupils in the school's Accelerated Science Programme, were assigned two authentic tasks to be completed in their groups over the course of two months. The pedagogical process started off with pupils participating in a role-play activity as representatives from different backgrounds at the 2009 Copenhagen Summit to encourage the sharing and challenging of opinions on the impacts of climate change between the various groups. The first authentic task aimed to increase pupils' awareness of the impact of electricity consumption on the emission of greenhouse gases, by asking them to calculate the amount of electrical energy conserved after school staff adopt various measures to reduce electricity consumption in the staffrooms. The second authentic task challenged pupils to design a prototype to harness an alternative energy source. Upon completion of the tasks,

students participated in a show-and-tell presentation of their findings and design, on which they would be graded based on an assessment rubric. As part of the lesson study approach, teachers in the team observed the lessons, and provided qualitative data and feedback on the effectiveness of the lesson package during the post-lesson discussions. Pupils were given an initial and final written survey to provide quantitative data for the study. Data from the assessment rubric, survey results and teachers' reflective feedback were triangulated to analyse the effectiveness of the lesson package in helping pupils' achieve the targeted stages in climate change education.

Learning of values through empathy

*GHAZALI Ahmad Luqman,
CHENG Cai Ling*
Westwood Secondary School,
SINGAPORE

Keywords

Value Education; Civics and
Moral Education; Character
Education

Home@Westwood is a weekly programme in Westwood Secondary School where pupils learn values such as Respect, Responsibility, Care, Harmony and Integrity. In semester one, it was observed that most of the lessons were based in the classroom and conducted using teacher-centred approaches. Pupils discussed about case studies and reflected on values at the end of the lessons. However, it was observed that pupils 'know' of the values but they do not 'enact' them in relevant situations. We are conducting a series of lessons where pupils will spend most of the lessons interacting with not only the teacher, but also with one another. They will also participate in activities outdoors where they will get to experience being the one giving or receiving the act of 'Care'. Pupils will share about what they feel during the activities and how will they go about caring for each other. We will be using the lesson study approach where the members will observe and make notes for each lesson on this value. The team will then discuss and make modifications based on the post lesson conferences. Data collection will be based on the reflections made by the pupils. The pupils will be given a booklet where they will write down any acts of care that they receive from their classmates. On the last session, they will share this act with the class followed by another reflection. Members will collect the booklets and study the reflections to gauge the level and/or the amount of such acts of caring and evaluate the progress of the experiment.

Towards self-directed learning in Mathematics

ONG Melissa, QUEK Liza
Westwood Secondary School,
SINGAPORE

Keywords:

Self-Directed Learning; ICT;
Teacher Collaboration; e-
learning

The purpose of this research focuses on the effectiveness of using an online e-learning platform towards pupils' self-directed learning in acquiring the skills and knowledge on the topic Angle Properties of Circles. The Professional Learning Team (PLT) comprises of five Mathematics teachers and one of the Secondary Three Express classes as the target group. Using lesson study, we will be conducting the research in a few stages that consist of planning, collaborating, implementing, reflecting and reviewing. Pupils will make use of the e-learning platform to access the video lessons from home and there will be self-exploratory activities to provide opportunities for inductive thinking. By analysing the results from the control group and the experimental group, we will examine how this approach in teaching is able to help pupils attain more ownership of their own learning to achieve the Curriculum 2015 outcomes and also help to change our teachers' mindset in using ICT as an alternative platform to achieve the lesson objectives. Finally, through feedback and reflections, we will also evaluate how this form of teacher collaboration can lead to fine-tuning of the pedagogies and methodologies as well as the completion of the scheme of work on time.

B03-SY **LT23**
Chairperson: *INPRASITHA*
Maitree,
Faculty of Education,
KhonKaen University,
THAILAND

Initiative on Lesson Study-based professional development (Math)

During the last three decades, mathematics Professional Development has been recognized as the major area of research in mathematics education (Diezmann and Perry, 2007). NCTM (2010) has summarized the core goals and important features of Mathematics Professional Development during the

Keywords:
Lesson Study, Professional
Development, Open
Approach, Teachers'
Mathematical Knowledge for
Teaching

past three decades through three bodies of research in US as follows; building teachers' mathematical knowledge and their capacity to use it in practice, building teachers' capacity to notice, analyze, and respond to students' thinking, building teachers' productive habits of mind and building collegial relationships and structures that support continued learning. In response to these demands, 'Lesson Study', a Japanese way of teacher professional development, has been adapted to schools in Thailand. Center for Research in Mathematics Education (CRME), Faculty of Education has been conducting the project for professional development of mathematics teachers since 2006. This symposium aims to present three research papers in the context of lesson study-based professional development in Thailand as follows: 1) Describes a variety of activities in the project school to provide opportunities to learn; 2) Investigates students' language for expressing mathematical ideas; 3) Explores teachers' mathematical knowledge for teaching.

INPRASITHA Maitree,
Faculty of Education,
KhonKaen University,
THAILAND

Keywords:
Professional Development,
Lesson Study, Open
Approach

How is Lesson Study-based professional development effective?

During the last three decades, mathematics Professional Development has been recognized as the major area of research in mathematics education (Diezmann and Perry, 2007). NCTM (2010) has summarized the core goals and important features of Mathematics Professional Development during the past three decades through three bodies of research in US as follows; building teachers' mathematical knowledge and their capacity to use it in practice, building teachers' capacity to notice, analyze, and respond to students' thinking, building teachers' productive habits of mind and building collegial relationships and structures that support continued learning. In response to these demands, 'Lesson Study', a Japanese way of teacher professional development, has been adapted to schools in Thailand. Center for Research in Mathematics Education (CRME), Faculty of Education has been conducting the project for professional development of mathematics teachers since 2006. This study aims to describe how a variety of activities in the project school provided opportunities for teachers to learn. One among four project schools participating in the project was selected for this study. The case study school has 14 teachers and the school participated in the project in 2007 academic year (May 2007). To get start, the CRME provided a 3 day workshop on "Open Approach" focusing on "how to incorporate open-ended problem into mathematical activities", for example, how to construct 'open-ended problems', how to make them into mathematical activities using short instructions, how to organize these activities in the classrooms. Three basic steps of lesson study has been introduced and organized in the schools by the leadership of the school principal. Moreover the school participated in APEC lesson study international conference, where public lessons were demonstrated by Japanese teachers. Internship students participated in the lesson study team since 2008. Outside knowledgeable persons organized workshops, participated in Open Class, visited the normal classes. Student teachers from KKU visited and observed classes taught by the teachers in a lesson study team. Research results found that there were opportunities for learning while participating in the workshop, opportunities for learning while participating in three steps of Lesson study and opportunities for learning while participating in extra activities.

KASEM Premprayoon,
Thaksin University

Keywords:
Students' Language,
mathematical idea

An investigation of students' language to express Mathematical ideas

Language is a tool through which pupils build their knowledge of mathematics, and knowledge is built in social settings (Vygotsky 1978; Bruner 1996). The important goal of education is not to get students to take part in the conventional exchanges of educational discourse, even if this is required of them along the way. It is to get students to develop new ways of using

language to think and communicate, 'ways with words' which will enable them to become active members of wider communities of educated discourse (Mercer, 1995). According to Open Approach, teaching aims to help every student be able to study mathematics in serving one's competency, aligned with decision making level by the self during study. In addition, the student had opportunity in negotiating meanings with other students (Nohda, 2000). Those techniques allowed the students to show their ideas and problem solving technique through their own language meaningfully. Language in its broadest sense is the mechanism by which teachers and pupils alike attempt to express their mathematical understanding to each other. The means of mathematical communication can be classified under 6 types: 1) "Ordinary" language, 2) Mathematical verbal language, 3) Symbolic language, 4) Visual representation, 5) Unspoken but shared assumptions, 6) Quasi-mathematical language (Pirie, 1998). The objective of this research was to investigate students' language for expressing mathematical ideas using a qualitative research methodology which the researcher applied in the lesson study by collaboration in planning the lesson, teaching observation, and reflection with team members as a lesson study participant. The data collected from various sources include participatory observation, interviewing, and artifacts from classroom activities. Three phases of lesson study were videotaped and then transcribed, and analyzed based on Pirie's (1998) approach regarding mathematical communication technique. The findings found that students communicate mathematical ideas by language in 6 types and the most frequent type that students used to communicate was ordinary language.

Improving teachers' Mathematical knowledge for teaching through Lesson Study

ANAKE Sudejamnong,
Suratthani
Rajabhat University,
THAILAND

Keywords:
Teachers' Mathematical
Knowledge for Teaching,
Lesson Study

Lesson Study is a collaboration-based teacher professional development approach that originated in Japan (Fernandez & Yoshida, 2004; Lewis et al., 2009; Murata, 2011). It provided opportunities for teachers to improve their knowledge of teaching mathematics (Meyer & Wilkerson, 2011; Corcoran & Peperrell, 2011), and teachers used Lesson Study to built their knowledge of mathematics and its teaching (Lewis et al., 2009). In 2009, a model is modified for long term mathematics professional development in 22 Project Schools. The model incorporates four phases of Open Approach as a teaching approach into three collaborative processes of Lesson Study (Inprasitha, 2010). Teachers in the project schools participated in many activities provided by the Center for Research in Mathematics Education and Japanese expert. After 2 years, we would like to know whether teachers' mathematical knowledge for teaching has improved. We explored the opportunities for professional development and tested their mathematical knowledge for teaching (Ball et al., 2008). The findings indicate that teachers in project schools participated in many activities for improving mathematical knowledge for teaching and they have higher mathematical knowledge for teaching than teachers in traditional schools.

B04-SY

LT24

In what ways can Lesson/Learning Study contribute to increase early childhood teaching?

Chairperson: *LJUNG-DJÄRF*
Agneta, Kristianstad
University, SWEDEN

Discussant: *AKITA KIYOMI,*
Tokyo University, JAPAN

The aim of the symposium is to highlight and discuss in what ways lesson and/or learning study can be used to increase pre-school teaching exemplified by projects from Japan, Hong Kong and Sweden. Previous lesson and/or learning studies has mainly been developed in and reports on different school contexts. Even if a few previous studies have been reported on research results found in pre-school practice, the need of further development of

international studies in early childhood contexts remains. With its focus, the symposium will attempt to be a part of the knowledge building on how a lesson and/or learning study model can be used for educational development, not only related to pre-school children's learning of a specified content, but also of teaching connected to content issues even with young children such as preschoolers.

Examining Issues And Challenges Of Field-Based On-Site Training Session In Japanese Kindergarten - Focusing On Its Roles, Perceptions, And Forms Of Documentation

KADOTA Riyo,
Seinan Gakuin University,
JAPAN

Keywords:
teacher professional
development; pre-school;
knowledgeable others; Japan

The significance of professional development is crucial for quality of early childhood educational practices in terms of developing a child's perspectives, understanding child's developmental stages, implementing play and learning contents into practices, designing better lesson plans, creating adequate play/learning environments for children, establishing harmonious collegiality, and so on (cf. OECD, 2012, Bredekamp, 1984; Morison, 2003; Darling-Hammond, 1994; Sommer et al., 2010; Pramling Samuelsson and Asplund Carlsson, 2008; Ackerman, 2006). As for professional development, various forms are available such as participating seminar/workshop, setting regular staff meetings, attending conferences, taking specialized/subject training, having field-based on-site training/consultation/mentoring, offering open-practices sessions, enforcing supervised practices, participating online/virtual training, and attending formal training course/acquiring degrees. However, how these professional development forms influence quality of early childhood educational practices are still unidentified. Moreover, few concrete practical/empirical studies of these professional development forms in early childhood education are reported (OECD, 2012). Alike lesson studies at elementary school education in Japan, Japanese kindergarten education has a long tradition of field-based on-site training session, where usually kindergarten invites professionals to discuss issues of practices and theories along with teaching staff members. Therefore, in this particular presentation, I will raise the followings issues that emerged from what I have done with Japanese kindergarten teachers in my region as field-based on-site training/consultation in these years:

- illustrating ways of on-site mentoring/training have been implemented at Japanese kindergarten,
- examining to which degree the training impacts Japanese kindergarten teacher's perspectives of practices, a
- arguing forms and utilization of documentations collected by kindergarten teachers are effective for quality of practices.

Through this case study with Japanese kindergarten teachers, I'd like to discuss what the roles of consultants/professions are and what the attitudes/disposition we as consultants/professions should possess in order support kindergarten teachers improving and elaborating their teaching competences.

Enhancing the teaching of performance tasks in kindergartens via Learning Study in Hong Kong

LAM Po Chi, ZHANG Yuefeng,
LAM Ho Cheong,
Hong Kong Institute of
Education, HONG KONG

Keywords:
teacher professional
development; pre-school;
performance tasks

This paper reports the initial stage of a learning study on enhancing kindergarten teachers' teaching of performance tasks in Hong Kong. Data from classroom observation and post-lesson interviews with two kindergarten teachers were analysed to identify the existing teaching practice focusing on four typical classroom performance tasks: storytelling, drawing pictures, singing nursery rhyme and physical movement. The findings have indicated that both teachers often simplified the object of learning into declarative knowledge and used passive receptive activities and neglected the specific

disciplinary skill-related aspects and seldom used active productive activities, which will more probably lead to deeper learning. The factors shaping these teachers' practice are also discussed and elaborated. The room for further improvement of these teachers is then identified as the object of learning for the teachers and the critical features of these performance tasks specified for student learning in the coming learning study projects. The paper concludes with implications and recommendations on teacher education for pre-school teachers in Hong Kong.

**Focus on play or the object of learning, or both at the same time? :
Examples from three Learning Studies conducted in Swedish pre-school
context**

*LJUNG-DJÄRF Agneta,
WENNÄS BRANTE Eva,
Kristianstad University,
SWEDEN*

Keywords:
Learning Study; Sweden;
teacher professional
development; pre-school;
object of learning; play

The Swedish school system offers a curriculum based early childhood education for children aged one to five, and a pre-school class for children aged six. Activities have by tradition been based on play and having fun, thus avoiding structured activities with formal learning objectives. Due to indications that the Swedish pre-school failed to use its resources to stimulate children's learning, the revised curriculum for preschool now contains discernible learning objectives. The aim of the paper is to discuss and exemplify the process of pre-school teachers changed focus during three learning study processes conducted in Swedish pre-school. In total, 13 pre-school teachers working with 95 children aged from two to six and 4 researchers participated. The object of learning in each study were: 1. Geometry (2-3 year-olds), 2. Organic decomposition (4-5 year-olds) and, 3. Twice as (6 year-olds). The empirical material consists of 285 pre-, post-, and delayed post- test interviews with the children, nine planning meetings and nine teaching activities. The result shows that the three learning study processes revealed complications not anticipated when play was used as an, more or less, axiomatic way of framing the teaching activities. During the learning study processes the pre-school teachers awareness of and chosen focus in the teaching activities changed. At the same time a changed focus also could be noticed among the participating children thus making an enhanced learning possible.

B05-SY

LT25

**Applying Lesson Study to the professional development of teachers in
an ICT-based Mother Tongue Language programme**

*Chairperson: LOW Tan Ying,
BUANG Arfah, SOON Hong
Lim, LEE Jo Kim, Educational
Technology Division, Ministry
of Education*

Keywords:
professional development;
technology integration; mother
tongue languages; capacity
building

This symposium expounds the application of the lesson study mechanism to the professional development (PD) programme for middle management and teachers involved in a group of Information and Communication Technology (ICT) based teaching and learning programmes for Mother Tongue languages, collectively known as 10'CMT. While the growth in technologies has brought fundamental changes in learning opportunities, studies suggest a continuing deficit in teachers' pedagogical awareness of ways of working with technologies to bring about improved learning outcomes. 10'CMT, which is initiated by the Educational Technology Division (ETD) of the Ministry of Education (MOE), Singapore, embodies a focus on the development of relevant pedagogy by which web-based technologies are embedded in meaningful learning activities in the classroom. Essential pedagogic support is rendered to teachers through an iterative PD programme which entails several rounds of lesson observations conducted by 10'CMT ETD officers for each individual teacher. With the incorporation of an adapted version of lesson study to the PD programme of 10'CMT, teachers are empowered to collaborate in designing and refining lessons through regular, structured lesson preparation and peer observation sessions under ETD officers' guidance. Lesson study has been found to be effective in affirming teachers' beliefs towards technology integration, and in building their capacity to design and deliver meaningful ICT-enriched lessons. It is also a means to encourage and sustain

teachers as collaborative and reflective professionals committed to ongoing inquiry and learning. It attests to the improvement in lesson quality, which in turn translates into better student learning experiences and outcomes. Lesson study has also enabled schools to take greater ownership of teachers' PD and 10'CMT programme implementation. The session will begin with an overview of the rationale, processes and outcomes of incorporating lesson study in the 10'CMT PD programme by ETD officers. The subsequent presentations by participating school teachers will draw attention to the issues that surface and the benefits reaped throughout the lesson study process from the collective vignettes of experiences.

Building teachers' capacity in 10'CMT

*LOW Tan Ying, BUANG
Arfah, SOON Hong Lim, LEE
Jo Kim, Educational
Technology Division, Ministry
of Education*

Keywords:
capacity building; technology
integration; interative cycles;
professional development

Building teachers' capacity is absolutely essential if technology integration in classrooms is to be possible and, more importantly, effective. It is therefore critical that professional development (PD) be utilized in its most powerful and potent form in order to equip, empower, and encourage teachers to meaningfully integrate ICT into their daily curriculum for better learning outcomes. To facilitate the continuing process of learning and development for teachers in an ICT-integrative programme, collectively known as 10'CMT, the Educational Technology Division (ETD) of MOE Singapore has designed and adapted an iterative PD framework which incorporates Lesson Study as an essential component. Lesson study is a potent embedded peer-to-peer professional learning strategy that enables teachers to work collaboratively to dwell deeper into their lesson designs and teaching strategies with students' learning outcomes in mind. The formation of research groups enables situated and distributed learning to occur. As learning is grounded in actual classroom practice, teachers inevitably grasp the 10'CMT pedagogical approach better and faster through Lesson Study. The iterative PD framework with Lesson Study is found not only to promote long-term teacher learning but also lends itself to aid in the shift of ownership of learning, from ETD to the research groups and their departments, and the empowerment of teachers to generate their own knowledge. This presentation provides an overview of the rationale, processes and outcomes of incorporating Lesson Study in the 10'CMT PD programme. Findings from a teacher perception survey on the effectiveness of the PD framework will also be discussed.

Journey of the 10C professional learning team in North Vista Primary School

*SOH Kang Hwee Gladys,
North Vista Primary School,
SINGAPORE*

Keywords:
capacity building; technology
integration; interactive cycles;
professional development

In today's context, it is increasingly common for schools to invest in developing professional learning teams (PLTs) as a central strategy for improving teaching and student learning. The building blocks of PLTs are collaborative teams of teachers who work together to change the way they teach in order to address students' learning needs. Based on the idea that teachers can learn from each other, PLTs contribute to the growth and development of individual members and to the group as a whole. The collective construction and sharing of new knowledge attests to the intellectual efforts of teachers who are engaged in ongoing inquiry and reflection. This presentation illustrates an evolving journey of a PLT at North Vista Primary School, which has embarked on the 10'C programme since 2009 to heighten students' interest in the learning of mother tongue language through ICT. Over time, the PLT has drawn on various tools of inquiry including Action Research as it seeks to improve and enhance its ICT-based teaching and learning. The PLT has now embraced Lesson Study as it possesses key elements of effective continuing professional development such as having a focus on student learning, providing opportunities to develop networks of learning, and the facilitation of reflection on teaching practice which are closely aligned to the broad aims and intentions of the school.

Challenges in implementing Lesson Study as a professional development tool: A practitioner's experience

LIM Chor Koon, Paya Lebar
Methodist Girls' School
(Primary), SINGAPORE

Keywords:
capacity building; technology
integration; interactive cycles;
professional development

Lesson Study is a means by which teachers are led to deep engagements with the processes of teaching and learning. As teachers engage in a lesson study cycle, they are prompted to reflect on their own approaches to these processes and to develop practices in ways that are meaningful to them in their working contexts. Teachers in the 10'C programme engage in Lesson Study through learning communities where awareness of effective ICT-based pedagogy and reflection on practice are promoted. In that respect, Lesson Study is found to be effective in affirming 10'C teachers' beliefs towards technology integration, and in building their capacity to design and deliver meaningful ICT-enriched lessons. Concomitantly, Lesson Study not only ensures the availability of evidence-based data to inform practice, but at the same time, enhances teachers' skills sets in other professional areas. While the merits of Lesson Study are apparent, its implementation is not without challenges. This presentation addresses the ways in which the Mother Tongue Department of Paya Lebar Methodist Girls' School (Primary) dealt with issues and practical constraints when it implemented Lesson Study as a professional development tool for its teachers in the 10'C programme. It will also bring to light how participating teachers perceived the process of lesson study.

B06-SY

LT26

Defining Lesson Study impact on daily practices: Exceeding elastic limit of spring of teacher quality

Chairperson: *HIDAYAT Arif*,
ANNISA Nurramadhani,
NASRUDIN AjengRatih,
Indonesia University of
Education,
INDONESIA

Keywords:
Lesson Study, Zone of
Feasible Innovation

In the process of learning that focuses on building students' way of thinking, the learning process is implemented in the classroom can be considered as one of the main miniatures to build the next generation. Constructing the way of student thinking through the learning process could be facilitated by many ways. There are lots of indicators that can be observed easily by the teacher. The extensive preliminary study to about five thousand students in elementary and secondary levels show that most of learning experiences tends to be bored, replicating things that teachers noted, only focused on answering students' worksheet, seldom to do demonstration and experiment, more focused on exam-oriented. These learning qualities at the classroom systemically decreasing the quality of expected generation, so that teaching gap appears brings to generation gap. When lesson study regarded as continuing professional development, learning process will be expanded like spring expanding by special force. The implementation of sustained lesson study will act as force to exceed the elastic limit of spring, while in this case the spring is teaching quality. The force will drive the impact to decrease the teaching gap. The impact is reflected by enhancement of teaching quality in daily practices. The research is focused on how to measure the change of lesson study on daily practices. Two teachers with teaching experience more than 20 years and have involved in lesson study for more than 7 years are taken to record their daily practices. More than 50 learning process videos during one-year academic program are recorded, transcribed and analyzed. The aspects that are analyzed are technological pedagogical content knowledge, learning pattern, learning sequence, pedagogical content knowledge, teacher thinking, teacher preparation, and teacher reflection. The change from those aspects are defined as zone of feasible innovation for teacher, which can be very small but its nature remain. While lesson study carried out in a long time and the systematic, this small feasible innovation will be shifted forward to reduce teaching gap and to increase the generation output.

Concurrent Session C

29th November, 09:00-10:30

C01-PL LT1 Theorizing lesson-based teacher research on teaching and student learning in China and Japan

CHEN Xiangming,
Beijing University,
CHINA
SATO Manabu,
University of Tokyo,
JAPAN

Discussant: *ELLIOTT John,*
University of East Anglia,
UNITED KINGDOM

Chairperson: *FANG Yanping,*
National Institute of
Education,
SINGAPORE

East Asian models of teacher learning share some common features. Teachers in China collectively observe and critique public lessons until their teaching becomes virtuoso performance (Paine, 1990) and teachers in Japan study children's learning to continuously improve teaching through lesson study (Stigler & Hiebert, 1999). Such practices of lesson-based teacher research on teaching were originated from and informed by different social and cultural traditions and schools of thinking at different times in both countries. They have also been adapted to meet the changing demands of social and political needs in different historical stages. Not until very recently have we started reading about these practices in their specific social-cultural contexts published in English, mostly from Western-based scholars. What we have known so far lack theorizing, particularly from the perspectives of the influential native scholars. Issues concerning the epistemological and methodological foundations of such cultural practices from insiders' views will be particularly valuable in helping the world better appreciate such traditions. The knowledge that teachers bring to and generate from deep engagement in these practices as well as the social, cultural and historical contexts in which it is situated can be one important dimension to look into. More recently, schools and teachers are increasingly caught in the competing interests of stakeholders. In China, for example, parents demand for better student exam scores for school promotions; the government calls for "quality education" to boost stronger national power; and educational researchers are pushing for a more humanistic education for the Chinese children. At a loss of what to do, most teachers are still organizing or being organized for various kinds of lesson study. The endeavor to examine these issues more systematically will be able to help move the field of lesson-based teacher research and school reform forward with greater understanding.

C02-PL LT2 Learning communities and school reform through Lesson Study

SATO Masaaki Sato,
Lesson Study Consultant,
JAPAN
THE SY Phan, Bureau of
Education and Training of Yen
Dung District (Yen Dung
BOET), BacGiang Province,
VIETNAM

Discussant: *GOODWIN, Lin,*
Teachers College,
UNITED STATES

Chairperson: *SAITO Eisuke,*
National Institute of
Education,
SINGAPORE

In this plenary session, there will be two speakers from Japan and Vietnam, namely, Mr Masaaki Sato and Mr Phan The Sy, who turned around their schools from one of the most problematic schools to one of the best in their region, by utilising lesson study for learning community (LSLC) as their reform policy. In their approaches, the uniqueness is that they involved the entire school from the very beginning of the process of reform and set up observation of and reflection on lessons, while keeping active informal consultation about crafting curriculum. Their reform efforts were strategic and systemic. At the same time, they emphasised an importance of close consultation with teachers and supporting them to improve their professional capacities.

In this session, there will be discussions on how they utilised LSLC in reforming schools, what kinds of issues they had and what sorts of lessons they could draw. Mr Sato is now working as a freelance consultant for school reform around Asian countries, including Singapore, Vietnam and Indonesia, while Mr Sy is Vice Director, Bureau of Education and Training of Yen Dung District. From their current working perspectives, there would be also comments on how to promote school reform with LSLC.

C03-PL **LT3** **Breaking new ground in early childhood settings**

HOLMQVIST Mona,
University of Gothenburg,
SWEDEN
YEAP Ban Har, Marshall
Cavendish Institute,
SINGAPORE

Discussant: *AKITA Kiyomi,*
University of Tokyo, JAPAN

Chairperson: *RATNAM*
Christina, National Institute of
Education,
SINGAPORE

Since the start of the 21st Century, many countries have been reviewing and revising their curricula for early childhood education. There is concern to balance play and fun with more formal learning objectives into developmentally appropriate practices. In Sweden, there was a strong tradition and emphasis in Swedish preschool on play and fun, and an avoidance of structured activities with the formal learning objectives typical of compulsory school; however, due to the results of an evaluation indicating that preschool failed to use its resources to stimulate children's learning (Memorandum U2008/6144/), the revised curriculum for preschool now contains discernible learning objectives. Learning, especially in the areas of language and communication, mathematics, and science and technology, is emphasized in the new curriculum. The situation seems to be the reverse for preschools in Singapore. Prior to 2003, there were no official documents guiding preschools on the curriculum for early childhood education. As such, most kindergartens tended to teach from curricula that reflected the formal primary education system, which emphasized language (both English and the Mother Tongue language) and Mathematics. In 2003, the Ministry of Education published a Kindergarten Curriculum Framework which explicated principles such as integrated and holistic education and play as a medium for learning.

Researchers from both countries have noticed that it is a challenge for preschool teachers to change their perspective. In Sweden, teachers are not accustomed to presenting activities as planned lessons or to assessing children's learning in terms of outcomes, but they now need to learn how to develop play activities aimed towards learning. In Singapore, teachers are not accustomed to plan their own lessons, with the objective of prompting children to discover the world through experimentation and observation.

The speakers at this plenary have been working with preschool teachers, using the platform of lesson/ learning study. Each speaker will present on the following questions and provide materials for discussion:

1. Why did you adopt lesson/ learning study in your work with preschool teachers? To what extent has lesson/ learning study helped you to achieve your objectives?
2. What is unique about lesson/ learning study in early childhood settings? What modifications were required to address issues in early childhood settings?

C01-SY **LT11** **Beyond the lesson plan - the Lesson and Learning Study as teacher research**

Chairperson: *RUNESSON*
Ulla,
University of Jonkoping,
SWEDEN

Discussant: *WOOD Keith,*
Universiti Brunei Darussalam,
BRUNEI

Keywords:
Teacher research, Learning
Study, Lesson Study;
professionals' task;
knowledge products

The Learning study could be considered as a form of teacher research aiming at understanding and improving practice and building theory. It is focused on the development of teaching-learning units, guided by a theoretical framework – variation theory and aims to accomplish the learning of specific objects of learning. The knowledge product is designed to help the professionals to solve problems with teaching and learning they encounter in their everyday practice. Hence, it is more connected to professionals' tasks than to professionals. Just like the Lesson Study it creates joint and shareable knowledge products in terms of lesson plans which could serve as a resource for other teachers. A significant feature of the Learning Study is however, its possibility to theoretically describe the results of the specification process regarding objects of learning within different subject matter areas (Carlgrén, 2012). In the presentations we will deal with issues about the knowledge products of the Learning study as well as Learning study as teacher research.

How Learning Study turns teachers into researchers

LO Mun Ling,
The Hong Kong Institute of
Education,
HONG KONG

Keywords:

Learning study; action
research; teachers as
researchers; shared
professional knowledge

For teaching to be respected as a profession, teachers must take an action research approach to teaching and generate professional knowledge that can be shared. In a learning study, three parties are involved: students, teachers and researchers, and a learning study aims at the learning of all of them. This paper focuses on the learning of teachers and argues that teachers are the main researchers in a learning study, and learning study helps teachers to become researchers. The process of learning study is examined to identify the critical features that promote this kind of learning, and to show evidence that this is indeed happening. The kinds of knowledge generated in this process are discussed.

Learning Study as subject didactic research?

INGRID Carlgren, Stockholm
University, SWEDEN

Keywords:

subject didactic research;
learning study as research
approach; knowledge
generating system

Hiebert et.al. (2002) presented Lesson study as a model for transforming teachers' craft knowledge into professional knowledge i.e. making it public, sharable, storable and verified as well as improved. In "The teaching Gap" Stigler and Hiebert pointed out the need of a research-and-development system for the steady, continuous improvement; such a system does not exist today." (Stigler and Hiebert, 1999, 126–127). Such a system should be organized around public changeable knowledge products (e.g. lesson plans for specific learning goals) (Morris & Hiebert 2011) The learning study approach is essentially a kind of lesson study with an explicit learning theory—the variation theory of learning (Pang & Lo, 2011). In a Learning Study there is a shift of focus from the lesson to the accomplished learning and teaching-learning units and the teachers are given a theory as a tool. The focus is on specific objects of learning and it is supposed that for every specific object of learning there is a specific pattern of variation that must be experienced and discerned in order to appropriate the learning object. A Learning study generates knowledge concerning critical aspects of the learning object, i.e. aspects that must be discerned in order to grasp the learning object. This paper takes as its starting point some questions regarding how the Learning Study can be used as a research approach for subject didactic research. What is needed in order to develop learning study into a research approach that can generate new knowledge – not only for the participating teachers (i.e. knowns rather than teacher knowings)? What kinds of theoretical contributions can be generated and what kinds of knowledge claims can be made? In order to discuss those questions we will present and analyze the kinds of knowledge contributions that are planned for in 15 projects using Learning Study as research approach. The projects will be carried out by doctoral students belonging to a national research school called "Learning Study – teaching developing subject didactic research". The focus will be on describing and analyzing the research questions and objects, research designs, the expected knowledge contributions to the field of subject didactics.

Combining Variation Theory and Activity Theory - What can be the benefit?

ERIKSSON Inger,
Stockholm University,
SWEDEN

Keywords:

Variation theory; activity
theory; learning object;
learning study; Learning study
as research

The issue of this paper is to explore the possibilities to combine theory of variation with learning theories founded in activity theory when using Learning Study as a research approach. In relation to what aspects of the Learning Study process can activity theory complement the theory of variation? Learning Study is developed as a variant of the Japanese Lesson Study approach. In the core of a Learning Study is the use of a theory of learning. Marton and his colleagues in Hong Kong have argued that Lesson Study, if informed by a theory of learning, can both produce new knowledge of the object of learning and test the strength of the theory. The theory of learning chosen by Marton et al. was the theory of variation (Pang & Marton, 2003;

Marton, 2005; Marton, Runesson & Tsui, 2004). The theory of variation is intended to help teachers/researchers to plan, implement and review the research lessons. It is also intended to help teacher/researcher to explore the learning object. However, the theory of variation gives no special guidance in the process of choosing a learning object for the Learning study. In the tradition of both Lesson and Learning Study, choosing the object of learning is mostly not problematized. Often the object of learning is chosen based upon teachers' experiences of what is difficult for students to learn. This implies that the chosen object of learning may conserve traditions of schooling. Further, the exploration of the meaning of the object of learning with the help of theory of variation may be enriched if also explored with the help of an activity theoretical perspective. That is, framing and analysing the object of learning in a cultural and historical perspective may open up for new understanding of what is to know and why. An activity theoretical perspective may also function as a complement in designing the tasks given to the students. These issues will be analyzed and discussed in relation to five PhD-student projects that aim at combining the theory of variation and activity theory. These projects are part of the Swedish national research school called "Learning Study – teaching developing subject didactic research".

C02-SY LT12 Using Lesson Study to enhance the teaching and learning of pupils with moderate learning difficulties

Chairperson: *NORWICH Brahm*, University of Exeter

Keywords:
development project;
moderate learning difficulties;
raising achievement

Lesson Study (LS) has been used from 2010-2012 in a large-scale UK project to enhance the teaching and learning of pupils with learning difficulties in secondary schools. This project has to date been the largest scale use of LS in the UK where there is growing interest in LS for both initial training and continuing forms of professional learning and development. The Raising Levels of Achievement for Pupils with Moderate Learning Difficulties (MLD) initiative, funded by the Esmee Fairbairn Foundation has worked with about 100 teachers undertaking Lesson Studies that have focussed on secondary aged pupils with MLD across about 30 schools. Pupils with MLD in the UK are seen to have significantly lower attainment across the curriculum; it is defined as a general learning difficulty rather than a specific learning difficulty, such as dyslexia. Though MLD is seen and recorded as the largest area of special educational needs (SEN), there is some contention about whether pupils so identified have SEN. MLD has been a much neglected area of research and development. This is partly because pupils identified as having MLD are often hard to distinguish from pupils who struggle with learning or are lower attaining and not seen as having SEN. These issues are outlined and discussed in various parts of this symposium. The aims of this symposium are: (1) To explain the rationale for use of lesson study in this area of teaching and learning, (2) To explain and illustrate the style of lesson study used in this project, (3) To communicate the experiences and learning of teachers from 2 schools involved in the project, and, (4) To communicate key evaluation research findings from the evaluation wing of the project.

Lesson Study in the UK and the Exeter Mld project

NORWICH Brahm, University of Exeter
DUDLEY Pete, University of Cambridge, UNITED KINGDOM

Keywords:
lesson study UK, moderate learning difficulties

In the introduction there will be 2 short accounts: (i) Lesson Study in the UK and the use of case pupils: In this section Pete Dudley (Project LS consultant) will introduce the recent conceptions and use of LS in the UK and how these experiences and models have informed the Raising Levels of Achievement project. (ii) Explanation about The Exeter MLD project: In this section Brahm Norwich (Project coordinator) will outline the origins and rationale for the project, its focus on MLD as an aspect of special educational needs and how LS has been used for the first time in this field in the UK.

Experiences and learning in Stoke Damerall and Chilton Trinity Schools

*BARRET Marie, BURMAN
Debbie,*
Stoke Damerall School

*HAWKINS Jane,
SHERWOOD Caroline,*
Chilton Trinity School
UNITED KINGDOM

Keywords:
lesson study UK, moderate
learning difficulties

This presentation will involve two accounts (with some use of videos) about the use of LS in these two secondary schools arising from the project in terms of the following aspects: (a) the wider school context and specific interest in adopting LS for teaching pupils with MLD, (b) the number and foci of the LS's undertaken during the project, (c) the preparation for LS, getting started and initial planning undertaken, (d) the LS team members and their working relationships, (e) lesson observations, (f) how review meetings were conducted; how reviews influenced subsequent research lessons, (g) how learning from LS was shared across school, (h) the nature and extent of support from the senior leadership team, (i) learning to use and adapt LS over time, (j) how LS was sustained in the school, (k) challenges and threats to LS; how they were addressed.

Evaluation research about the MID Lesson Study project

*YVLONEN Annamari,
NORWICH Brahm,* University
of Exeter,
UNITED KINGDOM

Keywords:
lesson study UK, moderate
learning difficulties

The project was organised into 2 phases with different schools/ teachers involved in each phase. Phase 1 involved each school in undertaking 3 lesson studies, while in phase 2 schools undertook 2 lesson studies. The project evaluation research wing focussed on the following aspects: (a) What Moderate learning difficulties (MLD) meant in the project schools, (b) The beliefs and attitudes of participating teachers about inclusive education, moderate learning difficulties, (c) What teaching strategies relevant to pupils with MLD were developed and used in the LS undertaken in the project schools, (d) How LS was conducted in project schools, (e) The contexts, processes and outcomes of the lesson studies undertaken in the project schools, (f) The learning outcomes for pupils with MLD from using lesson study, (g) Detailed case studies of lesson studies in 4 participating schools. A summary of key findings from these aspects will be outlined and their significance for the use of LS in enhancing teaching of pupils with learning difficulties and special educational needs.

C03-SY

LT10

Lesson Study as a school-wide approach to enhance student lessons in a Singapore neighbourhood school

Chairperson: *TAN Hui Ping,*
River Valley Primary School,
SINGAPORE

Keywords:
School-wide approach; Eco-
system for Lesson Study;
Case studies

The symposium chronicles how River Valley Primary School (RV), a pilot Professional Learning Community (PLC) school, leveraged on Learning Communities and Lesson Study to inspire teachers to become curriculum leaders. Focusing on the 3 big ideas of PLC (i) Focusing on student learning (ii) Building a culture of collaboration and (iii) Being outcomes oriented, RV established a learning ecosystem as an overarching framework to provide teachers with the support to carry out Lesson Study to promote critical dialogue amongst the teachers. An improvement in the Staff Climate Survey score for training and development and initial observations suggests that this innovative effort by the school to develop teachers as curriculum leaders can transform teaching practices. As we continue on this PLC journey, this combined systems and culture change approach will be fundamental to the success and sustainability of LS in RV. In this symposium, the school aims to share the ecosystem put in place to support the school-wide implementation of Lesson Study and 2 case studies from the Lesson Study projects carried out in school. The first case study focuses on the use of iPads to improve students' oral skills in English language. It explores the use of ICT and Peer Assessment pedagogies. The second case study explores how the use of Problem Solving in Mathematics can provide opportunity for students to apply their Mathematical concepts of Money and honing thinking skills in decision making. The sharing of ecosystem will provide a checklist of to-dos and possible challenges to schools that intend to adopt Lesson Study. The case studies serve to provide participants with real-life examples of how it has

enhanced teacher competency and student outcomes. Challenges that teachers faced would also be shared to give participants a total experience of Lesson Study.

Creating a school-eco-system to support learning communities and Lesson Study

*TAN Hui Ping, LEE Kathleen,
ONG Wendy*
River Valley Primary School,
SINGAPORE

Keywords:

Ecosystem; Learning communities; Lesson study

River Valley Primary School is a pilot PLC school. In line with the aspirations of PLC and Singapore's drive towards a first-class teaching force, it is crucial for us to initiate and bring about a paradigm shift in the teaching culture. To transform teaching practices, teachers must be equipped with the right attitude, skills and knowledge. Developing teachers into curriculum leaders would serve to uphold professionalism amongst teachers. Their work would thus become more meaningful, purposeful and thoughtful. In 2010, RV piloted Lesson Study with 2 teacher teams as part of PLC efforts. In 2011-2013, the school embarked on a 3-year plan to empower all teachers through LS to enhance teacher competency, student learning and student outcomes. The plan was established by a team of Heads of Departments with the school leaders to roll-out the school-wide LS initiative. The school established a 4-pronged learning ecosystem to spearhead the change in the teaching and learning in the school : (i) Advocacy – The school identified 2 HODs and 4 Heads of Levels to form a LS team to champion LS in RV. 2 pilot LS projects were carried out to involve a few more teachers and acquire more knowledge and experience in LS. This was also useful to get more teacher buy-in for LS. (ii) Support from school leaders – The school adopted a “ground-up approach, top-down support” model in staff professional development. School leaders were also involved in leading curriculum work and had put in place processes and structures within the school to support the LS innovation. (iii) Capacity Creation – The school adopted LS as a school-wide approach to provide the teachers with a platform to be engaged in critical dialogue about their work. Through a series of in-house training, teachers got the chance to discuss about content, pedagogy and assessment in their own practice and learn from their peers. A main facilitator was on hand at each of these sessions to provide JIT expertise. (iv) Learning by Doing – The teachers form LS teams to design curriculum and lessons that they would carry out in their classrooms. The LS tool is used by the school to distil the learning and the impact of the “re-designed” curriculum on student learning.

Lesson Study to explore the use of Ipad and peer assessment in enhancing English oral skills

WOO Jasmine, OH Cecilia,
River Valley Primary School,
SINGAPORE

Keywords:

Lesson study, iPad, ICT, Peer assessment, English oral skills

This paper explores how the team has innovatively used Lesson Study to explore the use of iPads and Peer Assessment to enhance English oral skills of primary 4 mixed-ability students. Using the LS tools, the team planned an English oral lesson that harnessed the power of ICT to better engage the students in their learning. The students work in groups with an iPad. They would video-record each other doing English oral. Then, with the checklist and rubrics provided by the teachers, the students would self and peer evaluate their performance. As a team, they would then work together to help each other improve on their oral presentation. A re-recording will be done. The cycles continue until the students are satisfied with their final recording which will be submitted to the teacher for teacher assessment. Through this, the team hopes to develop students into self-directed learners who can work collaboratively with others. We also aim to hone students in self and peer assessment in line with our school's Holistic Assessment directions. The LS protocol provided the team with a very concise and detailed process and structure to guide our lesson observation. The LS discussions were able challenge our thinking and the post-observation reflections provided the team

with new insights on how to better make use of the iPads and Peer Assessment. In the presentation, the team would like to share the LS journey, including our findings and learning gleamed from the project.

Lesson Study to explore how problem solving strategies can enhance student engagement in learning of money concepts

*TENG, Desirene, CHONG
Ailing, TAN Clarence*

Keywords:
Lesson study; Problem
solving; Student engagement

This paper explores how the team has innovatively used Lesson Study to explore how Problem Solving Strategies can enhance student engagement in learning of money concepts. The team decided to make use of Problem solving strategies as it could provide a real-life and authentic learning experience for the students. They will be able to see Mathematics in action. This Maths LS project was conducted with a group of primary 5 students. Using the LS tools, the team planned the problem solving scenario which involved a group of students making decisions to purchase an item. As a group, the students were required to discuss the various choices available, make use of the money concepts they have learnt previously to make the best choice. The team observed how the students interacted with the problem and amongst themselves. At the end of the lesson, they had to present and give reasons to justify the choices that they have made. By listening to their reasoning of their choices, the teachers were able to gather feedback about student understanding of Money concepts, as well as other external factors that could influence student decision making. This added another interesting learning element for the team, that is knowing how and what students think about. Through this, the team hopes to develop students into self-directed learners who can work collaboratively with others. We also aim to hone the students in their critical thinking and problem solving skills. The LS protocol provided the team with a very concise and detailed process and structure to guide our lesson observation. The LS discussions were able to challenge our thinking and the post-observation reflections provided the team with new insights on how to better make use of the problem solving strategies. In the presentation, the team would like to share the LS journey, including our findings and learning gleamed from the project.

D01-SY LT 1 Transcript-based lesson analysis for reconstructing cultural script of teaching

Chairperson: *SHIBATA Yoshiaki*, Nagoya University, JAPAN
 Discussant: *CHEON Hoseong*, Jeonju National University of Education, KOREA

Keywords:
 Lesson Analysis, Transcript, Comparative Study, Science Lesson, Teaching Script, Cultural Teaching

The aim of this symposium is to reveal the teaching script of the lesson practice of a first grade lower secondary science lesson (Classification of Non-living Things) in Singapore, by comparing this to a science lesson (Material) in Japan. In particular, the discussion provides the mental model of teaching (views about teaching held as tacit knowledge) of science instructors, with a focus on ‘acquisition, application, inquiry’ and ‘importance of nurturing the ability to think, judge, share and express. This symposium provides a theoretical framework of lesson analysis as research on teaching and teacher learning rather than evaluation, a cross-cultural lesson analysis (high school science lesson), and viewpoint of what is different between Japanese lesson analysis approach and western style of video study.

Framework of Lesson Analysis as research on teaching

SHIBATA Yoshiaki, Nagoya University, JAPAN

Keywords:
 Lesson Analysis, Transcript, Comparative Study

Although this study gives a lesson in Singapore as an example for a comparative international lesson analysis, this does not represent a typical lesson in that country. The approach employed by this study, the comparative international lesson analysis, does not compare typical or representative examples of lessons. Lessons involve a complex and varied set of factors, and are influenced greatly by the teacher, teaching materials, students and the relationship between these. For this reason, it is not possible to extract or show a typical example that represents all lessons in a country. It might be possible in theory to determine the characteristics of a country’s lessons by balancing the results of a quantitative study, but as this would mask characteristic differences in lessons, the current study adopts a qualitative method of case study lesson analysis. In doing this, it plans to make apparent the structure of meaning hidden in lesson practice – the script – by analysing this practice in different countries through the eyes of education researchers and instructors from different cultural backgrounds. In other words, it takes an approach not of typifying or standardizing, but of comparison to illuminate issues through diverse exchanges. In order to determine whether the results of this case study are peculiar characteristics of the particular instructor or school in question, or can be described as common features of all lessons in the country, this study will also take all possible measures to consider the role of objective factors that define educational content and teaching methods, such as each country’s policy on education and national curriculum.

Changing teachers' mental model of teaching: Learning from a comparative analysis of Science lesson in Japan and Singapore

SARKAR ARANI Muhammad Reza, Teikyo University, JAPAN

Keywords:
 Comparative Lesson Analysis, Teachers' Mental Model, Science Lesson, Singapore, Japan

This presentation provides a cross-cultural lesson analysis of the ‘Lower Secondary Science’ in Singapore and Japan. Emphasis is placed here on the mental model of teaching (views about teaching held as tacit knowledge) of science curriculum and instructors, with a focus on ‘acquisition, application, inquiry’ and ‘importance of nurturing the ability to think, judge, share and express. According to a Singaporean policy of education, “Teach Less, Learn More”, the key point of lesson analysis is focus on students learning and enrichment eyes of teachers to observe students thinking process, and rebuilding school as a place for utilizing learning community. The acquisition of knowledge is something that students can do individually, while school is valued as a place for utilizing groups of those individuals, who hold a variety of ideas. In Japan, knowledge acquisition is often done at school, altogether as a group. In Singapore, the nurturing of ‘ability to think, judge and express’, on

which importance is place in Japan's new National Curriculum seems actually to be being carried out well. This means that the social aspects of science set out in Singapore's curriculum 'knowledge, understanding and application', 'skills and processes', 'ethics and attitudes' such as ownership and responsibility, are being applied appropriately during lesson practice.

How can we store the good practice in order to deliver it to other teachers?

*KUNO Hiroyuki, Aichi
University of Education.*

Keywords:
Transcript-Based Lesson
Analysis, Video Study,
Research Method, Teacher
Learning

Nowadays, we can store it in video record as data of lesson study and deliver it through ICT. But is it really meaningful way of storage and exchange of importance of that lesson? It is true that video recoding is an effective tool for delivering the research lesson, but it is not enough to deeply understand the values of lesson, because the main characteristic of video is "flowing" of lesson, which means that it makes us momentary image of lesson so far from detail facts. The presenter emphasizes the Transcript-Based Lesson Analysis to recognize and transmit the value of lesson instead of video-based analysis. And he identify benefits of TBLA are: 1) to be able to read the lesson transcript repeatedly and find out meaning of the lesson deeply; 2) to be able to choose and concentrate on some valuable sessions in the lesson; 3) to be able to store up the lesson long time; 4) to be able to share the lesson to someone who did not observe it; 5) to be able to look over whole lesson in one view.

D02-SY

LT 2

Lesson Study in teacher preparation: Lessons learned from a case of large-scale implementation

*Chairperson: BIEDA Kristen,
Michigan State University,
USA*

*Discussant: Catherine Lewis,
Mills College,
UNITED STATES*

Keywords:
mathematics education;
teacher education; lesson
study; elementary education;
secondary education

One way prospective teachers learn to teach is by engaging with and reflecting upon teaching through approximations of practice (Grossman et al., 2009). Lesson study can be a particularly rich approximation of practice that allows teachers to engage with the processes of teaching in a collaborative way to develop deeper understandings about content and student thinking. Most published scholarship discusses practicing teachers' learning from lesson study, and the small amount of published work on prospective teachers has been broadly descriptive and not analytic in nature. The purposes of this symposium are to share features and discuss lessons learned from an ongoing initiative at Michigan State University (MSU) to utilize lesson study in elementary and secondary education pre-service coursework. Two presentations in this symposium will focus on prospective elementary teachers' (PETs) learning through lesson study assignments required in their mathematics pedagogy courses. One presentation will discuss an empirical study of prospective elementary teachers' participation and learning in a multi-week, one-cycle lesson study activity focused on developing students' understanding of spatial measurement. Analyses of the post-lesson discussions, particularly how groups discussed enacted lessons in relationship to planned goals, will be shared. The second presentation will discuss the experiences of the mathematics pedagogy instructor group at MSU in implementing lesson study with PETs, focusing on the use of pedagogically rich tasks and international assessment data in coursework to facilitate the cycles. The third presentation will discuss a investigation of mentor-guided lesson study in a secondary mathematics pedagogy course, in particular the aspects of pedagogical content knowledge that emerge in prospective teachers' reflections during different phases of the lesson study cycle. These three presentations are synergistic in that they will not only describe features of a large-scale lesson study implementation within a teacher preparation program, but that they will also provide tools and insights for examining prospective teachers' learning through lesson study from both an empirical and practice-based perspective. At the symposium, 20 minutes will be allocated for each paper presentation. After the presentations, Elizabeth Baker, Assistant

Professor at Mills College, will provide a 15-minute commentary followed by 15 minutes for audience questions. References Grossman, P., Compton, C., Igra, D., Ronfeldt, M., Shahan, E. & Williamson, P. (2009). Teaching practice: A Cross-professional perspective. *Teachers' College Record*, 111(9), 2055-2100.

Examining the nature of post-lesson discussions in Lesson Study with U.S. prospective elementary teachers

MALES Lorraine,
Michigan State University,
USA

Keywords:
mathematics education;
prospective elementary
teachers; teacher education;
post-lesson discussions

This paper reports an analysis of U.S. prospective elementary teachers' (PETs) participation in lesson study. Research has shown that lesson study supports learning about mathematics teaching, however most published scholarship has concerned lesson study among practicing teachers. Because pilot work indicated that the post-lesson debrief could be short and unfocused, we focused on the relations between the designed lesson, its enactment, and PETs post-lesson debrief. This study was carried out within the context of a 15-week mathematics methods course for PETs at Michigan State University. We collected field notes in nine out of 12 sections, beginning with whole-class discussion in the methods course and continuing to follow one group from initial lesson design through submission of assignments. This included attending the lessons and debriefs in local elementary classrooms. Discussion in post-lesson debriefs centered on praising the lesson and/or teacher, potential lesson revisions, and student work. These student work discussions were focused on students' thinking (e.g., student solutions, different methods, misconceptions) or behavior (e.g., general behavior, group dynamics, assumption of roles). In discussing potential lesson revisions groups attended to both mathematical (e.g., citing specific questions, demonstrations, or explanations they would include to bring attention to ideas) and pedagogical issues (e.g., clarity of directions, allowing more autonomy), however, it was unclear how these discussions related directly to groups' teaching/research goals. For example, one group's goal was for students to discover the relationship between a linear unit and its corresponding square unit, but the group discussed that in their revision they would show students that area can be changed by making shapes "skinnier and longer." It is not clear that this discussion directly related to their goal. This could be due to the ambitious nature of the planned goals or a lack of clarity about the purpose of the debrief. Due to the constraints of planning and teaching lessons during field experiences and PETs inexperience, it is unclear how the benefits of lesson study may be realized in prospective teacher education. We hope these results provide teacher educators with areas in which to focus on to improve lesson study's usefulness for prospective teachers.

Practice-based insights on Lesson Study in elementary Mathematics teacher preparation

GILBERTSON Nicholas,
Michigan State University,
USA

Keywords:
elementary education;
mathematics education;
lesson study; teacher
preparation

This presentation will discuss lessons learned, from the perspective of a teacher educator, on the implementation of lesson study across elementary mathematics pedagogy courses focusing on the teaching of measurement and fractions. The instructor group of elementary mathematics methods at MSU chose to incorporate lesson study in elementary teacher preparation because of the potential benefits to using a rigorous professional development system, like lesson study, in the process of working with prospective teachers. The group noted that lesson study amplifies development of practicing teachers, in structured ways, allowing for influences in how teachers think about teaching and how they act within the classrooms. Not only does lesson study provide space for professional development, it supports prospective teachers in understanding the role of teacher as a researcher (Frank, 1999; Hopkins, 2008). Because lesson study also provides opportunities for the development of content-focused knowledge as the lesson is being developed, the

elementary mathematics pedagogy instructor group chose to restrict the options for the lesson study topics to content areas that are often difficult for prospective elementary teachers in the US, particularly measurement and fractional representations. Much has been written concerning the misunderstandings of measurement (see e.g., Hiebert, 1981; Lindquist, 1989) and fractional representations (see e.g., Empson and Levi, 2011; Wearne and Kouba, 2000). Combining these ideas helped us to create a course project that was geared to challenge prospective teachers' thinking about content, pedagogy, and student learning through the collaborative work of lesson study. This presentation will draw from the experiences of the mathematics methods team in implementing lesson study within including the use of pedagogically rich tasks and U.S. and international assessment data in coursework. Specifically, Mr. Gilbertson will describe the aspects of the program, ranging from success to challenges, in an attempt to discuss what lessons we have learned in the process of implementing lesson study in a senior level methods course. REFERENCES Frank, C. (1999). *Ethnographic eyes: A teacher's guide to classroom observations*. Portsmouth, NH: Heinemann. Hiebert, J. (1981). Cognitive development and learning linear measurement. *Journal for Research in Mathematics Education*, 12, 197-211. Hopkins, D. (2008). *A teacher's guide to action research* (4th ed.). Berkshire, England: Open University Press. Empson, S. B., & Levi, L. (2011). *Extending children's mathematics: Fractions and decimals: Innovations in cognitively guided instruction*. Portsmouth, NH: Heinemann. Lindquist, M. (1989). The measurement standards. *Arithmetic Teacher*, 37, 22-26. Wearne, D., & Kouba, V. L. (2000). Rational numbers. In Silver, E. & Kenney, P. (Eds.) *Results from the seventh mathematics assessment of the NAEP*. Reston, VA: National Council of Teachers of Mathematics.

Developing content knowledge for teaching secondary Mathematics through Lesson Study

BIEDA Kristen, Michigan State University, USA

Keywords:
secondary education; teacher preparation; lesson study; mathematics education

For over a decade, education researchers have advocated for the use of lesson study as a medium to improve teaching and learning in the United States (Fernandez & Chokshi, 2002; Fernandez & Yoshida, 2004; Lewis, 2005; Richardson, 2004; Stepanek, 2001; Stigler & Hiebert, 1999; Yoshida, 2005). This study extends existing research to examine the benefits and challenges that lesson study offers for mentor and novice teachers' collaboration and learning. Specifically, this question guiding this work is: To what extent do novice teachers in early field experiences develop mathematical knowledge for teaching during phases of mentor-guided lesson study? To address this question, I collected data from the implementation of a mentor-guided lesson study activity in a pre-internship mathematics pedagogy course, of which I was the instructor. Mentor-guided lesson study is a form of lesson study where a team of two intern teachers and a mentor teacher collaborates during all phases of a lesson study cycle. Written reflections, which consisted of responses to assigned questions like "Why did your team decide to make these revisions?" were collected from each novice teacher (n=17) within the 8 lesson study teams for each stage in the lesson study process. The students' responses to reflective logs were analyzed using a framework elaborated from Hill, Ball and Schilling (2008). Responses were coded as evidence of pedagogical content knowledge (PCK) – such as knowledge of students and curriculum. Findings show the most predominant category coded in students' responses to the writing prompts during the cycles was discussing teaching moves related to student thinking. Overall, this code, along with observations of student misconceptions and observations of student understanding, were the most prevalent aspects of PCK evident in the written responses. There was a wide variance in the prevalence of these codes

depending upon lesson study team, suggesting that one factor influencing the extent to which novices engage with issues related to mathematical knowledge for teaching during lesson study depends upon the patterns of discourse between members of the team. Findings related to this hypothesis will be shared at the symposium, as analysis of audio recorded meetings is currently in process. References Fernandez, C., & Chokshi, S. (2002). A practical guide to translating lesson study for a U.S. setting. *Phi Delta Kappan*, 128-134. Fernandez, C., & Yoshida, M. (2004). *Lesson study: A Japanese approach to improving mathematics teaching and learning*. Mahwah, NJ: Lawrence Erlbaum Associates. Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking pedagogical content knowledge: Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education*, 39(4), 372-400. Lewis, C. (2005). How do teachers learn during lesson study? In P. Wang-Iverson & M. Yoshida (Eds.), *Building our understanding of lesson study* (pp. 77-84). Philadelphia, PA: Research for Better Schools. Richardson, J. (2004). Lesson study: Teachers learn how to improve instruction. *Tools for Schools*, National Staff Development Council, 1-8. Stepanek, J. (2001). A new view of professional development. *Northwest Teacher*, Northwest Regional Education Laboratory, Spring 2001, 2-5, 16. Stigler, J. W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*.

D01-PP **LT3** **Transformative Lesson Study workshop by Academy of Singapore Teachers: The 5Cs approach for effective professional development**

YAU Li Heong (Room Chairperson), CHEW Charles, Academy of Singapore Teachers, SINGAPORE

Keywords:
Transformative, Professional Development, Lesson Study, Teachers' Capacity

This paper reports the findings of a transformative Lesson Study (LS) workshop conducted from January to March 2012 in the professional development (PD) of 86 secondary and junior college science teachers in Singapore. Conceptualized and developed by the Master Teachers at the Academy of Singapore Teachers (AST), this transformative LS workshop is designed for sustained professional learning to support Professional Learning Community (PLC) schools in their journey of building teachers' capacity for improved student learning outcomes. Based on Posner's four conditions for conceptual change (namely, dissatisfaction, intelligibility, plausibility and fruitfulness), the 5Cs approach is employed in the conduct of a series of four interactive sessions in the LS workshop over a period of eight weeks. At the final session, participants will realize that while Posner's four conditions are necessary for conceptual change, these are not sufficient to effect change in practice. Hence the fifth condition of "changed practice" is incorporated using reflection as part of the evaluation to foster reflective practice. The areas of progress in the PD of teachers described are organisational learning in terms of PLC, student learning and teacher learning. The analysis of the evaluation at the end of the LS workshop showed the usefulness in understanding and applying the LS knowledge and skills for transforming classroom practice for effective instruction.

D02-PP **LT3** **Theorizing lesson-based research as a bridge to curriculum and pedagogical inquiry**

FANG Yanping, National Institute of Education, SINGAPORE

Keywords:
Lesson-based research on

Lesson-based teaching research, a long tradition in China and Japan (albeit their different cultural, historical and political backgrounds), has contributed to rich discourse and knowledge base for teaching. Having been introduced to the English speaking world, particularly in the form of lesson studies in Japan, the introduction has mainly taken the form of what and how to do it. Little has

teaching, curriculum and pedagogical inquiry, activity theory

been done to theorize such teacher-directed school-based practices in the context of curriculum and pedagogical inquiry. Drawing on my research on public lessons in China, lesson studies in Japan, and their adaptations in Singapore and elsewhere, this paper represents an effort to build theory and knowledge of lesson-based teaching research from the perspectives of situated learning and cultural-historic activity theory. The research questions include: in what ways lesson-based teaching research serves a bridge between curriculum and teaching inquiry, between study of teaching and teacher continued learning and cultural building at the workplace, and between national curriculum reform and school adaptations.

D03-PP

LT3 Leading Lesson Study: Infusing ICT, SDL & COL in Mathematics curriculum

SHEN Sirui, KAUR Rekhvinder, LIN Huiyuan, Sengkang Secondary School, SINGAPORE

Keywords:

Leading, Lesson Study, Mathematics, ICT, SDL, CoL

In Dec 2010, a team of teachers collaboratively designed a lesson study guide and conducted a workshop for all teachers in the school with a view towards developing the Ministry of Education's (MOE) Curriculum 2015 competencies in students. To develop our teachers professionally, we have adopted a whole-school approach in Lesson Study for the past year. This presentation will discuss (1) the development of a user-friendly and concise lesson study guide for teachers, (2) sustaining lesson study and (3) the 'teachers leading teachers' process undertaken by the team in leading the whole school. The initiative kick-started with the Mathematics Department taking the lead to design 3 lesson packages targeted at meeting the MOE's Desired Outcomes of Education, rationale and aims of Mathematics Education. Elements such as ICT (Information & Communication Technology), SDL (Self-Directed Learning) and CoL (Collaborative Learning) were also evident in the lessons. The department invited all teaching staff to participate in the open lessons on Number Patterns, Simultaneous Equations and Sketching of Quadratic Graphs. There was a good mix of tools adopted in the lessons e.g. online flash games, manipulatives, puzzles, excel spreadsheet, online E-Learning platform, forum and Graphmatica. The teacher participants played the role of observers and provided constructive feedback to the department during the post-lesson discussions. With the insights gained from multiple perspectives, the Mathematics teachers reflected on, reviewed and refined the lessons. From the feedback gathered through surveys and interviews, students conveyed that the lessons were engaging, provided them with a platform for communicating ideas with peers and increased their interest in the subject.

D04-PP

LT11 Learning Study: A collaborative way to develop and conceptualize TESOL Teachers' PCK

KO Po Yuk (Room Chairperson), LAM Tak Shing John, LAI Meng Choo, Hong Kong Institute of Education, HONG KONG

Keywords:

Learning Study; Hong Kong; PCK; TESOL; English writing; case study

PCK has been defined as one category of the amalgamation of pedagogical constructs that constitute the knowledge base that is essential for teachers' quality teaching. Nevertheless a brief review of the history of pedagogical content knowledge reveals various definitions and conceptualizations of the construct (Hashweh, 2005). Besides the need to investigate what constitutes PCK, also not enough is known about how this knowledge develops (Rovegno, 1992; Shulman, 1987). Different subject disciplines require slightly different set of PCK. On the other hand, Learning Studies and Lesson Studies have been widely documented in research to be a tool for teachers' professional development in which teachers can develop a new identity, a new set of knowledge and skills (Lewis, Perry, and Hurd, 2009). In this study, it aims to find out (1) whether Learning Study can develop the PCK of teachers teaching English as a second language (TESOL), and (2) how the emergent PCK constructs from the data are interpreted and conceptualized by researchers

and participant teachers in a collaborative manner. Data are collected from a Learning Study project with four TESOL teachers in a primary school in Hong Kong on the theme of improving students' story writing. Findings reveal that the participant teachers' PCK is developed or enhanced through Learning Study and some reconceptualization of Shulman's PCK framework is collectively made.

D05-PP **LT11** **Switching off the filters: What a study of sixty learning points reveals about how Lesson Study enables teachers both to access and to develop their practice knowledge**

DUDLEY Pete,
Leicester University,
UNITED KINGDOM

Keywords:
lesson study, teacher
learning, teacher knowledge,
social capital, talk, learning
points

The 'swiftly flowing river' (Lewis, 1998) is an abiding image conveying the speed and complexity of the classroom as a working environment. Studies of teacher learning have shown how, in order to cope with this complexity, teachers develop the ability to filter-out classroom information that is superfluous to the moment so that they can concentrate on matters in hand. As a result, early on in their careers teachers increasingly come to rely on their tacit knowledge system both for storing and when next required, for retrieving practice knowledge unconsciously. This means that most teacher practice knowledge is as invisible and indescribable to teachers as is our knowledge of how to ride a bicycle: we never forget how to do it once we have learned - but we could not adequately describe how to ride a bicycle to someone else such that he or she could get on and ride. The tradition in the west of 'lone practice' exacerbates this as teachers' practice is seldom witnessed by peers. This presents a problem for teachers when it comes to pinpointing how they might improve aspects of their practice in order to improve their pupils learning. In a discourse analysis of interactions and knowledge sources in teacher talk in lesson studies in two schools, this study reveals how lesson study contexts permit teachers to develop social capital tools and resources and exploratory talk and 'rehearsal' that enable teachers to see their pupils' learning with fresh eyes. They discover they can switch off the filters imposed in their early career and deal with increased levels of classroom information and knowledge in their subsequent teaching without being overwhelmed. The study concludes that LS creates a zone of proximal teacher development that uniquely provides teachers with access to imagined and observed tacit knowledge in a strongly scaffolded context that both facilitates and promotes the development of practice knowledge.

D06-PP **LT11** **Developing teachers' pedagogical content knowledge of applying Drama as pedagogy in teaching Second Language writing through Lesson Study approach**

*CHOU Shiao-Yuh, LIM Chin
Nam, LIU Zeng Jiao,* Nanyang
Technological University,
*TAM Siew Kee, NEO Han Wei
Candy, SEE Bee Keow,*
Regent Secondary School,
SINGAPORE

Keywords:
pedagogical content
Knowledge; drama pedagogy;
lesson study

This paper aims to investigate one participant teacher's learning of pedagogical content knowledge (Shulman, 1986) and the challenges of teaching second language writing faced by a teacher who was new to applying drama as pedagogy. Freire's (1970) praxis theory specifies that teachers' knowledge building be grounded on reflections on actions, thus leading to transformations. Lesson study hence in our research project was employed as a professional development platform where teachers carried out, reflected and theorised their practice collectively through co-planning, classroom observation and post-lesson conferences. A group of three Chinese language teachers carried out three cycles of lesson study with the knowledgeable others' support from February to July this year. Data were collected using classroom observations, interviews, minute-taking, reflective notes, student survey, and collection of student compositions. It is discovered that the generation of the participant teacher's pedagogical content knowledge is based on her reflection on experience working with and in dialogue with members of the lesson study group. Accordingly with the knowledge newly developed, the case teacher's

praxis became more learner-centred, more reflective and more interactive after three cycles of lesson study.

D07-PP **LT12** **Changed practice: Transformative approach to Lesson Study workshop in the Humanities subjects**

*LEE Hwa Phaik (Room
Chairperson),
Academy of Singapore
Teachers,
SINGAPORE*

Keywords:
Lesson Study, Transformative
Professional Development,
Capacity Building

Teachers' misconceptions about Lesson Study discourage the use of Lesson Study as a tool for collaborative inquiry into teaching and student learning in the Humanities subjects of History, Geography and Social Studies. The newly developed approach for transformative workshops developed by Master Teachers at the Academy of Singapore Teachers aims at the heart of change, i.e. teacher beliefs. It is known as the 5Cs approach and it is based on Posner's conditions for teacher conceptual change namely, dissatisfaction, intelligibility, plausibility and fruitfulness. The fifth 'C' incorporated is "changed practice" using reflection as part of the evaluation at the end of the workshops. This approach was used in the Lesson Study workshops in the Humanities subjects over a period of 5 weeks. The analysis of the evaluation is indicative of the extent to which the 5 Cs approach is able to bring about better understanding of the research stance, collaborative inquiry and improved self efficacy among workshop participants. It is directly related to organizational learning in terms of PLCs, student learning and teacher learning.

D08-PP **LT12** **Exploring teachers' learning from three Learning Studies in Mathematics**

*KULLBERG Angelika,
MÄRTENSSON Pernilla,
RUNESSON Ulla,
University of Gothenburg,
Jonkoping University,
SWEDEN*

Keywords:
teachers' learning;
mathematics; learning study;
variation theory

Research on learning studies has in many cases shown great progress in student learning between the different lessons in the learning study cycle. Furthermore, it has been indicated that students' knowledge on long terms have increased, e.g. on national standardized tests in mathematics. This effect can most likely be explained by the fact that teachers' common practice improves due to their participation in learning studies. However, this has not been researched in detail. In this paper teachers' learning from three learning studies is explored. The aim is to scrutinize changes in teacher practice in ordinary lessons that can be related to the knowledge gained by the teachers from learning studies. The study is a part a larger study in Sweden (LGK-Teachers collaborative knowledge production) investigating what teachers learn from participating in learning studies conducted in mathematics and natural science. This particular paper reports on findings concerning three teachers' learning after three learning studies in mathematics in the 7th and 8th grades. Two lessons with each teacher have been video recorded, one before and one after the three learning studies. The lessons have been analyzed with regard to changes in teaching practice using a variation theory framework. Interviews and stimulated recall interviews were also used to capture changes in how the teachers reflected up on their own practice. The changes in their teaching practice and its implications for student learning are discussed.

D09-PP **LT12** **Impact of Lesson Study in daily practices: exploring learning pattern on driving students thinking**

*SEJATI Binar Kasih,
KULSUM Euis Umi,
HIDAYAT Arif,
University Of Education,
INDONESIA*

Keywords:
Lesson Study, Learning
Pattern

Lesson Study is very useful for teachers to be able to analyze their performance when the lesson takes place, improve the deficiencies and apply refinements to the next open lesson. It goes on and on to improve the quality of student learning. At the time of teacher reflection, things which are most often discussed are method, strategy, media, and other pedagogical aspects while deeper aspects of learning pattern are rarely revealed. Preliminary studies of one year of open lessons in 4 cities in Indonesia showed that common patterns of lessons conducted in the classroom involve content explanation, students working with worksheet, internal group discussion,

classroom discussion, and practice with exam problems. Most learning opportunities lack in providing space for students to develop or construct their own thinking or to have cognitive conflict. The paper investigates how learning pattern in daily practices are changed due to using lesson study as continuing professional development. This research is conducted on two secondary school teachers with over 20 years of teaching experience and 7 years of lesson study experience. More than 50 daily practice videos of full one-academic year were recorded, transcribed and analyzed. The research is focused on analyzing shifts in learning pattern. The main result showed that some learning patterns remain, but students' thinking in each week and over months of learning pattern changed. Detailed parts of learning pattern shifts are also discussed.

D10-PP TR503 A Lesson Study on the use of Edulab Applet and worksheets to improve students' understanding of the concepts of collisions

*LEONG Robert (Room
Chairperson),
River Valley High School,
SINGAPORE*

Keywords:
Lesson Study; Edulab; applet;
worksheet; collision;
momentum

The primary objectives of the study are to develop the senior high physics teachers on their competencies in using lesson study methodologies for practical lessons, as well as improve students' understanding on the conservation of linear momentum through the use of nTIPERs (Newtonian Tasks Inspired by Physics Education Research) inquired-based worksheets by Curtis J. Hieggelke. The worksheets contain several open-ended collision scenarios which allow groups of students to carry out a discuss-predict-observe-reflect (DPOR) learning process. By going through this process, students benefit by externalising their prior knowledge on the physics concepts through constructive discussions among peers. After predicting the outcomes of the scenarios and verifying with a customised Java applet designed for the worksheets, students internalise their understanding on concepts related to linear momentum, and are more confident to solve momentum related questions. The customised Java applet was developed in a collaborative project with ETD to gather feedback on the useful characteristics of the applet. Through this lesson study, teachers are able to apply the do's and don'ts on being an effective researcher and observer, and reflect on their teaching pedagogies on the topic of linear momentum. In this study, all year 5 senior high physics teachers came together and 1. planned and designed a research lesson 2. observed the research lesson 3. improved the research lesson 4. reflected on learning points This sharing will entail the process of implementation and reflections on the learning points.

D11-PP TR503 ICT-enhanced TFU research lessons to construct concepts in Newton's Laws

*LEE-TEO Lak Tin, LING Wee
Lee, YEO Poh Huey,
River Valley High School,
SINGAPORE*

Keywords:
SDL; CoL; CTS; guided
inquiry; TFU; ICT, student
engagement; learning styles

The Research Lesson entitled "ICT -Enhanced TfU Research Lessons to construct concepts in Newton's Laws" was conducted with the objective of using ICT-infused lessons to promote self-directed learning (SDL), collaborative learning (CoL), and critical thinking skill (CTS). A Google site was created to include Introductory Performance of Understanding, Guided Performance of Understanding in the form of online PHET simulations accompanied by 3 Google form worksheets to help students, working in twos, form concepts in Newton's Three Laws. Students then showcased their understanding of Newton's 3 Laws in a Culminating Performance of Understanding using an electronic poster in EduGlogster.

Four teachers on the Research Team observed students during the lessons, students' and teachers' feedback were gathered using Google forms, and a Google form quiz was also completed by students. Data collected from teachers' observations show students' engagement to be high. Students also

graded themselves high on ability to do self-directed learning and to work collaboratively in their groups to arrive at the concepts at the end of the lesson. This ICT-enhanced lesson surfaced students' concepts and misconceptions in dynamics. Using simulations where all forces acting on the object becomes visible, students who are visual learners learnt using their preferred learning mode. Videos and images further help students concretize something as abstract as forces as well as relate to real life scenarios and experiences around them. The kinesthetic learners were engaged in learning by exploration. The self-directed and self-motivated learner gains some control over his learning through the guided-inquiry.

D12-PP TR503 Teacher development through Lesson Study on enhancing students' level of engagement and conceptual understanding on science

*CHUA Khoon Siong Ray,
LAM Kam Cheung Alister
Emmanuel, AW Weifen, Hll
Xiren Cassandra,
SETHURAM Sujena d/o,
WONG Kah Wan Joy, NG Yi
Ting Karen,
Admiralty Secondary School,
SINGAPORE*

Keywords:
Teacher professional
development; students'
engagement; Science

Lesson Study was first introduced in Admiralty Secondary School in 2011, the Science department initiated a Lesson Study Team (LST) to focus on Lower Secondary Science. This is an extension from the Action Research (AR) on "Study of Science Misconceptions in Secondary 2 Express students" in 2010. The team decided to investigate how secondary one classes could be effectively engaged in their Science lessons through lesson resources that are developed by the team. The two classes were taught by different teachers, a new teacher and an experienced teacher. The lessons were carried out with the aid of Information and Communication Technology (ICT) and through collaborative learning on a Chemistry unit on "Simple concepts of atoms and molecules". Two lesson study cycles were carried out, with each cycle lasting about 6 to 7 weeks. The LST was involved in lesson planning, refining and reflecting on the lessons conducted. Invaluable lessons were learnt during the course of the lesson study in terms of how one can best deliver for understanding and engaging the students. This paper hopes the learning experiences shared will provide Science teachers and educators with valuable insights in the teaching of these topics and in implementing Lesson Study (LS) in their schools. Most importantly, it looks at how teachers have grown in their own pedagogical knowledge and understanding of their students' learning, to become effective classroom teachers.

D13-PP TR504 The fusion of theory and practice in M level professional development

*WOOD Keith (Room
Chairperson),
University BRUNEI
DARUSSALAM*

Keywords:
learning study; professional
development; geography

In this example of Learning Study, four teachers, each with nine years of experience of teaching high school geography, and their tutor undertook the study as part of a module of a Masters in Education (MEd) degree. Two classes of year nine students (females, 13 - 14 year olds) were chosen for the study. Class 9A (20 students) was described by the teachers as a higher ability class in comparison with class 9J (15 students). The teachers agreed to focus on the object of learning to interpret contour maps as representations of land relief. The group selected the topic because they had found from experience that their geography students had difficulty in visualizing from two-dimensional maps the three-dimensional features represented by the contours. The lesson was designed to provide a pattern of variation to foreground contour numbers as a critical aspect of the interpretation of maps. It aimed to help the learners see how changing land relief may or may not be related to a change in the contour numbers, how an increase or decrease in contour numbers will indicate a change in the relief of the land, and that reversing the contour numbers would change the feature of the land for highland to depression. The teachers were impressed by the results of the post-test which showed an increase in the mean mark of 85% for class 9A and 130% for class 9J. This paper describes how they achieved this result and

how Learning Study transformed their view of professional development.

D14-PP TR504 Lesson Study in teaching and learning Geography at Cedar Girls' Secondary School

*NG Bee Sun, TAN Yah Hui,
KOH Vivien,
Cedar Girls Secondary
School,
SINGAPORE*

Keywords:
Lesson Study; Teaching and
Learning; Geography;
Secondary School

Since 2007, Geography teachers at Cedar Girls' Secondary School, Singapore have worked collaboratively in a professional learning circle, using Lesson Study as a tool to develop individual and collective teacher skills to improve student learning outcomes. A range of student learning needs were identified and researched e.g. improving essay-writing skills, reading topographical maps and promoting higher-order thinking on Geographical issues. Various pedagogies including peer-coaching and Six Thinking Hats, among others, have been applied and tested to address students' learning difficulties observed during research lessons. This presentation will highlight some insights gained from the various cycles of Lesson Study conducted thus far, with an emphasis on findings from the 'Inquiry Approach in Teaching and Learning Geography' cycle conducted this year.

D15-PP TR504 A study of pupils' engagement in learning journeys (overseas)

*SEM Kai Peng,
Presbyterian High School,
SINGAPORE*

Keywords:
engagement; VARK;
PETALS; learning styles;
learning journey

This study seeks to discover the effects of a field trip learning experience on pupil engagement levels in the study of humanities subjects. With the adoption of the PETALS Framework as Presbyterian High School's school-wide pedagogical framework in 2010, it became imperative to ascertain how existing curricular programmes, especially school-based ones, align to the PETALS framework. Furthermore, as overseas learning journeys become an essential feature in a pupil's experience of a well-rounded education, the necessity of evaluating the effectiveness of such initiatives warrants attention as well. This is especially so in view of the paucity of research on learning journeys (particularly in the local context) as well as the substantial planning and funding invested in such programmes. It is in this context that this action research was conceived. Using the PETALS Questionnaire, this study hopes to uncover the engagement levels of pupils in three aspects: affective, behavioural and cognitive while undergoing a learning journey to Ho Chi Minh City, Vietnam. It also assesses the learning framework of the learning journey in five different dimensions, namely the Pedagogy, Experience of Learning, Tone of Environment, Assessment and Learning Content. To augment the findings, the learning styles of pupils engaged in the study were also elicited using Fleming's VARK model, which categorises learning styles into the broad modalities of Visual, Auditory, Reading-Writing and Kinaesthetic approaches. The detailed analyses of the results (which include the collection of quantitative and qualitative data) would help to shed light on student engagement levels during learning journeys and also provide insights on how the learning journey can be further improved to enhance the overall learning experience of the pupils.

D16-PP TR505 Microteaching, observation and reflection in an English Teaching Methods Course: A case of Lesson Study in Japan

*SASAJIMA Shigeru (Room
Chairperson),
Saitama Medical University,
JAPAN*

Keywords:
classroom observation, lesson
study, teacher cognition

This paper explores how to provide a better English teaching methods course in pre-service teacher education in Japan. In most countries, the pre-service teacher education curriculum includes teaching methodology and teaching practicum. In Japan, English is one of the most important subjects in secondary education and there are many schoolteachers who teach English as a school subject. English teaching methodology is important in pre-service teacher education to become a qualified English teacher. In teaching English,

Communicative Language Teaching (CLT) (Richards, 2006) or English-medium Instruction (EMI) (Coyle, 2008) is encouraged but the grammar-translation method (GTM) is still actually very popular in Japan. Many pre-service teachers have not experienced CLT or EMI classrooms in their school days and rather wish to become a schoolteacher to educate students, so they are not strongly motivated to be professional subject teachers. Pre-service teachers in Japan normally have three weeks of teaching practicum at school. They study teaching methodology and need to have sufficient teaching knowledge and skills, but they are not sufficient. In order to provide a better course for English teaching methodology, collaborative classroom observation has been conducted by applying some aspects of the Japanese traditional collaborative lesson study protocol. Three phases are set in collaborative classroom observation: 1) microteaching, 2) observation, and 3) reflection. Each pre-service teacher does microteaching and observes other pre-service teachers' teaching. After each microteaching, all pre-service teachers discuss what happens in the classroom. They also watch a video of their own microteaching, read the observers' feedback later, and then reflect on their own teaching. These three phases are interrelated for each pre-service teacher's future teacher development. The ongoing results thus far show some positive evidence for autonomous teacher development. Many pre-service teachers have developed their teacher cognition – what teachers think, know and believe (Borg, 2003), and started to reflect on and in teaching. Based on the findings that were identified through the collaborative lesson study protocol, the paper discusses how pre-service teachers can develop their abilities of reflection-in-action and reflection-on-action (Schön, 1983), and suggests some implications for the advantages and disadvantages of lesson study in pre-service teacher education.

D17-PP TR505 Use of Lesson Study simulation to develop pedagogical competencies of students in microteaching

WAHAB Jufri, KHAIRUDDIN Khairuddin, HANDAYANI Baiq Sri,
Mataram University,
INDONESIA

Keywords:
simulation, microteaching,
teaching, skills

Lesson study has been proved to be effective in improving teacher professionalism. Lesson study can be applied either in real class room settings or in simulation class in order to train students in teacher training faculties. As an effort to help develop pedagogical competencies of students, we have undertaken a classroom action research by applying lesson study simulation for bachelor students who have enrolled for Microteaching course in the Educational Biology Study Program of Mataram University. The objectives of this research are to analyze: 1) the development of students' abilities in designing lesson plan including instructional objectives, student worksheet, learning material, instruments, and teaching media, 2) the students' ability to exercise basic teaching skills, and 3) the students' ability in reflecting teaching and learning processes. In order to achieve these objectives we involved two groups of students in lesson study simulation which included plan, do and see phases. The research started in March 2012 and will be finished at the end of September 2012.

D18-PP TR505 Implementation of Lesson Study for student teachers' practice as teachers in school

HAKIKI Rini,
University of Malang,
INDONESIA

Keywords:
Lesson Study; Student
Teachers

During its practice, Student Teacher Practice conducted in schools is supervised by a teacher and lecturer. In the process, student teachers must go through two stages of learning practice. The first stage is conducted in campus and the second at school. The first stage of teacher training implementation at school consists of student teachers' observation in the classroom which aims to observe how teachers teach. The second stage requires the student

teachers to practice their teaching in front of the class. In this stage, they implement the peer teaching, during the process of teaching practice, the school teacher and the lecture observe the on-going practice and then they are observed while doing the learning practice at school. At completion of the teaching practice, the school teachers or lecturers comment on the student teacher's performance. This stage where the school teacher and lecture supervise and comment on their performance sometimes scares and frustrates the student teachers. However, this kind of fear and frustration can be minimized through the use of lesson study. In this seminar, the author will share the experiences of supervising student teachers in the School.

D19-PP TR506

*ALWADI Hasan (Room
Chairperson), SARAVANAN
Vanithamani,
University of BAHRAIN*

Keywords:
teacher professional
development

Learning Communities: Teacher Professional Development

Bahrain Teachers College' has been given the mandate to develop professionalism in government schools. www.btc.uob.edu.bh/index/html . www.bahrainedb.bh (Bahrain Education Reform,2006). This work-in-progress (UoB/BTC Research Project Hassan & Saravanan, 2012/49) reports on PGDE teachers engaged in professional development, and on their pedagogical and content knowledge (PCK), (Darling Hammond, Hammerness, Grossman, Rust and Schulman,2005). The changing socio cultural situations in the site require teachers to build upon not only their school based knowledge but on their existing community based knowledge (Lave & Wenger, 1991).The proposed changes in the curriculum is to shift teachers from 'norms of conservatism' (Lieberman, 2009), 'cultural conservatism' (Hiebert et al 2002), the shift from finishing the textbook, the curriculum to collaborative problem solving tasks. This paper reports the processes of teachers' thinking, epistemological knowledge and teacher beliefs through analyses of their digitized logs, journals, and e-portfolios. Reflective practice prompted further review, action and reflection on selecting PCK, on rethinking and reviewing approaches and choices. Decisions made that addressed how gaps in pedagogical content knowledge need to be bridged are discussed (Stigler &Hiebert, (2004). The following research questions will be analysed:• To what extent do teachers focus on student learner experiences and their understanding of learning? • To what extent do teachers use reflective practice to review their beliefs, review their strategies and review their decision making in the classroom? • To what extent do teachers bridge the gaps in pedagogical content knowledge as a result of reflective practice? • To what extent is there a potential for developing teacher learning communities within the scoio-cultural context of Bahraini communities? The potential for developing Lesson Study research frameworks for building teacher learning communities will be discussed (Lieberman, 2009), Watanabe, (2002), C Lewis, (2006) Myers, (2012), Fernandez et al, (2003), Stigler& Hiebert,(2004). University of Bahrain/Bahrain Teachers College Research Project Hassan & Saravanan, 2012/49).

D20-PP TR506

*BANNO Kumi, SAKAMOTO
Atsushi,
Meirin School,
Seijoh University,
JAPAN*

Keywords:
Lesson study in elementary
school; Arithmetic; Teacher
questioning (Hatsumon); Fact-
based discussion

Lesson Study as a core part of in-school professional development: an analysis of the language used by students and teachers

We examined the impact of lesson-study reform on the relationship between teachers' words and the diversity of ideas expressed by students during arithmetic lessons in an elementary school. All teachers at this school participate in an annual lesson study as part of their in-school professional development. They examine lesson design in the grade sectional meeting, observe an actual lesson, and participate in a post-lesson conference to discuss the lesson and other topics presented during the conference. However, because teachers' opinions in this context are based on subjective impressions rather than on facts derived from empirical observations made during the observed lesson, no concrete plan for lesson improvement emerges. Therefore, since April 2012, we have maintained records of lessons

and have conducted analyses of these data to enable conference participants to engage in fact-based discussions on the basis of advice from a university lecturer about the analytic method. Additionally, we decided to include teachers from different grades (Junior high school) and supervisors who instruct teachers about lessons in specific subjects in the lesson-analysis meeting to enable exposure to various perspectives. We expected that concrete plans for improvement would emerge by examining the opinions of teachers and students with various perspectives. The present study addressed arithmetic lesson-study as an example of the aforementioned process. After extracting a concrete plan for improvement from the first research lesson of the conference, we developed a challenge for the second lesson based on the first. The relationship between teachers' words and the diversity of students' utterances was examined. We clarified the factors and conditions related to teacher questioning (Hatsumon) that elicit diversity of students' responses.

D21-PP TR506 Development of teacher's practical knowledge in teaching communities in developing countries

TAKAHASHI Takai,
Hiroshima University,
JAPAN

Keywords:
Practical Knowledge;
Teacher's community;
Professional Development;
Developing Countries

The expertise of a teacher is the improvised performance toward students in the unpredictable learning situation. Yinger (1987) described a master mathematics teacher who did not plan more than a day or two ahead, because each day's plan improvisationally responded to his students' performance on the prior day. Such teacher's practical knowledge is called "tacit knowledge" and is key to support the teacher's professional development. Teacher's practical knowledge can be acquired in "collegiality" where teachers experience dialogue, conflict, and reflection between them. The proficient teacher who has practical knowledge supports the novice teacher to gain new knowledge within "teacher's community" which enhances their practices, and that is the function of teacher's community. In recent years, teacher education in some developing countries have been focused on collegiality and teacher's community as an approach for teacher's professional development instead of just inputting subject matter knowledge or teaching strategies. However, there is a lack of research into the significance of introducing approaches such as lesson study from the aspect of teacher's practical knowledge. Hence, this study will aim to 1) review the individual case of lesson study in order to grasp the background of its implementation, 2) reveal the aspect of teacher's practical knowledge possessed by teachers in developing countries, 3) suggest the way of gaining practical knowledge in teacher education. The empirical review in this study implies that the existence of proficient teachers who have practical knowledge is essential for the development of teacher's practical knowledge. However, it could be the limitation in the context of developing countries. There should be proficient teachers who have practical knowledge or alternative resources within the communities of practices.

D22-PP TR507 Lesson Study on the design of authentic learning for Primary Two pupils

*TAY Pei Lyn Grace (Room
Chairperson), LIM Siok Hui,*
Fairfield Methodist School,
SINGAPORE

Keywords:
authentic learning, mobile
technology, design,
interdisciplinary trail

Efforts to provide authentic learning experiences for students have been ongoing in primary, secondary and post-secondary schools in Singapore. Authentic learning motivates students through solving of real-world problems and has been considered one of the most effective ways to learn, however, it is not always easy to implement. This paper describes the use of lesson study to improve the design of authentic learning tasks for Primary Two pupils. Every year, P2 pupils in the school embark on a shopping trip to a supermarket to purchase items for preparation of a food product. This aims to provide an authentic learning experience in conjunction with the topic of 'Money' in Mathematics. At the same time, pupils complete an English Unit related to the

topic of 'Food'. After examining this learning task, teachers felt the experience was fragmented and pupils may not be able to transfer the knowledge learnt. Moreover, the experience was largely teacher-led instead of pupil-centred and did not help to build 21st century skills. Using the lesson study approach, teachers redesigned the experience to include authentic design elements discussed by Reeves, Herrington & Oliver (2002) such as collaborative learning, real world relevance, reflection, integrated assessment and sustained investigation, redesigning the task to be inter-disciplinary i.e. integrating English, Health Education, Social Studies, Mathematics and Art. The redesigned experience also made use of the affordances of mobile devices to include problem-solving scenarios. A total of 9 classes with 30 pupils each and 9 teachers participated in the two-week learning experience. Results of pupils' reflection, focus group discussion with teachers as well as a self-assessment on the impact of the learning experience will be reported.

D23-PP TR507

*NAHADI Nahadi, WAWAN
KUSWANDI Wawan,
Universitas Pendidikan
INDONESIA*

Keywords:
lesson study, reform, SMPN 1
Lembang

Lesson Study: an instrument to reform Smpn 1 Lembang

SMPN 1 Lembang is a junior secondary school in the district of West Bandung, Indonesia which has been practicing lesson study since 2010 officially. Open lessons were carried out once a month led by the principal which involved all teachers within SMPN 1 Lembang as observers. At times, parents were also invited to observe an open lesson. It is observed that the school quality has improved gradually in terms of academic atmosphere and community support. Factors contributed to school reform at SMPN 1 Lembang will be described.

D24-PP TR507

*LIM Hui,
Zhejiang University,
CHINA*

Keywords:
wisdom classroom; lesson
study

Building a "Wisdom Class" through Lesson Study in four schools in Zhejiang Province

The key feature of "wisdom class" is "teaching tactfully"; to create "wisdom" in class we need to research teaching and have overall reform concerning lesson preparation, observation and evaluation. Lesson study involves research that transforms the way of teaching; it emphasizes exploring deeply about the uncertain world and is suitable for creating "wisdom" in class through research. Specifically, it reflects the following shifts in perspectives, that is: "from putting the theory into practice to finding the theory in the practice; from the research focusing on teaching to the research focusing on learning; from the single-component research group to the multi-component research group; from classification and rating to appreciation and criticism". Around the theme "Create Wisdom [in the] Classroom through Lesson Study", we carried out practice in four schools of Zhejiang province. We constructed "wisdom class" creatively from designing the teaching improvement plans, three-dimensional diagram of lesson observation and lesson study reports.

D25-PP TR508

*SHANMUGANATHAN Chitra
Devi (Room Chairperson),
Ang Mo Kio Primary School
SINGAPORE*

Keywords:
Effectively use catchy
phrases to improve on their
writing skills

Improving writing skills through the use of catchy phrases

The purpose of this lesson study is to help pupils to effectively use catchy phrases to improve on their writing skills. As many of our pupils lack home support in the learning of the Mother Tongue Language, the teaching and learning of writing poses a challenge to both teachers and pupils e.g. pupils' writing lacked expression and vivid descriptions. The target group for this Lesson Study is a Primary 6 Tamil class. This lesson incorporated the use of a list of catchy phrases for the different types of feelings that can be used in any given composition. Prior to the lesson, they were provided with the list of 60 catchy phrases together with the meanings and explanations as well as examples of how to incorporate them in sentences. Subsequently, the pupils were subjected to a structured lesson on composition writing using these phrases. The findings showed that the pupils were able to express themselves

better and give a better description of the events of the composition by using these phrases. There was an overall improvement in the composition marks of the pupils in both the 1st and 2nd cycle groups.

- D26-PP TR508 Lesson designing for improvement of Science lesson at Smpn 1 Lembang**
IMANSYAH Harun, ONO Suharyono, MUKOHAR Mukohar,
Universitas Pendidikan INDONESIA
Keywords:
lesson design, lesson study
- According to government regulation, Indonesian teachers must prepare a lesson plan and submit to the principal and get approval. However, most teachers lack skills in preparing a proper lesson plan according to the government format. It was found that though the teachers were able to come up with lesson plans, they had difficulty in predicting student responses. Hence when the lesson was carried out, teachers could not facilitate all the students to be engaged in learning. A new format of lesson design was introduced, which included prediction of student response, was given to trained teachers and tried out. It was found that teachers were able to improve science lesson by engaging all students in learning. Experiences in designing science lesson will also be discussed.
- D27-PP TR508 Improving teachers' ability through Lesson Study: The case of lesson planning in Mathematics teacher groups in Bandung**
MULYANA Endang, SURATNO Tatang,
Universitas Pendidikan INDONESIA
Keywords:
Lesson study, lesson planning, teacher learning
- Improving teachers' ability through lesson study; the case of lesson planning in mathematics teacher groups in Bandung Endang Mulyana, Tatang Suratno Universitas Pendidikan Indonesia. This paper reports current development of lesson study practice in two mathematics teacher groups in Bandung in which special attention is given to teachers' ability in lesson planning. As facilitators in these groups, the authors describe changes in teachers' instructional conception and practice, as well as changes in students' learning activity. These changes might challenge teachers' thinking about lesson planning and delivery. By analysing lesson plan documents, classroom practices and post-class discussion through lesson study activities (January-December 2011), the authors identify possible teacher learning obstacles particularly those related to teachers' thinking about students and their learning, and propose teachers' learning trajectories for lesson planning through lesson study.
- D28-PP TR703 Sustaining Lesson Study**
KAN Karen (Room Chairperson), ONG Janice,
Guanyang Primary School, SINGAPORE
Keywords:
Lesson Study; Professional Learning Community; collaborative spirits; pupil-centered; Sustainability
- In Guanyang Primary School, we aim to nurture a culture of excellence and collaboration through Lesson Study. The school started Lesson Study (LS) in 2007 and adopted Professional Learning Community (PLC) in 2010. Although PLC and LS are synergistic and interwoven, sustaining lesson study remains a challenge for the school. In this presentation, we will share how the school has incorporated LS into PLC and how LS has evolved from 2007 till 2012. The presentation also covers the PLC/LS structure, its processes, school support, the development routes of PLC/LS and the school's efforts in recognising staff. In a nutshell, the interweaving of PLC/LS (termed 'Support the School') is championed by a PLC coalition team comprising Heads of Departments (HODs), the School Staff Developer and the School Leaders. The school adopted a whole school approach in the implementation of PLC and LS and tapped on Time-tabled Time for staff to collaborate, the PLC focus was crafted to align with the school's objectives. We also implemented lesson observations across grade-levels for particular research lessons to widen staff perspectives and enhance competencies. 'Support the School' provides a facilitator guidebook and templates for PLC/LS teams to guide planning of lessons with the inclusion of PLC 3 big ideas and 4 critical questions. To increase staff buy-in, LS drivers were introduced in year 2011 to facilitate LS processes. The

school maps out the abilities of each teacher and plans a learning route for PLC/LS teams. Each year, the school sends teachers for LS workshops that addresses individual's needs and charts the PLC competency level of the school. All research lessons and packages are shared during the annual Lesson Study Learning Conference organised to encourage teams to share their learning and celebrate success and completion. All lessons and packages are made available in the school's internal web portal. An internal SEAL award was introduced in 2011 to recognise positive synergy and collaborative spirit among team members. To enhance sustainability, all lessons and packages undergo an evaluation by various HODs to identify possibilities for further development in the following year. In order to continue to foster collaboration among teachers, each team adheres to common group norms. The school values staff feedback and encourages staff to give constructive suggestions for improvement. The school finds PLC/LS still relevant and beneficial through the process of collaborative lesson planning to reach out to pupils better and maximise pupil learning.

D29-PP TR703

LAU Lillian, TAN Joanna,
Poi Ching School,
SINGAPORE

Keywords:

Lesson Study, practices in schools, leadership, structures and processes

Dream Dare Do

Developing Communities of Practices (COPs) in Poi Ching School is a whole school approach for teacher collaboration and sustainable professional learning. A key objective for developing COPs in our school is to improve instructional practice via a culture of collaborating to strengthen teachers' professional practice, commitment and collegiality. The inquiry-based and collaborative nature of Lesson Study is vital to the development of such a culture. By fostering a culture that nurtures the development of COPs, the school leadership prioritises staff development, providing goals and direction underpinned by the school's mission, vision and values. Lesson Study is thus used to help teachers examine successful teaching strategies to strengthen content mastery, pedagogic competence and assessment literacy, ultimately, for the purpose of improving student learning. Teachers' professional learning is facilitated by a Framework for Staff Engagement and Howard Gardner's 5 Minds for the Future. The school has put in place structures and processes for Lesson Study to be carried out across all 6 grade levels in a sustained manner with a focus on nurturing a collaborative learning culture where teams of teachers learn through overcoming challenges faced. The school is currently in its third year of Lesson Study implementation. Over the years, modifications have been made to refine our processes. This presentation will share key insights from our journey of leading Lesson Study to develop COPs.

D30-PP TR704

CHIA Kok Hwee (Room Chairperson), KEE Kiak Nam,
National Institute of Education,
SINGAPORE

Keywords:

diagnosis; dialogics; didactics; lesson study; special education; special needs therapy

Professional development of Special Needs therapists through Lesson Study within the Triple-D model of Special Education in Singapore

Special education is a specialized branch of education with lineage to Dr Jean Itard (1775-1838), who worked with the wild boy of Aveyron, and Anne Sullivan (1866-1936), who taught Helen Keller. Both Itard and Sullivan are often regarded as the pioneering special educators. Since its inception in the early nineteenth century, special education, which was born with the passage of the Education for All Handicapped Children Act (EAHCA) in 1975, has been the target of criticism throughout history. For example, special education has been criticized for its ineffective educational interventions. Another example is the use of diagnostic labels that many have argued, is potentially stigmatizing to students with special needs while other minority students are over-represented in some disability categories. However, the greatest concern even until today is the little attention being given to the professional training in instructional strategies and best practices for special educators. Throughout the twentieth century, the field of special education repeatedly adopted

instructional strategies of questionable efficacy, i.e., interventions that have little to no empirical basis. In Singapore, the training for special needs therapists (SNTs) involves diagnosing learning and/or behavioural challenges, dialoguing with the client and his family to establish a clear understanding of his challenges, and didacticizing (coined by Oerbaek, 2009) so that the client can learn to manage or cope with his learning and/or behavioural challenges. This systematic approach is known as the Triple-D Model in special education covering diagnosis, dialogics and didactics. Within this framework, the Lesson Study is adapted and implemented to help the SNTs to develop deep understanding of and skills in educational therapy – a form of therapy that deals with processing of information as well as academics and it offers a wide range of intensive interventions designed to treat individuals with learning and/or behavioural challenges. This paper presents a case study of how a team of SNTs – working with children with autism at a private learning clinic in Singapore – uses the Lesson Study to continuously engage in learning more about best or effective practices in educational therapy in order to improve the student learning and behavioural outcomes.

D31-PP TR704 Deepening student learning – finding a powerful object of learning that opens up possibilities for students in Special Needs schools

*LO Mun Ling,
LO-FU Priscilla Yin Wah,*
The HONG KONG Institute of
Education,
HONG KONG

Keywords:
Learning study; opportunities
to learn; object of learning

Teachers sometimes limit the opportunities for students to learn because they perceive that their students have limited ability or potential for learning. In this paper, through a case study, we show how teachers taking part in a learning study learnt to cater for students' individual differences and at the same time, opened up opportunities for students to reach their potential. The learning study took place in special school settings in Hong Kong. Instead of following their former practice which was considered to be tailoring the curriculum to the students' perceived ability, the group of teachers tried to find a powerful object of learning, such that further learning can be built, leading to a level of learning that they had never dared to try to reach before. The outcome was encouraging and had great impact on the teachers involved.

D32-PP TR704 To discern a learning object teacher's development during a Learning Study in Swedish school age educare settings

*ARENHILL BECKMAN
Madeleine, TULLGREN
Charlotte,*
Kristianstad University,
SWEDEN

Keywords:
Learning Study, school age
educare, teacher's
development, learning object

This study focuses upon teacher's development during a Learning Study among children in Swedish school age educare. The aim is to explore and describe in what way Learning Study could affect teachers approach to the learning object and thereby develop their teaching. The study is performed in school age educare settings which is an after-school activity for students in need of childcare during the afternoon. School age educare is a part of the Swedish educational system, regulated by the government, and led by school age educare teachers specially trained for teaching in this setting. A learning study among children in the age group of nine to eleven years, and what influences as learning object was carried out. Two teachers participated in the Learning Study and their conceptions of influences were documented. Data consist of audio recorded interviews and dialogues between researcher and teachers. The study is based on variation theory and the concepts of discernment, simultaneity and variation (Marton & Booth, 1997; Marton & Pang, 2006). While learning it is important for the learners to discern critical aspects of the learning object, discern different aspects simultaneously and variation and contrast in representation forms. Within variations theory learning is defined as gaining knowledge about the world and an assumption is that different people experience things in different ways (Marton & Booth, 1997). That means that an aspect could be critical for one individual but not for another who has already experienced this aspect. A critical aspect is thus critical just as long it is not discerned by the learner. Once the learner has

understood the aspect it is no longer critical and a new critical aspect could occur. The result shows that the teachers' participation in a learning study enabled them to discern the learning object in a different and more complex way. Some critical aspects were illuminated and teachers' awareness increased and changed to a different way of discerning the terms. The result also shows a new awareness among the teachers when describing their work to their children.

D33-PP **TR705**
OLTEANU Constanta (Room
Chairperson).
Linnaeus University,
SWEDEN

Keywords:
learning study; mathematics;
activity theory; competence;
teaching; learning

Learning Study in Mathematics education - opportunities and challenges

The Swedish National Agency of Education was commissioned by the government (U2009/914/G) to allocate project funding to school authorities in order to support local development projects in mathematics. The types of schools which benefited from this investment were primary schools, compulsory schools, special needs schools and Sami schools. Between 2009 and 2011, over 200 000 students and 12 000 teachers participated in the mathematics initiative pursued by the National Agency. Several projects received funding to work with learning study as a model for developing the teaching of mathematics. This article will present ways in which the learning study model is used as an activity in mathematics education. The impact of the projects is also reported in this presentation. The results are based on the analysis of eight case studies. The material consists of interviews with teachers, students, school principal and project manager, video-recorded lessons, students' tests and notes from the minutes which were taken at various mathematics project meetings. The analyses of the collected data were based on theoretical concepts from activity theory. It is evident that the teachers' participation in the process of implementation of the learning study has, amongst many teachers, created a process which facilitated both their ongoing professional growth and improved the culture of their schools. The results show that the supervisor's competence, dedicated time in the schedule for teachers' cooperation, the connection to learning theory and the teacher's ability to choose content to be covered in the lesson are key success factors in mathematics teaching.

D34-PP **TR705**
FOO Kum Fong, SETO
Cynthia,
Academy of Singapore
Teachers,
SINGAPORE

Keywords:
lesson study, transformative
practice, learning community,
professional network

Networked learning to sustain transformative practices in Mathematics through Lesson Study

This paper reports the progressive effort of the Mathematics Master Teachers from the Academy of Singapore Teachers in building networked learning communities among teacher participants of their lesson study workshops. Besides "face-to-face" networked meetings, the paper also explores the possibilities and potential of harnessing online platform to enhance collaborative professionalism. Through the professional networked learning, the Master Teachers aspire to build a repository of lesson study experiences and encourage the pervasive sharing of effective practices amongst mathematics teachers in the fraternity. Traditionally, professional development for teachers is namely, a one-time, in-service workshops or courses provided by an external expert with limited opportunities for participants to engage in a generative dialogue to further deepen their understanding. For successful professional learning to take place, Borko and Putnam (1995) asserted that efforts in professional development must help teachers build a deep subject matter knowledge base as well as develop new ways of thinking about learners and learning. Such proficiency would enable and empower the teachers to reach out to students in more impactful and meaningful ways. Schoenfeld and Kilpatrick (2008) noted that building a deep and broad knowledge base is a critical factor for proficiency in the teaching of Mathematics and cited the examples of Japanese teachers who engaged in lesson study. To encourage the professional learning amongst Maths teachers

after attending lesson study workshops, the Mathematics Master Teachers established networked learning communities to promote generative conversation on the teaching and learning of Maths and sustain their transformative practices. The Master Teachers will share their roles as facilitators in empowering teachers to use lesson study as a professional development tool and as a catalyst for growing professional networks.

D35-PP TR705 Collaborative culture in a bureaucratic school recontextualization of Lesson Study in a junior high school in Java, Indonesia

KUSANAGI Kanako N.
Institute of Education,
JAPAN

Keywords:
professional development;
collegiality; Indonesia;
bureaucracy; collaborative
culture

Lesson study aims to build a collaborative culture of teachers to engage in professional development continuously. In Japan, traditionally the informal learning among the teachers took place but under the liberalism and performance-oriented evaluation, recently the individualism of teachers is becoming an issue. Lesson study provides a system to overcome the tendency of teachers to isolate from each other by connecting them by the common mission centered on student's learning. In a junior high school in the Central Java, Indonesia where this study took place, the teachers have been engaged in lesson study for 3 years as a government-funded program. The school is under pressure to compete for better funding and recruitment of best performing students with other schools. The school is organized to pursue efficiency to meet the state set standards and requirements. The responsibility of teachers is not on the acquisition of learning by the students but presentation of the curriculum. Therefore, the nature of teaching is instructional and defined as an assignment from the higher authority. Naturally, there is lack of presentation of leadership and personalized interactions with the students. Although the teachers form solid community, their interest is centered on private life and well being of teachers. Because teaching responsibility is separated out from the decisions teachers make, the teachers rarely discuss about their teaching. This is in contrast with the Japanese setting where the teachers face uncertainties in dealing with the students and their daily agenda is how to build relationship and handle students. The introduction of lesson study was intended as a professional development activity that, it was hoped, would lead to improved teaching practice. Management instructions—including the implementation of the lesson study activities—were dutifully followed. However, in the Javanese school managerial authority and teaching practice per se operate in relatively independent spheres, the public and the private respectively. Activity in each sphere has little or no influence on activity in the other. Thus, whilst the public appearance of lesson study is as it is intended, its impact in terms of transforming teaching is negligible. This presentation will explore how the Javanese teachers accommodate their role and responsibilities in various settings which bring an obstacle for collaborative learning.

D36-PP TR706 Pedagogical implication of writing back as a tool for English learning in the global era

*SATO Takeshi (Room
Chairperson),*
Tokyo University of
Agriculture & Technology,
JAPAN

Keywords:
writing back, critical reading,
language awareness, EFL,
Computer-mediated
communication

The aim of my study is to explore the effectiveness of “writing back” (Pennycook, 1994) as an exercise to manifest learners’ critical language awareness in English language classrooms. The pervasiveness of computer-mediated communication through the Internet places greater emphasis on English literacy rather than on English speaking skills in countries like Japan, where English is used as a foreign language. People who learn English as a foreign language (EFL) are usually exposed to the language on websites that they browse for information or while writing e-mails, tweets, or comments to

connect with friends in cyberspace and not through real-life listening and speaking activities. As a result, although English is now a part of their social life, it remains an alien language. Although English has become more accessible, the methods of teaching English still seem inadequately developed; EFL teachers might assume that they are responsible for only teaching the language itself and might use texts from Anglophone countries. Greater effort should be made to teach the language as a medium for learners to express their own ideas, beliefs, and values. In light of the current reality, my study addresses the pedagogical implication of writing back based on critical reading of English texts. Pennycook (1994) explains that writing back “produces realities as well as reflects them. The production of such meanings, however, is always an issue of cultural politics, of struggles over meanings as they are located within language and discourse” (p.267). This activity, I believe, fosters learners’ critical awareness of the English language in their native settings, resulting in more effective English literacy. Based on my research, writing back tasks in a language classroom should be selected after due thought along these lines: the kind of text that should be prepared, the source for deriving the text, the questions that should be posed, and the writing back tasks that should be implemented such that learners’ critical viewpoints are reflected.

D37-PP TR706

MURAYAMA Taku,
Teikyo Heisei University,
JAPAN

Keywords:

EFL, elementary schools,
foreign language activities,
curriculum planning

Teacher's manual and teaching methods: EFL in the elementary schools

This research aims at the meta-analysis on teaching and instruction in the foreign language lessons, focused on the teaching methods or teaching materials in the elementary schools. In Japan, “Foreign Language Activities” (mainly English Activities) has been fully introduced by the Ministry of Education into the elementary schools in 2011. Because so many Japanese elementary school teachers never experienced English instruction, and curriculum for pre-service teachers has not fully developed to prepare elementary school teachers plan and design English Activities. However, the introduction is so politicized, the practical preparation and pedagogical discussion for the teacher education and curriculum development is not found enough. Some schools and the board of education try to utilize Assistant Language Teachers who are English native speakers. But there is no discussion regarding the quality of Assistant Language Teachers, nor does it address the issue of communication between Assistant Language Teachers and Japanese elementary school teachers (Kushima, 2007, Ohtani, 2010). On the occasion of these activities introduced into the Japanese elementary schools, some discussion on the professional development of teachers and curriculum development, but after the introduction, the concern has not been enough improved and upgraded. Moreover, lack of lesson planning has been pointed out. Preparing the EFL lesson with native speakers, team teaching has been emphasized, but such studies have not fully examined. Then, this study will analyze the teaching method and curriculum development through a resource study on the teacher’s manuals both for the elementary school teachers and Assistant Language Teachers. Furthermore, the review of research on EFL teaching method in Asian countries and Pacific Areas are referenced for the implication in the situation. Further action research into the elementary schools and the board of education will be required, and the theoretical modeling in EFL teaching strategy.

D38-PP TR706

PURNAWARMAN Pupung,

Electronically-delivered teacher corrective feedback to improve students' grammatical accuracy in ESL/EFL writing using readily-available technology familiar to teachers and students

This paper is part of a larger research report which investigated the impacts of

FADHLY, Fahruz Zaman
University Of Education,
INDONESIA

Keywords:
electronic feedback; teacher
corrective feedback; writing;
grammatical accuracy; ESL;
EFL; revision

various strategies in providing teacher feedback on the grammatical accuracy of first semester students of ESL/EFL (English as Second Language/English as Foreign Language). The study employed three types of feedback strategies such as indirect feedback (IF), direct feedback (DF), and no feedback (NF). Teacher feedback was provided by utilizing color highlights available in Microsoft Word's 'edit and insert comment' features and delivered via email. Ninety-one freshman EFL students were randomly assigned into three feedback groups consisting of IF, DF, and NF groups. Participants in each group produced two narrative essays. Feedback from instructors was provided in two segments on the first essay and participants revised their essays based on the feedback. Errors found in participants' essays at each stage and in each group were indicated by teachers and counted to be compared to other groups and other stages. Results of data analysis show that the mean number of errors in the two treatment groups decreased significantly in each stage of essay writing. Both the treatment groups outperformed the control, no feedback group, in terms of grammatical accuracy in each stage of the writing. There was no significant difference in the mean number of errors between the treatment groups in the first and second revisions. However, both groups showed significantly higher grammatical accuracy than the control group. Results of the study also showed that the mean number of errors of the treatment groups decreased in the new essay and both groups outperformed the control group which did not receive any teacher feedback. These results indicated that providing teacher written electronic feedback was effective in reducing grammatical errors on students' essays, not only on the essays revised based on teacher feedback but also on the new essay produced after the completion of the treatment. Results of the study also showed that available technology familiar to teachers and students can be used effectively by teachers to provide feedback and by students to revise their essays.

D39-PP

TR708

To enhance the quality of upper primary pupils' writing through the use of wider repertoire of vivid words and phrases

LEE Wen Yen (Room
Chairperson),

TAN Li Hwa, Fiona,
Fuchun Primary School,
SINGAPORE

Keywords:
enhance quality of pupils'
writing; use of wider repertoire
of vivid words; phrases

The goal of this Lesson Study is to research on effective ways to teach Upper Primary pupils to use vivid words and phrases correctly to enhance their composition writing. Our target group of pupils is the mixed-ability learners as we felt that pupils who belong to the high ability group are able to develop their writing and use descriptive phrases naturally in their compositions. Nevertheless, at the other end of the spectrum, there are also pupils from the low ability group who are struggling with the use of vivid phrases in their writing. Hence, we did a research lesson with the mixed ability learners to enhance their writing skills so as to benefit the majority of the pupils in our school. To achieve the goal of Upper Primary pupils using vivid words and phrases correctly to enhance their composition writing, pupils were shown a passage containing mundane words or phrases. After reading through, they were asked to compare and contrast it with a passage with descriptive words or phrases. The teacher then highlights to pupils the importance of using vivid phrases in their writing. Pupils were asked to rewrite a paragraph by incorporating as many relevant vivid phrases as they can. This Lesson Study used a variety of teaching methods. It included group work and cooperative learning. We also used pre-and post-writing to measure pupils' improvement after going through the lessons. Results of the survey carried out after the lessons were also used to measure pupils' level of awareness of using descriptive phrases in their writing. From the various modes of evaluation, we realized that by deliberately teaching the middle-ability pupils explicitly on the usage of vivid words and phrases in their writing, they were able to enhance

their writing skills and produce better quality compositions. With the success of our Lesson Study, the taught writing strategies were included in the Primary 6 English Language writing package. This was part of the English Department's initiative to boost pupils' writing skills. The resources (lesson plans, worksheets etc.) were also placed into our common depository for teachers' reference. With the platform of Lesson Study, the development and refinement of the lesson package served its purpose such that it is shared with the level teachers as resources for their writing lessons based on the same theme. Employing Lesson Study as a mode of reflective practice is indeed beneficial and practical. It allows practitioners to come together and be involved in lesson planning, implementation and refinement. This mode encourages a culture of learning from one another and learning together.

D40-PP

TR708

Scaling the pyramid

NG Eileen,
Tampines Primary School,
SINGAPORE

Keywords:

English Language, Lesson
Study, Composition Writing,
Graphic Organiser, Upper
Primary

This lesson study looks at how the use of a graphic organiser helps pupils produce writing that is coherent and adequately developed. To further enhance the benefit of using the graphic organizer, pupils are also taught the questioning technique so as to provide constructive feedback to their peers. Based on teachers' experience and the analysis of upper-primary pupils' writing, it was observed that while pupils are primarily able to produce a piece of seemingly coherent writing, their work lacks depth as they are frequently inadequately developed with significant "gaps" between the different parts of their story. Pupils also have the tendency to elaborate excessively during the introduction, thereby neglecting the adequate development of other parts of their work. As such, it is necessary for teachers to provide pupils with a structure that enables them to recognise the need to adequately develop their writing in a balanced manner. According to Meyers (1995), graphic organisers can help writers visualise the relationship between the details in their writing in a sequential order and guide them in the writing process. Different graphic organisers were therefore examined and evaluated for their effectiveness in helping to achieve the objectives of this lesson study, which led to the eventual decision to adapt the Freytag's Pyramid. 38 pupils of mixed ability were involved in this lesson study. They were taught how to make use of the adapted Story Pyramid to plan their writing. As it was noted that the pupils lacked questioning skills, they were also explicitly taught how to use the 5W and 1H to ask questions effectively in order to address the gaps in their peers' work. A comparison of the pupils' pre and post test results suggests that the use of the Story Pyramid positively enhances pupils' writing, resulting in better developed stories.

D41-PP

TR708

A qualitative study of online journal writing to improve pupils' organization of ideas

ONG Jeanette Kang Nee,
CHIA Ivy Chew Hoon,
Fuhua Primary School,
SINGAPORE

Keywords:

Online Journal Writing,
Thinking Framework,
Collaborative learning

This study investigated the use of social media 'Edmodo' as a platform for online journal writing to improve pupils' organisation of ideas and thoughts. Most research studies on journal writing have been qualitative in nature and the focus is largely on analysing the content of the journal entries for trends in writing improvement. There is limited literature on the use of online journal writing to help pupils in their organisation of thoughts in the local context. This study provides unique information on the use of online journal writing to facilitate the organisation of pupils' ideas and thoughts through a structured thinking framework based on a 'Head-Heart-Hand' Approach. Using a combination of self-directed and collaborative learning, pupils carried out debates in class to help them form opinions on various real-world topics. Findings indicate that the use of online journal writing generated a high level of

pupil engagement and improvement in pupil expression of personal opinion and organisation of ideas.

- D42-PP TR709 Teaching speaking using a holistic oral communication approach**
ONG Roseline (Room Chairperson),
Canossa Convent Primary School,
SINGAPORE
- Keywords:**
oral communication; confident speakers; teaching speaking; holistic; presentation skills; speaking
- Talking and eloquence are not the same: to speak, and to speak well, are two things (Ben Johnson). Teachers of the Primary 4 level observed that pupils were chatty and lively during informal interactions. However, when faced with an audience or when asked to address an audience, the majority of these pupils clammed up. Pupils tended to be self-conscious and were extremely shy. These pupils could talk but lacked eloquence; they could speak but were not able to speak well. With these observations, the Primary 4 teachers began investigations on why pupils were not confident presenters. Teachers wanted to find the root cause of pupils' difficulties so that they could tackle the problem better. The teachers also experimented with the use of a holistic oral communication approach, the "Teaching Speaking Cycle" as a possible solution to the problem. This presentation seeks to share the findings of the teachers on the oral presentation difficulties faced by the Primary 4 pupils. It also seeks to share the experience of the teachers using the "Teaching Speaking Cycle" to develop the oral presenter skills of the pupils.
- D43-PP TR709 Teaching Picture Conversational Oral Communication Skills Using HEBAO**
TEO Yan Chun, ZHENG Pamela, PERERA Anne,
Canossa Convent Primary School,
SINGAPORE
- Keywords:**
oral skills; conversational skills; picture discussion; communication skills
- Since 2011, English Language teachers in the school have experimented with the use of HEBAO, a picture conversational oral approach, to improve pupils' oral communication skills for the oral examinations. Teachers of the Primary 6 level observed that despite the introduction of the approach, pupils were still weak in expressing their ideas for the Picture Discussion and Conversation components of the examinations. With these observations, the Primary 6 English Language teachers experimented with an enhanced version of the HEBAO approach based on the Teaching Speaking Cycle. They also designed a self-assessment and peer-assessment rubric for the evaluation of pupils' oral picture and conversational performances. This presentation seeks to share the experience of the teachers using the enhanced HEBAO approach as well as the effectiveness of the approach.
- D44-PP TR709 Dart-Right On Target! Boosting pupils' confidence and academic performance in the picture discussion component in the oral examination through dart and integration of ICT**
SINGH Sharmila, ASLINDA Reina,
West View Primary School,
SINGAPORE
- Keywords:**
Picture discussion; structured approach; ICT; peer assessment; self-directed learning
- This study investigates the impact on pupils' confidence and their academic performance for the picture discussion component in the oral examination in Singapore primary schools through the use of a structured approach, DaRT (Details, analyse, Reason, Thought), integration of Information and Communication Technology (ICT) and peer assessment. A total of 165 average-ability and high-ability primary five pupils and two teachers were involved in this study. There was an experimental and control group. Prior to this study, pupils tend to simply describe what they see in the picture without giving their personal opinions and reasoning for the actions. There was a need to stimulate pupils' interest in picture discussion by using ICT to support self-directed learning and collaborative learning. Through a structured approach, DaRT, for picture discussion, pupils give details on what they see in the picture, analyse the details and give reasons for the actions. This structured approach guides them in their presentation and has boosted their confidence

when they are going through the examinations. It has also boosted their overall English results. Tapping on the use of technology, pupils access Oral Buddy, one of the features found in the e-Learning Portal, LEAD.com. Pupils made use of DaRT when practising picture discussion in Oral Buddy. Pupils also used MP3 players to record their responses which served as a form of feedback for them. Pupils engaged in self-directed learning when they used a rubric to assess their responses at their own time at home. The use of MP3 players also provided a platform for pupils to assess their peers. Pupils' mid-year oral examination scores for picture discussion and the examiners' feedback showed that the pupils in the experimental group performed significantly better than those in the control group. Through a perception survey, pupils also indicated that they felt more confident in attempting picture discussion as the structured approach enables them to organise their thoughts and ideas more systematically. The success of this project led to the introduction of DaRT with the integration of ICT to all primary 4, 5 and 6 pupils in the school.

D45-PP TR710 Variation Theory as guiding principle for formative assessment in a Learning Study

*NYBERG Eva (Room
Chairperson), HOLMQVIST
OLANDER Mona,
University of Gothenburg,
SWEDEN*

Keywords:
Formative assessment,
learning study, mathematics,
fractions, primary school

This study explores how students' learning in primary school was investigated through formative assessment based on variation theory. The model Learning Study, a kind of lesson study, was used. The research questions are: What do they discern and focus when discussing the students' learning, how is this implemented in their teaching and what is the learning outcome? The subject-specific content was learning of fractions, specifically the concepts of double and half respectively. Extensive research implies that an increased use of formative assessment in school can lead to great improvements in student learning (Black & William, 1998). This "assessment for learning" is usually informal, embedded in all aspects of teaching and learning and is carried out by teachers as part of their teaching (Black, Harrison, Lee, Marshall & William, 2003). Learning studies (Marton & Tsui, 2004) encompasses teachers and researchers in collaboration. In the learning study addressed in this study, variation theory (Marton & Booth, 1997) is used as a theoretical framework. One learning study consisting of three lessons, following each other, was studied. The study took place during one semester and encompassed in total 51 students, age 7 (24 girls and 27 boys). Four teachers from two different schools participated. Two researchers were involved. The results from the analysis indicate that the teachers throughout the study become increasingly aware of the fact that even small changes in the teaching might have a great impact on the students' learning and that eliciting students' ideas and understanding seems to have an impact of the teachers' apprehension of their students' difficulties to understand the object of learning. The formative assessment performed were mainly based on the results from the student tests and the video recordings from the lessons. During the lessons, however, little direct feedback is given to the students. It is concluded that variation theory can be a useful tool for guiding teachers in their formative assessment during the iterative process in a learning study. References Black, P., & William, D. (1998). Assessment and classroom learning. *Assessment in education*, 5(1), 7- 74. Black, P., Harrison, C., Lee, C., Marshall, B., & William, D. (2003). *Assessment for learning: Putting it into practice*. Buckingham: Open Univ. Press. Marton, F., & Tsui, A. (2004). *Classroom discourse and the space of learning*. Mahwah, N.J.: Lawrence Erlbaum associates. Marton, F., & Booth, S. (1997). *Learning and Awareness*. Mahwah, N.J.: Lawrence Erlbaum Associates.

D46-PP TR710 Does teacher questioning improve students' ability to solve word problems involving fractions?

YEW Christopher, NEOH Pauline, ROSLI Siti Nuraishah,
Yu Neng Primary School,
SINGAPORE

Keywords:
Upper Primary Mathematics;
Fractions; Action Research;
Word Problems

Word problems involving fractions, particularly those that require a good understanding of related mathematical concepts, have always been problematic for students. When the primary 5 students in a local neighbourhood school faced difficulty with two such types of problems, a group of math teachers decided to use the questioning technique to help students understand the problem context, identify the mathematical connections and write the appropriate number sentences. The teachers posed the questions progressively to the students to stimulate thinking and promote understanding. This action research study examines the impact of teacher questioning as a learning tool on student achievement.

D47-PP TR710 Using Concrete-Pictorial-Abstract approach to teach the conversion of fractions

KANAGESWARI Ravindran, NOORDIN Mastura,
Ang Mo Kio Primary School,
SINGAPORE

Keywords:
conversion of fractions, CPA
approach, manipulative,
converting improper fractions
to mixed numbers

Lesson study provides meaningful feedback for the teachers. It is a professional development process in which teachers work together to systematically examine their practice, with an aim of becoming more effective. 'It is best known as a means for improving Mathematics instructions and can also be practiced in all other subjects from language to physical education' (Dubin, 2009). According to Dubin (2009), in the researched lesson plans, teachers focus on posing key questions to stimulate students' thinking. Through the questions, teachers guide students' learning and understanding of the problem. In our lesson study, we combine both the professional developmental process and the instructional teaching method. Every year, one of the main challenges that a primary school teacher faces when teaching Mathematics is getting pupils to understand abstract mathematical concepts and internalize them. Moreover, as reflected in the Ministry of Education syllabus for primary Mathematics, a teacher must also cultivate in pupils a positive attitude towards the learning of Mathematics, and develop their ability to apply Mathematical knowledge in their daily lives and other subject areas of their undertaking. After much consideration, our team of Primary Four teachers decided that 'Conversion of Fractions' is one of the topics which pupils of the lower ability struggled with, and hence requires special attention. The team drew up a detailed plan for the lesson using the CPA (Concrete-Pictorial-Abstract) approach to introduce the mathematical concept of Conversion of Fractions. Twenty low-ability pupils were given a scenario and ready-made manipulative which helped them in converting improper fractions to mixed numbers. The pupils, who activated their prior knowledge on the concepts of multiplication and addition, were able to solve the given tasks under the facilitation of the teacher. Observations were recorded and shared during the post-observation discussion. Overall, the pupils seemed completely engaged in the activities. Changes were made to the lesson plan for the second cycle of the lesson study. On the whole, it was an enriching process which benefitted our teachers.

D48-PP TR711 Comprehension, so easy

*SIM Lucy (Room
Chairperson),*
Guangyang Primary,
SINGAPORE

Keywords:
Chinese Language; reading
comprehension; lesson study;
story-mapping strategy;

To develop pupils' reading comprehension ability is one of the major tasks in teaching Chinese Language. The low level of reading comprehension among Chinese Language pupils reveals issues with underlying reading proficiency. As children read, they tend to put most of their energy into decoding or "reading" every word perfectly. While they may be able to say all of the words right, students must also be able to obtain meaning from what has been read. Students with special needs often experience considerable difficulty in

graphic organizer comprehending what is read aloud or silently. They may have difficulty with processing the ideas, with relating new information to previous learning, or with using higher order thinking skills to organize, sequence, or prioritize that information appropriately. What "good" readers do naturally must be made very explicit for the special needs reader, and each strategy must be taught separately in a logical order. Guangyang Primary School Chinese Language Lesson Study Team aims to design a reading comprehension teaching system to assist teachers in teaching reading comprehension. Story-Mapping Strategy was adopted by the lesson study team in the research targeted at Primary 3 and 4 classes. Pupils were guided to use story-mapping technique to concentrate and list down the important facts of a story. Story-mapping is a strategy that uses a graphic organizer to help pupils learn the elements of a story. By identifying story characters, plot, setting, problem and solution, students read carefully to learn the details. Many different types of story map graphic organizers are used in Guangyang Primary School Chinese Language lessons. The results show that the story-mapping strategy increased the comprehension scores of the pupils. It enhanced the pupils' comprehension ability. In general, the pupils performed better on their reading comprehension when using the story-mapping strategy.

D49-PP TR711 Using Bloom's Taxonomy to enhance Chinese comprehension skills of Primary 5 students

LAU Hwee Noy, NG Tiong Bee, LIM Hwee Tin, CHER Meng Hol, TI Tat Hua, CHAN Bi Hui,
North Spring Primary,
SINGAPORE

Keywords:
Chinese Language;
Comprehension; Lesson
Study; Bloom's Taxonomy;
collaboration

The objective of this study is to enhance the comprehension skills of 128 Primary Five students who are learning Chinese as a second language in a Singapore primary school. In this study, teachers collaborated with one another, to develop, implement and refine a series of comprehension lessons. These lessons were designed through utilizing Bloom's Taxonomy theory to categorize the comprehension questions into six cognitive levels of complexity, namely remembering, understanding, applying, analyzing, evaluating and creating. For each comprehension lesson, teachers focused on one cognitive level of complexity and taught students the relevant skills in answering the questions. Through the activities, students picked up essential answering and analytical skills and showed improvement in their comprehension. The lesson study processes allow teachers to develop professionally, through consciously reflecting and revising their lesson plans. The lesson study was conducted over a period of 18 months and in total 6 lesson plans were created. For each lesson, teachers went through the lesson study process of (1) setting goal, (2) planning, (3) implementing and (4) debriefing. After each public lesson, teachers documented their observations on students' learning and responses. The lesson plans were subsequently revised collaboratively during the debrief sessions. Based on these revised lesson plans, teachers would teach the lesson to another class and only when the feedback for the revised lesson was good, would the lesson study cycle be completed. Pre-test and post-test results suggested that students improved significantly in their comprehension segment. From the activities, students learned how to work collaboratively. They also expressed that they liked the activities designed and the skills taught enabled them to overcome various difficulties they faced initially in answering comprehension questions. Teachers felt that the lessons created were ideal and effective in attaining learning goals.

D50-PP TR711 Designing a questioning model based on the revised Bloom's Taxonomy to teach Chinese comprehension skills using Lesson Study approach

TEE Guat Hwa, LIU Zhao,
Nanyang Primary School,

Designing A Questioning Model based on the revised Bloom's Taxonomy to teach Chinese comprehension skills using Lesson Study Approach: Mdm Tee

SINGAPORE

Keywords:
thinking process;
comprehension skills; Bloom's
Taxonomy; engaged learning;
curriculum innovation

Guat Hwa, Lead Teacher Mr Liu Zhao, Subject Head of Chinese Department Mdm Tan Siow Hwee, P5 Chinese representative Ms Bai Qiong, the exchanged teacher from Mainland China Mr Fei Meng, P5 Chinese Teacher Nanyang Primary School, Singapore. One of the educational goals of the Ministry of Education for pupils taking Higher Chinese in the Primary School in Singapore is to enable them to comprehend in depth and read between the lines. As Chinese Language is not the first language for many school children in Singapore, it has remained a great challenge for Chinese teachers to stimulate students' thinking process in order to understand a passage in depth on their own. This presentation is a sharing of our Lesson Study on a new pedagogy for teaching Primary 5 Higher Chinese students. We designed the Questioning Model based on the revised Bloom's Taxonomy (Anderson & Krathwohl, 2001) taking into consideration the knowledge as well as the cognitive domains, in order to enhance the students' thinking process for better comprehension skills. In the Questioning Model, students simulate teachers' thinking process and work in groups to brainstorm questions and solicit answers from other groups based on a selected reading passage. Teachers merely act as the facilitators by cueing students' attention to specific comprehension decoding process through questioning. This teaching process also incorporated Howard Gardner's Multiple Intelligence and Spencer Kagan's Cooperative Teaching Strategies to ensure greater understanding and leading to greater engagement amongst students in learning the comprehension skills. The lesson study theme for our team is "Engaged Learning through Curriculum innovation" and our research lesson learning goal is "To enhance comprehension skills through revised Bloom's Taxonomy". We have conducted the research lesson three times with the lesson plan and the implementation of the plan has been continually refined. In reporting on our Lesson Study project, we will share photographs of classroom teaching, students and teachers' reflections, lesson plans, lesson observation notes as well as post-lesson discussions, showcasing how the Lesson Study has enhanced students' deep thinking in comprehension and teachers' professional development towards curriculum innovation in designing engaging comprehension lessons to stimulate that deep thinking amongst students and develop them into self-directed learners.

D51-PP

TR712

*LIM Chap Sam (Room
Chairperson), CHEW Cheng
Meng,*

Universiti Sains
MALAYSIA

Keywords:
Lesson Study; primary
mathematics teachers;
tension

Engaging teachers in Lesson Study: Tensions and negotiations

In view of the potential benefits of Lesson Study as an effective teacher professional development programme, a study was carried out to promote Lesson Study in nine low performing primary schools in Malaysia. The main aim of the study was to improve the quality of teaching practices among science and mathematics teachers through the lesson study process. However, as with the introduction of any new innovation, a variety of tensions and challenges arise while engaging teachers in Lesson Study. Two major categories of tensions were identified: cultural and personal tensions. The Japanese model of Lesson Study has three key features: bottom-up, peer collaboration and self reflection. Culturally, Malaysian teachers are used to top-down instruction and lack of peer collaboration. It is also uncommon for Malaysian teachers to observe and reflect on their own or their peers' teaching for professional development. As a result, administrative tensions were experienced between teachers and administrators, particularly in terms of top-down versus bottom-up instruction; collaborative versus individualistic; time management versus value of time used. Personal tensions were also experienced by some teachers, particularly for those who have weak collegial

relationships or are not ready to open their lesson for discussion. Thus, based on the analysis of five real cases, this paper aims to share and discuss these tensions and how some of these tensions have been resolved through negotiations. It is hoped that sharing experience in this way would help future implementers of Lesson Study elsewhere.

D52-PP TR712 Improving teaching and learning quality of primary Mathematics through Lesson Study

HERMAN Tatang,
Universitas Pendidikan
INDONESIA

Keywords:
improving teaching and
learning quality, primary
mathematics, lesson study

In order to improve the quality of primary mathematics teaching and learning, many efforts have to be made by researchers; otherwise, it is difficult to implement research findings in the schools setting to improve teaching outcomes. This action research attempts to explore the implementation of lesson study to improve the quality of teaching and learning mathematics in primary schools. The study was conducted in some private and public primary schools around Bandung. The study found that lesson study becomes one of the most effective ways to improve the quality of primary mathematics teaching and learning through teachers' professional development.

D53-PP TR712 Changing Mathematics teachers' teaching practices and student participation through Lesson Study in a Tamil primary school

*SHANMUGAM Kalaivani, LIM
Chap Sam, ABDUL RAMAN
Shafia,*
Universiti Sains
MALAYSIA

Keywords:
Lesson Study; primary
mathematics teachers;
teaching practice; student
participation

This paper aims to discuss changes in a group of three primary Mathematics teachers' teaching practices and their students' participation before and after the Lesson Study (LS) process. Before the introduction of LS, the teaching practices of a typical Mathematics lesson taught by one of the participating teachers were observed and video-recorded for analysis. The Japanese model of LS was introduced to a LS group in a Tamil primary school in Malaysia. This LS group consisted of three Mathematics teachers: one experienced teacher with more than 20 years of teaching experience and two novice teachers with less than 5 years of teaching experience. The entire process of Lesson Study (identifying the goal, planning and refining of lesson, lesson observation and reflection, as well as revising the lesson plan and re-teaching of the lesson) was video-recorded for analysis. A comparative analysis of the three observed lessons (before and after LS and the re-teaching lesson) showed that there were positive changes in the teaching practices and student participation in the Mathematics lessons. Analysis of teachers' reflection after LS observation indicates that all the participating teachers responded positively to the implementation of LS as they commented that they have gained many teaching ideas from peer observation and sharing of experiences. They also observed that their students participated more actively throughout the lessons. In sum, this case study highlights the potential benefits of LS as an effective and recommended model for teacher professional development.

D54-PP TR713 A Lesson Study on teaching length through the use of 'scallop' method & C-P-A approach

*MAT NOOR Maslinda (Room
Chairperson), MOHAMAD
Faisal, DANKER Kristen,
TWONG Siew Yin Anne, AN
Peck Imm,*
St Anthony's Primary School,
SINGAPORE

Keywords:
'Scallop' Method & C-P-A
Approach

This Primary Mathematics lesson study topic was chosen based on an analysis of past year assessment results: the average MSG (Mean Subject Grade) of the different Topical Reviews for Primary 1 (2011) was compared across different classes and it was found that the topics of 'Length' and 'Mass' recorded the lowest average MSG, this finding was cross-referenced with data from Primary 1 (2010) and it was established that between the two topics, pupils were weaker in the topic on 'Length'. This is especially evident in comprehension and application types of questions. Based on the team members' collective teaching experiences, it was observed that pupils tend to have difficulties in reading or interpreting scales accurately when determining

the lengths of items or objects. Hence, the aim of this lesson study was to restructure the teaching plans and activities on the topic of Length to enhance students' skills in reading and interpreting scales accurately. Students who have difficulties with Mathematics can benefit significantly from lessons that include multiple models which approach a concept at different cognitive levels. Thus, the use of the Concrete-Pictorial-Abstract (C-P-A) approach was weaved into the research lesson. Through our literature reviews, we also identified a teaching strategy, called the 'scallop' method, to complement the C-P-A approach. This would also provide students with a new or alternative tool to read and interpret scales in order to determine the lengths of items or objects. This paper further describes how the research lessons were designed, the teaching processes involved and the reflection and learning of the team members through the Lesson Study process.

D55-PP TR713 Principle of construction in measurement of quantity: The effective of use manipulative in elementary Mathematics

*NAKASHIMA Yoshiko,
Nagoya University,
JAPAN*
*ABDULLAH Nor Azura,
University of Brunei
Darussalam,
BRUNEI*

Keywords:
Student Mathematical
Conception, Elementary
School, Measurement

The acquisition of skills, procedural knowledge and understanding of conceptual knowledge in teaching and learning measurement in Elementary School such as length, area, volume, angle, and weight are important. However it is difficult to link two things together in practice. Based on my research, students of elementary school usually make mistakes when they are going to measure the length as 1cm, 2cm, 3cm, from the edge of scale. It means some of them couldn't understand concept of length. This paper tries to clarify effective of manipulative activity on teaching and learning measurement in Japanese elementary school. Emphasis is placed here on the principal of construction in measurement of quantity and how students acquire mathematical concept particularly in elementary school mathematics. This study used data from a second grad mathematics lesson which designed and done it in Fukushima elementary school in Tokai City, central Japan, by the first author. Textbook analysis, transcript of the lessons, participant observation notes and other relevant data and lesson analysis was followed. From this study it can be seen that how designing effective mathematics lesson based on 'principal of construction in measurement of quantity' enhance students learning and expand their mathematical concepts and skills in 'area, volume, angle, weight and time' through the manipulative activity.

D56-PP TR713 How to make students understand the concept of scale - a Learning Study

*ANDERSSON Malin,
BERGKVIST Kent,
ELOFSSON Martin,
HELLSTEDT Mattias,
OLSSON Anna,
SVANTESON WESTER
Jenny,
Fenestra Centrum,
SWEDEN*

Keywords:
Learning Study; scale; critical
features; mathematics;
proportionality

At Fenestra Centrum, we have been working with Learning Study for three years. During the past year, studies have been made in almost every subject and all teachers have been involved. This Learning Study focused on improving student understanding and capability to enlarge and reduce uniform two-dimensional shapes. We asked: What makes it difficult for some students to understand the concept of scale? To answer this question, we decided to do a Learning Study with the concept of scale as our object of learning. We wanted the students to develop proportional reasoning and handle the relations between two-dimensional shapes as linear instead of quadratic, i.e. that the students should be able to distinguish the linear relation between uniform two-dimensional shapes when they determine the scale. We also worked with questions like: What does "three times larger" or "three times smaller" mean? What is larger or smaller and compared to what? During the study we wanted to create variations relevant for students to work out their understandings. After this study was completed we have asked ourselves: If students are able to discern the lengths out of the area when they want to decide the scale between an enlargement or reduction of a rectangle, what about other shapes like circles, triangles, cones or spheres? However, this

would have to be the focus for possible future studies.

D57-PP TR714

*YAU Siew Cheng (Room
Chairperson),*
Ang Mo Kio Primary School,
SINGAPORE

Keywords:
Adaptations in the arctic

Primary 6 Science Lesson Study

The premise of this Science lesson study begins with the end in mind – assisting pupils in recalling the adaptive features of animals for survival under differing environmental conditions. Using the ‘Spaced Learning’ strategy developed by Monkseaton High School, students were led through a series of developmental activities aimed at enhancing retention of information. The lesson activities progressed from teacher input of key facts to student recall of the information and finally, student application of the key facts provided. During the application stage, students were required to be innovative and creative in their problem-solving activity – creating an imaginary animal with structural or behavioural adaptations for survival. Subsequently, a second cycle of the lesson was conducted with refinements and adjustments after the post-lesson discussion by the teachers.

D58-PP TR714

*PEH Yunn Chyn Clare, KOK
Wei Ling Brenda,*
Nanyang Primary School,
SINGAPORE

Keywords:
Anchored Instruction, Science
Lesson

Designing a Science lesson with anchored instruction using Lesson Study approach

In 2012, Nanyang Primary School embarked on a whole school approach to adopt Lesson Study (LS) as a professional development tool across all levels for all subjects. Each teacher belongs to a LS team. Groups are formed based on the Instruction Programme (IP) departments and level the teachers belong to. Based on the school’s overarching research theme “Engaged Learning through Curriculum Innovation”, each team crafted its professional learning goal. This presentation is a sharing of our LS on a Primary 5 Science lesson, planned and carried out for the unit “The Human Circulatory System”. Nanyang Primary School Science Department wanted to promote the use of Anchored Instruction (AI) in our science lessons. Anchored instruction (AI) refers to instruction in which the material to be learned is presented in the context of an authentic event that serves to anchor or situate the material e.g. video and, further, allows it to be examined from multiple perspectives (Barab 2000). Making learning authentic for pupils is also one of the five dimensions of learning and teaching that contribute to engaged learning as prescribed by the PETALS framework (developed by the Ministry of Education, Singapore). The lesson study theme for our team is “Engaging learning and Critical Thinking” and our research goal is “How do we promote critical thinking through more engaged learning”. Our team attempts to use the LS stages to chart a lesson with AI. This lesson tries to incorporate AI strategies to engage learning and the use of 5Es Instructional Model to analyze the different parts of an experiment to stimulate critical thinking. The LS stages our team used in our process include: Identifying Research Theme, Plan Lesson, Conducting Research Lesson, Post-Lesson Discussion and Lesson Plan Revision. In our presentation, we will share our process of developing our AI lesson using LS stages. We will also discuss how AI can be used to promote engaged learning in a Science lesson based on our teachers’ observations and a pupils’ survey. The presentation will include numerous photographs, pupils and teachers’ reflections, lesson plans as well as post lesson discussions.

D59-PP TR714

*SOH Fiona Yon Leen, WONG
Allan, TAN Sharon, LEE
Jasmine, DJAFAR Mulyani,
CHAN Kelvin,*
Tao Nan School,
SINGAPORE

Keywords:
Change; Lesson Study;

Bringing about change through Lesson Study

In 2012, Primary 4 teachers of Tao Nan School decided to form a Lesson Study (LS) team in Science. Bearing in mind the school’s mission to develop in the student the love for learning, engaged learning and critical thinking skills, which are important considerations for the planning of all lessons. The two classes involved in the LS were very different in abilities: the smaller class of the two was more language-inclined as the pupils were selected based on their

Critical Thinking; Engaged Learning; Reflections

aptitude in Higher Chinese and the other class was the best of the mixed ability classes. The team wanted to find out the impact of using the Inquiry Approach in Science in the pupils' learning. The hypothesis was that there would be a higher level of pupil engagement in a Science lesson using the Inquiry Approach than a teacher-centered approach in a conventional lesson. With more pupil to pupil interaction, there would be more questions raised which in turn would promote critical thinking and thus lead to pupils' better understanding of Science concepts. Invaluable lessons were learnt during the whole course of the lesson study. The reflective learning of the LS team in this paper looks at how LS enhances their professional development in pedagogical knowledge and better understanding of their pupils' learning. This paper presents the learning experiences to provide some insights into the teaching of the topic Heat and into the implementation of LS in schools.

D60-PP TR715

LOH Valerie (Room Chairperson), TANG Lyn Lyn Grace, TEH Gaik Lean, THIRUSELVAN S,
Hillgrove Secondary School,
SINGAPORE

Keywords:

Lesson study; cross-curricular; seating arrangement; lesson study; ICT; life skills

Cross-curricular Lesson Study - moving beyond the lesson plan

While there are a variety of factors that impact student learning and engagement, professional development efforts are predominantly placed on improving pedagogical content knowledge. The complexity behind student motivation and engagement necessitates looking outside the confines of the lesson plan to explore varied strategies for improving student learning in the classroom. Hillgrove secondary school will detail how lesson study is being used in an interdisciplinary manner to achieve these aims of improved student motivation and engagement. Three different cross-curricular lesson study groups have been set up this year focussing on strategies to improve (1) the engagement of low-ability students, (2) the use of ICT in the school, and also (3) the teaching of life skills (by their own teachers) as a compulsory module. For example, the group focussing on low ability learners had used the lesson study process to identify how the seating arrangement was one of the fundamental changes that improved the classroom environment of low-ability students. Student concentration and engagement had improved, and teacher movement in the class was also facilitated. In this presentation, the authors will describe the trajectories of this process, as well as how the lesson study process has contributed to the use of ICT tools and the development of a life-skills package resulting in improved engagement and motivation in a more holistic manner.

D61-PP TR715

HO Thi Thu Ho, TRINH Quoc Lap, NGUYEN Thi Hong Nam,
Can Tho University,
VIETNAM

Keywords:

Applying lesson study; micro-teaching; pre-service teacher education in Vietnam

Applying Lesson Study in micro-teaching for teacher education in a Vietnamese context

Housed in Can Tho University (CTU)- Vietnam, the School of Education (SoE) is missioned to offer pre-service primary and secondary teacher education programs largely for residents in the Mekong Delta. Within these teacher education programs, in addition to courses focusing on knowledge of subject matters, educational sciences, micro teaching is a core course that aims to help teacher students develop their professional learning (teaching skills) before they do their teaching practicum at high schools. In micro-teaching courses, each teacher student will prepare a lesson plan and teach that lesson in front of their peers as in a real class in high schools. Their peers play the roles of school students. This paper reports the results of our application of lesson study (LS) into micro-teaching course to train our pre-service teachers, namely our geography pre-service teachers at the SoE, CTU. The paper addresses the following three research questions. 1. How was LS applied in micro teaching for training geography pre-service teachers? 2. How did the use of LS in micro-teaching affect professional development of geography pre-service teachers and how does LS develop students' perception of building a community of practice and reflective practice? 3. In

applying LS in micro teaching, what were challenges and possibilities for further use of LS? Which suggestions should be introduced to maximize the application of LS in micro teaching in this Vietnamese context? The paper will also attempt to propose a feasible LS model for teacher education programs in educational contexts like Vietnam.

D62-PP TR715 Perception of Biology lecturers on Skripsi Writing using Lesson Study based teaching practice to enhance the graduation of Biology teacher candidate

SUSILO Herawati, IBROHIM Ibrohim,
University of Malang,
INDONESIA

Keywords:
Perception; Biology Lecturers;
Skripsi Writing; Lesson Study
based Teaching Practice

During academic year of 2007/2008 and 2008/2009 Susilo introduced the combination of Lesson Study (LS) and Classroom Action Research (CAR) to be done by 26 and 34 Science teachers during two months of "Teaching Consolidation Activities" at junior high schools. The idea was picked up by LS developer team of the Faculty of Mathematics and Science, State University of Malang (FMIPA UM) since academic year of 2008/2009 to be implemented as Lesson Study based Teaching Practice (LSbTP). During the three months of teaching practice at a junior or senior high school, each teacher candidate should have at least two open classes. Through LSbTP various aspects of learning and teaching skills can be explored and investigated by the teacher candidates. Susilo initiated the use of LSbTP as a means to guide students' research for skripsi writing since 2010/2011. Descriptive research has been done to find out the perception of biology lecturers on Skripsi Writing Using Lesson Study based Teaching Practice (LSbTP). Questionnaire has been returned by 17 (100%) lecturers who are responsible in guiding students in skripsi writing as well as in guiding students' teaching practice in odd semester of 2011/2012. The results of the research shows that 1) most of the lecturers (60%) agree on skripsi writing on LSbTP; 2) skripsi is written based on the teaching and learning processes done by 1 to 4 model teachers; each model teacher is expected to do 3-4 open classes; therefore the number of open classes is expected to be 3-16 open classes; 3) the advantage of skripsi writing is the students can graduate sooner 4) the difficulties experienced by the lecturers is in making time to attend the students' open classes and 5) the criteria should be met by the students before using LSbTP as a means for writing skripsi are: the skripsi proposal has been approved by the skripsi supervisors; the students has been able to teach.

D63-PP TR716 How to enhance English language teaching with En-ELT

*JEE Elaine (Room
Chairperson),*
Bukit Panjang Government
High,
SINGAPORE

Keywords:
English Language;
Assessment for Learning;
Professional Learning
Communities; Adapted
Learning Study

This Teaching and Learning project is an action research project on assessment for learning. It aims to provide more empirical evidence to the benefits of assessment for learning on students' learning motivation and English Language (EL) academic competency. In particular, assessment for learning develops learners' capacity for self-assessment so that they can become reflective and self-managing, which is in line with the 10 BPian Competencies, the school's desired outcomes for its students. Assessment for learning was implemented in all of the Sec 1 Express and Normal Academic classes, for EL. The learning and teaching process was based on the guiding principles of assessment for learning by Young (2005): focusing on how students learn, planning objective-led lessons, creating authentic tasks, higher-order questioning, self-and peer-assessing, ensuring a shared understanding of criteria, and recognising students' full range of achievements. Project En-ELT aims to: (1) translate the 29 Learning Outcomes in the EL Syllabus 2010 into classroom context; (2) deepen teacher leadership in school-based curriculum planning and development; (3) infuse the 21st Century Competencies, particularly 'critical and inventive thinking' and 'information &

communication skills' through contextualized teaching and learning. There were two lesson-study cycles in the year. One cycle focused on Reading & Viewing/ Listening & Viewing Receptive, and Speaking & Representing Reproductive Skills: Retelling; and the other focused on Writing & Representing Reproductive Skill: Process Writing. The following question guides the exploratory research design: does formative assessment enhance the EL academic performance of the Sec 1 students? In order to assess the impact of the intervention on student progress, a considerable amount of data was collected. The data includes scores on standardised tests and teacher assessments. A questionnaire was also administered to elicit further background information from students in areas which have an impact on school performance, such as aspects of student motivation and attitudes towards school (Smith, 2003). Content and face validity for the tests and questionnaire were established by the project team. The tests and questionnaire were administered twice, in Term 1 Week 2 (Pre-test) and Term 4 Week 2 (Post-test). Reliability was examined using Cronbach Alpha. The scores of these tests and questionnaire were analysed using the Microsoft EXCEL statistical tool, Windows XP version. Comparative quantitative analyses of the research data include means, standard deviations, t-tests and Pearson correlations. The alpha level is established a priori at the 0.05 level.

D64-PP

TR716

*HU Diane, BARNWELL
Widya, CHO Franklin, GOH
Chong Mui, CHENG Michelle,
CHEONG Tracy, CHOO
Gloria, NEO Siew Bee, NEO-
ANG Melissa,
Singapore Chinese Girls'
School,
SINGAPORE*

Keywords:

Lesson Study; Professional
Development; English; Big
Questions; Conceptual
exploration

Asking big questions in the English language classroom

This paper aims to show how teachers use Lesson Study (LS) to evaluate and improve on teaching students how to ask Big Picture questions in the upper secondary English classes. The questions posed to the team were : (1) How do we increase and elevate the quality of the questions asked by students in an English classroom? (2) How can LS create a community of sharing and in the process enhance teachers' pedagogy, and skills in selection and use of resource materials for the department? The participants for this study comprised eight experienced Upper Secondary English teachers with varied expertise to form an LS group. The overarching goal for this case study was to find strategies to scaffold the development of thinking skills in students to enable them to ask Big Picture questions to deepen their understanding of skills and concepts covered in the English Language classroom. To achieve the goal, the LS team adopted Bloom's taxonomy as well as the use of inquiry based learning to help refine the quality of the students' questions. Based on perspectives offered by observers and feedback on the first study, the LS team reviewed and revised the lesson to incorporate a more meaningful context to the stimulus used as well as a more student-centric approach. With the revised lesson, students in the second study were observed to be more engaged in peer discussions and the teachers were better able to facilitate groups to refine the questions posed. Based on teachers' reflection on the two lessons, it was noted that their participation in the LS has heightened their consciousness on the differing learning needs of their students. It has also sharpened their questioning techniques such that they were able to model use of different types of questions based on Bloom's Taxonomy as well as critical and creative thinking. In this presentation, the presenters will be sharing more details on the case study, the related issues encountered and how they overcome challenges.

D65-PP

TR716

*LEE PIN Liew, ANG Choon
Keow, WONG Soon Yeow,
ENG Chia Lee,
Clementi Town Secondary
School,
SINGAPORE*

Lesson Study: Using ACS to raise students' picture analysis skills

This research project sets out to study the effectiveness and systematic use of ACS (Analysis-Capture key points-Significance of Picture) to raise students' picture analytical skills. The team adopted the Lesson Study approach, conducted pre-and post-observation discussions and video-recording of students' responses and classroom behaviour. Thereafter, a review and

Keywords:
Picture analytical skills
Lesson Study

refinement of the lesson plan was done. This process also included interviews with the students, analyses of observation findings with reference to the Taxonomy of Educational Objectives (Bloom 1956) and the comparison of the research findings amongst classes. The results show that the ACS help students to become more confident speakers during the picture discussion examination. Students have shown improvement in expressing themselves in a more systematic and organised way. The framework- guideline approach has made oral examination (picture discussion) preparation easier.

D66-PP TR717 Lesson Study: using Logger Pro to trace and analyse the motion of moving objects

TAY Eunice (Room Chairperson), CHAN Him Nok, KOK Hui Ching, River Valley High School, SINGAPORE

Keywords:
Logger Pro; ICT; video analysis; Inductive & Deductive Reasoning; Kinematics Graphs

Research has established that introductory physics students have consistent difficulties with the interpretation of kinematics graphs of position, velocity, or acceleration versus time. Robert J. Beichner's (1996) research "The Impact of Video Motion Analysis on Kinematics Graph Interpretation Skills" (1996) reported that by utilizing the video analysis technique in teaching, pupils' ability to interpret Kinematics graphs has shown a significant improvement as compared with the traditional instruction. Thus our research focus is to explore the effectiveness of the video analysis technique in improving pupils' ability to interpret kinematics graphs. We hypothesize the greater the integration of video analysis into the teaching of kinematics, the greater the pupils' understanding of the relationships between kinematics variables and their connections to graphs. Students will develop a sound conceptual understanding through graphical and dramatic representations before moving on to an algebraic treatment of problem solving.

D67-PP TR717 Incorporation of collaborative learning (COL) and self-directed learning (SDL) to enhance students' learning in salt preparation

TAN Jaime, CHIA Yong Koon, LEE Daphne Yen Hong, TAN-SIN Li Huang, YEO Hui Yin, Montfort Secondary School, SINGAPORE

Keywords:
self directed; collaborative; chemistry, salt preparation

This paper examines the attempt by the upper secondary Chemistry teachers to explore and design lessons which incorporate Self-directed Learning (SDL) and Collaborative Learning (CoL) in enhancing our students' learning of the topic "Salt Preparation". The lessons are designed for student-centredness and the provision of an experiential learning environment. The students involved are in the Secondary Three Express stream. Each group of students was expected to design a suitable experiment of preparing a salt of their choice. Relevant learning materials such as videos of methods of salt preparation, theories and questions for discussion were uploaded into 'Edmodo', an ICT platform which was used to support their SDL. Through these, the students were being directed to take ownership, manage and monitor their own learning. The lesson study model was adopted to create a learning community for the other chemistry teachers to learn from the research teacher and a knowledgeable other was invited to share collaboratively during the post-lesson discussion. A laboratory session was also arranged for various groups of students to try out their proposals with their suggested methods after being vetted by the teachers to ensure that all the safety aspects were observed. This again provided them another opportunity to work together in groups in the practical context. Measurements both qualitative (reflection and survey) and quantitative (student-designed experiment and the actual salt preparation) were conducted to gather the necessary feedback from both students and teachers involved. Generally the feedback and results had been encouraging and positive.

D68-PP TR717 Does knowledge about nature of Science facilitate conceptual understanding? A proposal of instructional intervention

MA Guanzhong,

Understanding nature of science (NOS) has been advocated as a central aim

The University of Hong Kong,
HONG KONG

Keywords:
Nature of Science;
Conceptual change;
Intervention

in science education because it facilitates science content learning. However, little evidence has been provided that supports this argument. This study is to explore if conceptual understanding of physics (mechanics) could be enhanced with an instructional intervention integrated with NOS ideas, and to test the integrative theory informing the intervention design to explain its mechanisms. The intervention consists of three components: (1) class preparation, (2) class instruction and (3) assignment. Class preparation is to help review previous learning and preview forthcoming lessons. Class instruction was designed based upon coordination between literature on studies of science (e.g., philosophy of science) and conceptual change in science education that informs processes students are intended to undergo and pedagogical elements each topic module would have. Students begin with constructing initial ideas about particular phenomena to explicate their prior knowledge. Then, they are guided to critically analyze and examine these ideas in terms of fit with empirical evidence, alignment in tool use for observation and measurement with science practice, consistency in defining concepts, and compatibility with existing knowledge. This contributes not only to bring about conceptual conflict, but to introduce a set of criteria for evaluating an idea as scientific or not, including structural and empirical nature of science knowledge. Next, guided by clarification of tentativeness of science explaining the necessity and benefit of idea revision, students are intended to develop science knowledge by modifying their initial ideas. Hereafter, the knowledge is evaluated against the criteria introduced previously. Finally, they are required to review how their knowledge develops and compare science knowledge with the initial ideas, in order to help understand why the former is superior to the latter. Class instruction would last for 15 lessons (40 minutes each) over a 4-week period. Assignment includes journal writing and practice to help reflect learning process and consolidate conceptual understanding. All the above content is contained in a student workbook. This study is expected to shed light on the construction of a subject matter-specific curricular model of NOS in secondary science education.

D69-PP TR718 An inquiry approach for collaborative learning on the experiences and engagement of students' learning in integrated Science, a school based curriculum

*THANG Fong Kwan (Room
Chairperson), SURIN Anne
Christina, TAN Sze Jiin, TEO
Hui Yi,
Nan Hua High School,
SINGAPORE*

Keywords:
Lesson Study; Energy;
Integrated Science; Lower
Secondary Science;
Collaborative Learning; ICT

This paper focuses on lessons using the inquiry approach. It incorporates collaborative learning on the experiences and engagement of students' learning in Integrated Science, a School Based Curriculum. The Integrated Science module was rolled out to all Secondary 2 pupils as part of the Lower Secondary Science program. It uses Environmental Science and Energy as the theme to design an interdisciplinary science curriculum. The team used lesson study to design a lesson package on the concept of Energy, to illustrate the idea and understanding drawing upon various topics from Physics, Biology and Chemistry in Lower Secondary Science. The lesson design based on 2 cycles of lesson study by teachers with different fields of expertise and the study was conducted on 120 secondary 2 express students. Activities planned comprised hands on self discovery activities, collaborative tasks and group discussion. Pre and post surveys were conducted for planned activities in the lesson study, which integrated ICT, to find out if they were fulfilling their objectives in improving students' learning and increasing their engagement level. We used the PETALS framework for evaluation.

D70-PP TR718 Formative assessment to enhance student learning and motivation in Science

*LEW Khee Guan, Levan, TAN
Swee Leng,*

Formative assessment informs teachers and learners about students' progress towards learning goals. The goal of the lesson study project was to examine

Bedok Town Secondary
School,
SINGAPORE

Keywords:

Formative Assessment;
Assessment for Learning;
Rubrics; Lesson Study;
Inquiry; Osmosis; Science

how formative assessment could enhance student learning of the concept of Osmosis in science. In the research lesson, a team of teachers designed an inquiry-based learning experience which included a series of learning activities with an accompanying video, hands-on model and self-assessment worksheet. Through an ethnographic-based lesson observation and reflection, teachers refined the lessons to improve student learning. Feedback obtained from the formative assessment rubrics helped students and teachers reflect the extent of learning vis-à-vis the learning goals. As a result of instructional changes made to enhance the facilitation of students' use of the self-assessment rubrics and to provide a more conducive learning environment, students gained confidence and were more engaged and motivated in their learning.

D71-PP TR718

*ABDUL RAHMAN Noor
Sarah, AMIN Juni Liyana, EK
Kim San Glen, LAM Yow Lan,
Chung Cheng High (Main)
School,
SINGAPORE*

Keywords:

Biology, journey,
pedagogies, flipped
classroom, lesson study,
teaching, learning, questions

The Lesson Study journey of a team of Biology teachers at CCHMS

Within a short span of two years, the Chung Cheng High School (Main) Lesson Study journey by the Biology Department has been a constantly evolving, dynamic and enriching one. The aim was simple: What can the department do to bridge the learning gaps or difficulties encountered by the students? In the first year, teachers noticed that amongst our non-physics students there was a common 'breathing mechanism' misconception. Hence, teachers crafted a lesson packed with hands-on activities like data-loggers and models, aimed at visually manifesting the interplay between pressure and volume in the thoracic cavity. This paper will discuss and present some of the valuable gemstones we picked while planning, executing and reviewing the lesson study cycle. They include teachers' resources (i.e. school support and presence of knowledgeable others), teachers' deliberation (i.e. planning and discussion), capturing evidence of learning (documentation and exploring new task/s) and crafting relevant assessments. The team found that lesson study gives enormous benefits to our students. Furthermore, it encourages teachers to revise and revisit our mode of delivery to provide quality and holistic education. Moving forward, the department felt confident enough to expand the scope of lesson study to focus on the needs of a wider population of students in 2012. In addition, the team graduated to address an entire topic versus a subtopic in 2011. This year, we identified that our students have problems giving complete answers to essay and open-ended questions. To tackle this, the team decided to adopt a popular teaching pedagogy, commonly termed as 'Flipped Classroom'. Students will watch a series of pre-recorded videos on the topic 'Excretion' at their own time. This will free up curriculum time for teachers to surface students' misconceptions, consolidate their learning and guide them in answering questions. This paper will also discuss our students' responses to the new teaching pedagogy as well as statistics to quantify their learning.

D72-PP TR719

*TAN Keok Kee (Room
Chairperson), PEK Geok Kim,
WONG Chun Kiat, NG Heow
Joo,
Jurongville Secondary School,
SINGAPORE*

Keywords:

Lesson Study; learning of
Mathematics; Upper
Secondary Normal Academic
classes; IT

Lesson Study: to enhance the learning of upper secondary Normal (Academic) Mathematics through using information technology

This examination centers on teachers working collaboratively on a small number of "study lessons". Working on these study lessons involves planning, teaching, observing, and critiquing the lessons. To provide focus and direction to this work, the teachers select an overarching goal and related research question that they want to explore. This research question then serves to guide their work on all the study lessons. Jurongville Secondary has embarked on using lesson study in the first semester of this year to enhance the learning of Upper Secondary Normal (Academic) Mathematics through the use of Information Technology. The IT software used includes GEOGEBRA, Geometer Sketchpad and internet search engines for relevant information. We conducted study lessons on selected Mathematics topics. These topics

included 'Trigonometric Ratios, Further Trigonometry and Vectors'. In order to be more objective about our lesson study, we incorporated an action research by using a Quasi Experiment on two classes of each of the three levels of Normal Academic. One class was a project class and the other was a control class. Based on the initial data obtained from our action research, we are pleased to note that the results are very encouraging. Although we are still in the middle of our research, we remain confident that lesson study will enhance the learning of Mathematics in Upper Secondary Normal Academic classes. We hope that we will be able to share with all educationists about what we have learnt so that all can benefit.

D73-PP TR719 Leveraging on assessment for learning (AfL) in the teaching and learning of Trigonometry

*RAMAN Puvaneswari,
AHMAD Fauziah, CAI
Zhemín, TAN Ying Yin,
Westwood Secondary School
HASSAN Nur Faidah,
Boon Lay Secondary School
CAI Zhiwen,
Juying Secondary School
CHUA Cheng Bee, MD
KHALID Nur Aida,
Pioneer Secondary School,
SINGAPORE*

Keywords:
Assessment for Learning;
Mathematics; Trigonometry

This lesson study is a collaboration between Mathematics teachers from four different secondary schools in the West 3 Cluster, Singapore. This project aims to reinforce our secondary three normal (academic) pupils' conceptual understanding of basic Trigonometry and address their misconceptions, by leveraging on Assessment for Learning or AFL, as the main pedagogy. The audience will be brought through the processes involved in implementing AFL in the curriculum as well as the challenges faced by the team. According to Lee, C. (2006), AFL is "a way of shaping learning using evidence of pupils' understanding" (p.43). Black, Harrison, Lee, Marshall and William (2004) have defined AFL as any assessment that has, as its main priority, the promotion of student learning rather than ranking, or accountability, or of certifying competence. According to Marshall and Drummond (2006), implementing AFL is actually difficult in practice. Despite this, the team decided to take on the challenge of using AFL as a student-focussed approach in the teaching and learning of Mathematics. This lesson study involves key elements of AFL, which include completion of an authentic task and the use of rubrics to assess pupils' level of attainment in specific skills. In addition, self-assessment and feedback from peer assessment tasks in this study allowed our pupils to evaluate the quality of their work, hence promoting responsibility for their own learning. Through groupwork in the research lesson, the authentic task and presentation, there was also provision of a safe and friendly environment for learning to take place. The research lessons were conducted in three different schools within the cluster. Although this posed a logistics challenge, it helped to strengthen the 'rigour' and 'richness' of the study, providing more opportunities for looking at diverse results, both qualitative and quantitative. The data and information collected will further help the team to modify teaching and learning activities.

D74-PP TR719 Drawing and interpreting distance-time graphs: Learning Study Report 2012

*AMANUDDIN, Mohammad
Amali,
Ministry of Education,
BRUNEI DARUSSALAM*

Keywords:
Learning Study; Graph,
Variation Theory

Distance-Time graph is one of the topics under Travel Graphs targeted to Year 9 general program students. The objectives of learning are students should be able to draw and interpret qualitatively distance-time graph. While students may be able to create a graph given a table of data, they often have difficulty making sense of what the graph is showing, once it is made. Hence, the mathematical goals include:
i) Understanding how different motions appear on a graph
ii) Understanding how the slope/s of a graph relate to the motion it represents
With the application of Variation Theory under Learning Study, the team discusses how the lesson will be carried out and types of activities suitable for the students. In one of the activity, students will distinguish and interpret

horizontal line as stationary, slopes as uniform speeds, convex curve as decreasing speed and concave curve as increasing speed. Introducing various graphs for students to consider will also help enhance their understanding. Students need lots of experience looking at graphs that display more than one variable to become accustomed.

The critical aspect in this study is for the students to be able to draw and interpret distance-time graphs through guided instructions in the classroom. Data collected from pre-test and post-test are crucial for the team to analyze the effectiveness of the lesson and see the student's progress before and after the lesson.

Mastering the skill to analyze and interpret distance-time graphs will benefit a lot as it helps the students solve problems on distance-time graphs. Furthermore, its application in the topic is essential as a pre-requisite to find the speed of a moving body from the distance-time graph.

D75-PP TR720 Structured conversations about lessons: a case study on the pedagogical coaching approach at Ngee Ann Polytechnic, School of Business and Accountancy

*TAN Beatrice Li Khoon (Room
Chairperson), YAP-TOO
Anna SH,
Ngee Ann Polytechnic,
SINGAPORE*

Keywords:
Communities of practice;
Coaching; Case study;
Lesson Observation;
Structured Conversations

There are numerous studies on the development, mentoring and coaching, and retention of beginning teachers but few examined the professional development of teachers beyond their initial years. How can beginning lecturers be put on a development roadmap that could transform them into core members of their professional community, and excellent lecturers? How do we develop Communities of Practice where both the development of beginning lecturers and core team members may interact? These are questions the authors attempt to answer through the design of a professional development initiative at Ngee Ann Polytechnic, called Pedagogical Coaching. The case study details the Pedagogical Coaching framework, a modified Lesson Study/Observation approach. Central to this framework are cycles of lesson observations, where members in this community come together to collaborate with beginning teachers in planning, examining and improving their lessons, and reflections on the lessons and their students' learning. The paper also describes the phases of this lesson study/observation approach and presents lessons learnt by a team of academic staff during a pilot implementation at the School of Business and Accountancy. Whilst the intent of this pilot was to establish the roles of the coaches and collaborating teachers, as well as to refine the goals and key elements (abbreviated G.R.O.W.) in the framework and the lesson study/observation process, a key outcome was the development of structured conversation pointers and observation areas for the different phases of lesson study/observation for different types of lessons. Participants in the initiative found that guided observation and quality conversations about lessons that are studied, are instrumental to the success of the Pedagogical Coaching process, and their reflections and learning in this community of practice. The value of this initiative cited by participants include better focused professional development; heightened "power in their observation lenses" to examine student engagement, teachers' lesson design and delivery, and coaches' competence to guide observation and reflections; more insightful reflections at individual and team levels; and enhanced lesson design and delivery for students' thinking, learning and engagement. These conversation starters and observation foci are refined and shared in this case study to guide newcomers to the Pedagogical Coaching initiative.

D76-PP TR720 Learning activities with contemplative education to promote group investigation in Consumer Education subject for Business and Computer Education students

*RUMPAGAPORN Methinee
Wongwanich,
Kasetsart University,
THAILAND*

Keywords:
Contemplative Education;
Learning Activities through
Group Investigation;
Consumer Education Subject.

The objective of this classroom action research was to develop students' learning activities with Contemplative Education Concept to promote learning group investigation through learning group process. The researcher developed six learning activities, including 1) Problem Identification 2) Problem Selection with Group 3) Finding Ways to Search Information and Knowledge 4) Searching Information and Create new Knowledge 5) Group Presentation, and 6) Results and Presentation Evaluation. The research population was 12 bachelor degree students who registered in Consumer Education class in Business and Computer Education Major under Department of Vocational Education in second semester in academic year 2010. Data were collected by classroom learning observations, self and group learning reflections, dialogue with deep listening, writing journal, and group record that were analyzed by content analysis method. The main research findings found that students were facilitated by classroom teacher to support students' thinking skills, students' searching and creating new knowledge skills and students' group working and presentation skills. Students had opportunity to identify problems or select interested situations, to consider problems through Group Investigation Process with searching information and creating new knowledge, presenting results or conducting relevant knowledge, concluding and evaluating new knowledge, and applying new knowledge with relevant situations. Interestingly, teacher created and applied six learning activities through Group Investigation learning and teaching with Contemplative Education Concept by using different learning medias and a variety of learning sources to promote students' thinking skills and group working skills by group member working and students' responsibility dividing.

D77-PP TR720 Students' varying ways of understanding an accounting concept: A case study of students' learning development in Higher Education Business Programme

*ROVIO-JOHANSSON Airi,
University of Gothenburg,
SWEDEN*

Keywords:
variation theory; conceptual
learning; knowledge
development; teaching;
didactic knowledge; higher
education

The case study investigates undergraduate students' knowledge development. It is a longitudinal study conducted among a sample of Swedish students enrolled in a three-year Business programme in Higher Education. The study investigates the students' knowledge development of a basic concept in accounting by focusing on their problem solving processes. The theoretical framework consists of phenomenography and variation theory. Empirical data are derived from 27 interviews with the sample of nine students during the higher education programme. Each year students' understanding of the concept is investigated. By their third year in the programme three conceptions were found indicating the qualitative differences of students' knowledge development: (1) fragmented insufficient knowledge; (2) algorithmic knowledge; and (3) the ability to make judgements and estimations of the influence of contextual factors in problem solving. The progression of students' knowledge development each year was depicted in patterns of variation of two critical aspects, efficiency and profitability, as varied or invariant aspects of the learning object. The scientific implications refer to widening the students' awareness of critical aspects of the learning objects. The educational implications relate to reorganized learning and teaching opportunities offered the students. Implications of the findings are discussed and further research in the area is called for.

- D01-WO TR 701 Problem solving using Polya's method**
TAM Jin Hui, HO Le Lian, Daphne, KOH Li Ping, CHIJ Our Lady Queen of Peace, SINGAPORE
Keywords: Primary School; Mathematics; Polya; Heuristic Problems
- A group of Primary 4 Mathematics teachers conducted a lesson study with the aim of assessing pupils' reflective skills in terms of articulating the thought processes that they had used in solving heuristic problems using the Polya's problem-solving method. Two mixed-ability P4 classes participated in this study. The findings of the study revealed that with more scaffolding and guided questioning, pupils were better able to articulate the thought processes they had employed in solving problem sums using the Polya's problem-solving method. Such training to reflect and pen down their thought process would be useful for pupils not just in Mathematics but also in other subjects as it compels one to think in a systematic way on how his/her answer is derived, convincing him/her on the accuracy of the solution. In this workshop, the group hopes to share this effective strategy with teachers who have difficulty teaching problem solving.
- D02-WO TR 501 Thinking 3.0 - A visual and multi-dimensional "thinking" tool kit to analyse and discuss social issues**
ONG Bernard, Shepherding Children Hearts Llp, SINGAPORE
Keywords: critical thinking, thinking tool, social issues
- The workshop aims to bring participants through a discussion on: History and origins of higher order thinking and critical thinking; Benefits and limitations of conventional thinking tools; A new and balanced way of thinking (thinking infused with feeling). Participants will be able to use the "finking" tool kit developed by the author to analyse a social issue, by considering the analytical and discrete dimension, and also the holistic and affective dimension. The "finking" tool kit is originally developed for Singaporean students to help them think visually, by considering the analytical and discrete dimension, and also the holistic and affective dimension of a problem or issue. Participants in the workshop will first be led through a discussion on the: History and origins of higher order thinking and critical thinking; Benefits and limitations of Thinking 2.0. Next, the facilitator will introduce a new and balanced way of "finking" (Thinking 3.0). Participants will finally be given a case that describes a social issue, and they will be using the "finking" tool kit to analyse it, and provide their response.
- D01-PO It's all about ME! (Meaningful, Excitement, Engagement, Extension)**
LOW Leng, NEO Shufen, TAN Yen Yen Jenny, MOHAMAD Imran, Tampines Secondary, SINGAPORE
Keywords: Information & Communication Technologies (ICT); engagement; NA/NT
- The use of Information and Communication Technologies (ICT) to support teaching and learning is not new. Multi-media presentations, interactive whiteboards, video and game software have already been used in many classrooms to help the students learn better. The emergence of new technologies has made us more connected with the world, sharing and communicating information through various Web 2.0 tools. There is a greater pool of the Normal Academic/Technical (NA/NT) students who are kinesthetic learners. To engage these students and prepare them for the 21st century environment (which includes being critical thinkers, collaborative and self directed), the team explored how the teachers can facilitate learning in English and Mathematics (core subjects) through the use of ICT. In the process of designing the lessons for these two core subjects, we take on a lesson study approach for the teachers to observe and refine the lessons and provide insights on how the students learn. The teachers' learning and development journey is crucial in providing student-centric support to the students' learning. It is important to be aware of the classroom environment and how to facilitate the learning process for the students to interact as this may affect the motivation of students (Boekarts, 2002). The research focuses on

understanding how the classroom environment and pedagogy can impact on the learners' engagement level and outcomes. Engagement is defined by Theresa Akey (2006) as “the level of participation and intrinsic interest that a student shows in school and involves both behaviours (such as effort) and attitudes (such as motivation)”. The pedagogical approach taken is to engage the students through hands-on activities via ICT tools such as the use of iPads and the interactive white boards which allow for collaboration in ways that support the development of the 21st century skills. This approach also aims to create a more interactive and questioning class environment, leveraging on IT so that the students would enjoy learning through self-discovery, experience success in learning, be more self directed in their learning through getting timely feedback and given opportunities to work in teams.

D02-PO

*CHENG Edwina, LIM Beng
Hua Alan, JAMAL Mohamad
Nazri, CHIN Li Li, WONG
Ryan, SOH Meng Le, ABDUL
RAZAK Muhammad Yasin,
HAMZAH Muhammad Hafiz,
Compassvale Secondary
School,
SINGAPORE*

Keywords:

at-risk; time out
programme;special
programme;discipline;self
esteem

The impact of special programmes for at-risk kids (Isparks)

In March 2008, the Ministry of Education (MOE) of Singapore introduced several measures to reduce the drop-out rate of students by strengthening the engagement of our students and providing more support and resources to schools. Two of the measures that were implemented are 'Supporting earlier intervention through identifying and monitoring students at-risk' and 'Enhanced Guidance and Support through “Time-out Programme”'. This paper shares the learning uncovered by Compassvale Secondary School in identifying and monitoring of students who are at-risk of dropping out of school and the effectiveness of the intervention strategies that were made in reducing the drop-out rates of students. To identify students who are at risk, a self-esteem test (adopted from The Song and Hattie Self Concept questionnaire, 1992) was administered to secondary one student at the beginning of the year. The self-esteem test was used as the research from Dr Garry Tester ('The Sports Challenge International Programme for Identified 'At Risk' Children and Adolescents: A Singapore Study', 1999) identified that low self-esteem would lead to physically and socially destructive behaviours and issues such as low level of confidence, poor academic results, committing many/serious disciplinary offences, poor relationship management in school and at home which are usually the precursor to a student dropping out of school. A time-out (intervention) programme was customized for this group of students. An action research was subsequently conducted to measure the effectiveness of this programme in improving specific key areas of a student's life, as indicated in the questionnaire as defined by Dr Garry Tester, which in turn would reduce the risk of them dropping out of school.

D03-PO

*LEE Shok Mee,
SEAMEO RECSAM,
MALAYSIA*

Keywords:

science lesson study project;
collegial collaboration;
professional growth

Enhancing teacher professional development through Lesson Study: The case of Penang Science teachers

Today's teachers need high-quality professional development in order to provide instruction that can lead to improved student learning. Otherwise teachers risk being irreverent challenged by the various modern sophisticated media of instruction. Even the paradigm of cascading style of professional development seems limited in its capability to achieve teacher growth. A growing body of educational research suggests that effective professional reform is classroom-embedded, collaborative and ongoing in line with current development. One such alternative is lesson study, where teachers work together conversing with their colleagues about teaching and learning as they design lesson, watch each other teach, and reflect on the process. Lesson study has been practiced in Japan for more than a century, and presently adopted by many countries. In the case of Malaysia, certainly in Penang, the implementation of lesson study in science was almost nonexistent until last year, when SEAMEO-RECSAM embarked on establishing a science lesson study project in collaboration with five selected local primary and secondary

schools in Penang. This science lesson study project aimed to introduce the lesson study process to school science teachers and other stakeholders, and establish models schools that would showcase the lesson study process as a strategy for enhancing teacher professional development. This qualitative design of the research study focused on exploring: (1) How does teachers' engagement in lesson study affect their instructional practice, knowledge of science and student learning? (2) How do teachers' beliefs and attitudes about teaching and learning change after participating in the lesson study process? (3) What conditions support the successful adoption/adaption of lesson study process in schools? This paper will attempt to address these questions and also highlight some recommendations on how lesson study as a form of professional development can be successfully implemented in Malaysian schools.

D04-PO

KARYEO Roshidah,
Jurong Primary School,
SINGAPORE

Keywords:
Professional Learning
Community; Lesson Study;
Action Research; Professional
Development

A professional learning community of hip teachers and cool students

Professional Learning Community has taken on a new sense of importance and urgency in the light of rapid and wide-scale educational reforms in Singapore. More schools are embarking on the establishment of professional learning communities with the rationale of building a learning culture in schools, ensuring ownership of students' learning and supporting collaboration amongst teachers. Being a Pilot PLC school, our journey has taken on a meaningful path, growing in strength and evolving into a form that has become uniquely ours. From adopting the disciplines of the Learning Organisation to using Action Research and Lesson Study, and integrating both development tools, our teachers' professional development has levelled-up as they are able to move away from being isolated practitioners to being collaborative, hence improving curricular practices and maintaining the focus on helping all students learn. This sharing highlights the nuances involved in engaging a whole-school approach towards a PLC. A structure that is supportive and grounded on innovation encourages and fosters teacher collaboration that will in turn enhance student learning.

D05-PO

*HENG Tze Wei, OON Tze
Ying, DIVAKARAN
Kuppusamy, LOH Serene,
TAN Cai Yu,*
Sengkang Secondary School,
SINGAPORE

Keywords:
PBL, SDL, CoL, ICT, problem
based learning

Investigation on the use of problem based learning infused with ICT, COL and SDL to learn mathematics

The increasing demands of the 21st Century prompted the need to revamp the teaching and learning pedagogies used in schools. This action research aims to test the effectiveness of a Problem Based Learning (PBL) project infused with ICT, Collaborative Learning (CoL) and Self-Directed Learning (SDL) to learn Mathematics. In this research, secondary three students worked in groups to formulate their own hypothesis, carry out their plans to address the authentic problem statement given and come up with a proposal. All discussions and reflections were done using the online platform. At the end of the project, students had to present their research process, findings and recommendation. Through this action research, the benefits of the integration of different learning strategies were harnessed to elucidate the relevance of Mathematical concepts, increase the engagement level of students in their learning and provide an opportunity for students to hone their 21st Century Skills.

D06-PO

SALVADOR Ivy Gay,
Pampanga Agricultural
College,
PHILIPPINES

Keywords:

Problem-Based Lesson Study: Effects on Mathematics teachers' perspectives and students' creativity and self-efficacy

Despite the encouragement of many researches on the positive effects of Problem Based Learning (PBL), using this teaching approach remains unpopular in many schools due to its limitations. Hence, this study will be undertaken to determine if such limitations can be addressed by incorporating Lesson Study to PBL. This research would like to find out the impact of this

Problem-based learning;
Lesson study; perspectives;
creativity; self-efficacy

new approach which will be called Problem-Based Lesson Study (PBLs), on Mathematics teachers' perspectives and the students' creativity and self-efficacy. The study will employ both qualitative and quantitative methods of research. The qualitative part will deal on the perceptions of the teachers and the students on the use of Problem-Based Lesson Study through open-ended questionnaires and interviews. The quantitative method will involve the pretest-post test experimental design to determine the effects of the experiment on the teachers' perspectives while quasi-experimental design of research will be used to determine the effects of the experiment on the students' mathematics creativity and self-efficacy. The study will further determine the relationship among mathematics teachers' perspectives, students' creativity and students' self-efficacy. The student participants in the study will be six intact classes in the secondary level who belongs to three different mathematical learning abilities categorized as low, average, and high. The teacher-participants will be all the mathematics teachers of those six classes that will be chosen as part of the experiment. The experiment will be conducted for two grading periods or approximately four (4) months.

D07-PO

TAN Ping Ping,
Fuchun Secondary School,
SINGAPORE

Keywords:
direct proportion; relationship
between variables; constant

Understanding the relationship between X and Y in direct proportion with or without evaluating the value of constant K

This project adopted an alternative pedagogy and strategy in allowing the students to develop a better understanding of the relationship between two variables in direct proportion with or without evaluating the value of the constant, k. The research lesson addresses the lack of ability for average students in solving direct or indirect proportion questions where the constant k in the relationship between two variables cannot be evaluated explicitly. The team explored different pedagogy and strategy in trying to simplify the concept on proportion as well to make it interesting for the students. The lesson uses the game Angry Bird in the design of the lesson activities and worksheets so as to cater to the interest of the students. Students will be guided to discuss on the effect of the constant, k on the relationship between the 2 variables and finally conclude that the change in one variable is attributed solely by the change in the 2nd variable and not the constant, k. The Mid-Year Examination results for the 2 Express classes showed that there was an improvement in the students' ability in solving direct or indirect proportion questions where the constant k in the relationship between two variables cannot be evaluated explicitly. The team sat down to discuss on how the initial lesson package prepared for the 2 Express classes can be modified to suit the learning ability of our 2 Normal (Academic) students and made the changes subsequently before conducting the research lesson for them.

D08-PO

*HARON Zainab, KU Seow
Yen, NEO Bee Lin, JAAFAR
Zaiton, TAN Eng Ling
Catherine, MAHMOOD Riza
Marfizan, ENG Stephanie,
POON Kar Tung,*
North Spring Primary,
SINGAPORE

Keywords:
Video Recording of live
lessons;Coach-
Rally;Manipulatives;3-part
routines;Cognitive:7-Steps
Strategy

Multi Strategy Intervention as a tool to help lower primary students with Mathematics word problems.

Multi Strategy Intervention is a tool employed by Primary 2 teachers to help students with advanced Mathematics word problems. The tool employs cognitive strategy whereby students are taught a 7-step process to solve Mathematics word problems. The metacognitive part of the tool consists of a three-part routine that follows a sequence of 'Say', 'Ask', 'Check'. Having a routine and step-by-step process for students to use when solving problems is useful, especially for those with learning problems, as it acts like a 'manual' which they can follow in trying to solve the Mathematics problems. Therefore, the simplicity of this 'Multi Strategy Intervention' tool is its greatest strength, as this tool provides students with an efficient way to acquire, store, and express Mathematics-related information and skills. This tool aids students in moving from concrete and representational understanding to abstract understanding. In addition, the tool facilitates independence and provides students with an

efficient, systematic method to retrieve from memory the information they have learnt. By engaging in the process of solving Mathematics word problems, students also engage in coach rally routines that further enhance their ability for mastery in solving Mathematics word problems using the Multi Strategy Intervention.

D09-PO

*TAN Seo Pheng, CHIA Chew
Hoon Ivy, AHMAD Khairil,
IBRAHIM Nursida,
Fuhua Primary School,
Singapore*

Keywords:

Foundation Mathematics;
Percentage

Learning Percentage in Foundation Mathematics

This lesson study was carried out based on the concern that pupils in the Primary Six Foundation classes were weak in understanding the concept of Percentage. Pupils' result in Revision Paper 1 showed that they had difficulty in understanding Percentage. The lesson study was carried out in Term 2, 2011. Two foundation classes were involved in the study and hence two Mathematics teachers, an 'expert' teacher and the level AED who helped with the resources, were involved in this lesson study. The lesson study focused on helping pupils acquire the concept of expressing a fraction as a percentage, calculating part of a whole given the percentage and the whole and solving to 2-step word problem involving finding the value of percentage part. In the course of the lesson study, teachers brainstormed for ideas that would help pupils in their learning of Percentage. The refined and improved lesson plan was then carried out in the second foundation class. This lesson study enables us to focus on the strategies and approach used, with the understanding of how pupils learn, our lesson plans were customised to allow our pupils grasp the concepts better.

D10-PO

*PUJIASTUTI Pratiwi,
Yogyakarta University,
SUSILO Herawati,
University of Malang,
INDONESIA*

Keywords:

The Development of Learning
Model of Guided Inquiry,
Cooperative TGT

The development of learning model of Guided Inquiry, Cooperative Teaching, and their integrations through Lesson Study, and their implementations influence on the Science process skills in Elementary School

For a doctoral research, learning instruments was developed through lesson study (LS) using Thiagarajan 4-D models, which are define, design, develop, and disseminate. The learning instruments that were developed during the third-D (Develop) then have been validated by experts, and socialized to the teachers through workshop. The workshop was initiated by presenting LS and developed learning model. The activities were followed by simulating the three developed learning model. LS activity was done through 3 steps, That is plan, do, and see. The purpose of plan is to design a lesson plan. During the activity teacher implement the designed plan. During the "See" the teacher and the observers discuss the implemented learning activity. Based on the discussion, the learning instruments were revised and improved, then be used in quasi experimental research which replace the fourth D to examine the influence of guided inquiry learning model integrated with cooperative TGT on the science process skill of the fifth grade students of elementary school who have different academic capabilities. The research used pretest-posttest non equivalent control group design. Samples were taken using stratified random sampling based on the result of the Final Examination in the National level from the population of 41 elementary schools. The schools were divided into upper-and-lower academic capabilities, and then the samples were taken randomly in which 4 classes were taken for each upper-and lower academic ability group, in which each class applies guided inquiry learning model, cooperative TGT, and combination of Guided inquiry and cooperative TGT, while 1 class applies conventional learning. Results of the analysis showed that (1) there was significant differences of science process skill for students who attended learning models of guided inquiry, cooperative TGT, and combination of guided inquiry and cooperative TGT, as well as conventional learning, (2) There was significant difference on the science process skills between students who have higher and lower academic capabilities (3) There

was no interactive influence of learning model and academic capabilities towards the science process skills.

D11-PO

LEE Pei Sze, FOO Chuan Kai, CHEONG Choi Ying, NG Kok Leong, LEE Mau Kin, JAMAIL Siti Aishah
Jurong Primary School,
SINGAPORE

Keywords:
Lesson Study; Primary
Science; Strategies

Idea construction to answer Science questions

The topic on Forces and Types of Forces was selected as the research basis for this Lesson Study. Forces and Types of Forces are P6 Science topics and there is a need for P6 pupils to acquire the right skills to comprehend these questions in the OE section of the P6 Std Science Exam and answer them correctly. From the observations of previous years, the team has seen a trend in P6 pupils not knowing how to answer these questions with sufficient explanations. As a result, the pupils are not awarded full marks for such questions. These questions carry a high weightage in the OE section of the paper and the team sees a need to help pupils acquire the skill of comprehending and answering them. The team imparts the concept of idea construction based on a linear diagrammatic model (known as the PLAN strategy) to the class in the Research Lesson. The teacher conducting the RL leverages on both a teacher-directed deductive approach and a peer learning strategy as key instructional strategies.

D12-PO

XU Huimin, PHUA Cheryl,
Fengshan Primary School,
SINGAPORE

Keywords:
analyzing skills; instructional
procedures; formative
assessment; quality
questioning

Explicit teaching of Science process skills using formative assessment

This paper describes how we use lesson study as a platform to assess the benefits of explicit teaching of analyzing skills to the pupils. The aim is to improve pupils' ability to answer experiment related science questions. Data collected from pupils' works as well as the teachers' reflections are used to modify and improve on the instructional procedures for future teachings. According to Dick, B. (2001), action research is both a change methodology and a research methodology within a single process. Hill, A.(2003), explains that science process skills refer to the underlying skills and premises which reflect the scientific method conducted by scientists. Our paper will give an overview of teaching of analyzing skills and reviewing the pupils' responses for our instructional procedures using formative assessment and quality questioning.

D13-PO

SIKDER Shukla,
Monash University,
AUSTRALIA

Keywords:
Scientific concept, Toddler
Play, Everyday family
Practices

How does knowledge create through practices? Toddler development of scientific concepts through play activities as part of everyday family practices

Play is a mirror of what is important to a culture. Children usually play within the home as part of taken-for-granted established family practices. According to cultural historical theory, play depends on the historical conception of the position of the child in society, with regard to cultural activities, peers and adults. The concept is not a usual mental practice, but a difficult and proper act of thinking which cannot be mastered through simple memorization and there are two dimensions of concept development - everyday concepts and scientific concepts, which are dialectically related. As said by Vygotsky, scientific concept is non spontaneous concept whereas everyday concept is spontaneous. For young children, concept formation foregrounds the value of everyday circumstance; however adults can support children to develop scientific concepts. However, empirical research illustrates that children aged from birth to three have received very limited attention worldwide, particularly about the scientific concept formation of toddlers. The focus of the study is to establish how play leads the development of toddlers' scientific concepts during everyday family practices. Specifically, the study will investigate the involvement of parents, other adults, siblings and peers for developing toddler's scientific concepts in family play. Vygotsky's cultural-historical research has been taken up for the theoretical framework of this research. Hedegaard's dialectical-interactive approach has been applied for analysing

data. This paper analyses an event of ARYAN (about two years old boy) and his parents playing in regular family play in order to identify how scientific concepts can be developed through their everyday play. This paper looks at the various aspects of family play, and ends with a discussion of the effectiveness of parents playing with children, to determine the pedagogical strategies parents should assist children in terms of cultural-historical theory. The video observation was the tool for data collection and Visual Vivencias has been used to interpret video data. According to cultural-historical theory, it is argued that parents or other adults or more competent peers as mediators can support young children to develop the scientific concept in play. This study will contribute to the development of pedagogical approaches in early childhood education.

D14-PO

*LING Yi Chin, AU Lei San
Michelle, SONG Yee Hong,
LIU Ying,
St Anthony's Primary School,
SINGAPORE*

Keywords:
Integrating; Dialogue

Integrating dialogue into Composition writing for Primary 3

This project is about incorporating dialogue into composition, so as to further enhance the composition. Through role play, we hope to get the pupils to think of the dialogues they can place in their composition if they assume the role of the character in the picture. At the end of role playing, the pupils were prompted whether dialogue could enhance their expression in composition writing. We believe that pupils will be motivated to think of dialogue if they know the use of it. We applied the strategy of think-pair-share to get the pupils to work in pairs and share their ideas of coming up with interesting dialogues. Through this strategy, pupils can learn to put themselves in another person's situation and design dialogue in their composition.

D15-PO

*XIE Jiamin, SIM Chui Hua,
LIM Daw Wee, PEK Quee
Hui, TAN Kin Chiew, HUANG
Kun, KER Bee Lay,
Jurong Primary School,
SINGAPORE*

Keywords:
Lesson Study; Primary Mother
Tongue; Strategies;
Comprehension

Incorporating Adjectives (Character) to enhance students' ability in answering open-ended questions

This study aims to examine whether the incorporation of adjectives (character) in lessons helps to enhance the P4 students' ability in answering open-ended questions. Our target group is the P4 mixed-ability students as many of these students still face difficulties when attempting open-ended questions. The strategies adopted by our team centres around a demonstration in which the students take an active part. Activity sheets were specially designed to cater to the needs and ability of our students. These learning sheets aim to reinforce the adjectives taught. Teachers would conduct the lesson by first introducing adjectives. Pictures were then used to guide the students in using the correct adjectives to describe the characteristics of the character in the passage. Next, students were given learning sheets to reinforce the adjectives taught. Finally, a comprehension passage would be given. Students were split into small groups to discuss before they complete the comprehension passage independently. After completing every task, teachers would then do a review with all students. After the lesson, a review of the teaching and learning process would be conducted in accordance to students' responses in order for teachers to strategise in preparation for the next lesson. The results had been analysed according to the rating scale in answering open-ended question. After conducting the first lesson, we realised that students are more confident in attempting the questions and there is a slight improvement in the ability to answer open-ended questions.

D16-PO

*LAU Kai Yen, GOH Aik Seng
Peter, HUANG Qiu Qin,
HUANG Zhengqiang, ZHANG
Huili,
St Anthony's Primary School,
SINGAPORE*

Lesson Study on 10'C Programme in the teaching & learning of Vocabulary

This project is about investigating effective vocabulary teaching using the 10'C teaching pedagogy & learning platform. At the end of the lesson, pupils are expected to be able to understand and use the vocab learnt to make or complete sentences. Our teachers started by planning lesson and learning activities with reference to the 10'C pedagogy recommended. From the first

Keywords:
Primary, Chinese Language,
10'C, Vocabulary

lesson observation and when reviewing the writings by pupils, it was found that abstract vocabulary are not easily grasped by pupils. Moreover, we also found that there is a need to design some purposeful learning activities (e.g. let's all read together) to reinforce abstract vocabulary learnt before getting pupils to complete the writing task. Thus, in refining the lesson plan for the next lessons, we use pictures, contextual clues in reading passage at the teaching phase and purposeful reinforcement activity is put in place before pupils start on the writing task. This makes the second lesson to be more effective. However, from the second lesson observation, we also found some areas for improvements: pupils' topic of discussions or trend of thought can be easily affected by the examples given by teachers, which might limit the learning of pupils. Thus, we reached the conclusion that there is a need for teacher to plan the questions to be asked when facilitating discussions. In language learning, teacher should work towards facilitating pupils to converse in the concepts or vocabulary learnt earlier, so as to create opportunity for them to put into practical use of pupils' learning. As seen, lesson study is a cycle of continuous learning. As seen that there will never be the perfect lesson plan, but more new areas for us to think about, as we move on in our path to be reflective education practitioners.

D17-PO

ARIF Nor Zakiah,
Pei Tong Primary School,
SINGAPORE

Keywords:
AKSARA; ICT; reading skills

The usage of ICT in enhancing pupil's reading skills

AKSARA Web Portal in improving the reading skills of pupils in a learning environment that is non-pressurising and fun. As the younger generation of children are digital natives, the employment of this ICT tool is appropriate and important to assess pupils' reading skills and to test their understanding of the content and information of the reading texts. Surveys are conducted to gather data to perform a qualitative-based research. This research involves a class of Primary 2 pupils who on the average, has the capacity to read simple and short sentences. This research paper also discusses the different methods of using ICT tools which can be implemented and carried out within the classroom.

D18-PO

MAEDA Kazuma, SHOTARO
Iwata,
Hiroshima University, JAPAN

Keywords:
developing countries;
sustainable development;
lesson study; demonstration
lessons; physical education

The construction of the support model for the pre-service education in a developing country through the practice of Lesson Study in The Dominican Republic

The purpose of this study is, towards the realization of "Sustainable Development (SD) " at developing countries, to conduct a practical study with researchers in multiple fields and to build the system in which can make the study into practices with the cooperation of other countries, which leads to bring up an advanced researcher with an international point of view. The field of education targeted "Autonomous University of Santo Domingo (Universidad Aut3noma de Santo Domingo: UASD)" in the Dominican Republic. The objective was to get a clear picture of the current situation of the teacher training in the UASD educational science department by monitoring and an evaluation result, and to reveal its characteristics and problems. Through the process, the model of lesson study was constructed so that it can support the improvement of teacher training in the developing countries. This study had been carried out in cooperation with Minister of Higher Education, Science, and Technology Dominica and UASD, supported by special expenditure from Ministry of Education from 2010 to 2012. As the introduction of lesson study, an educational research group of four different subject areas (physical education, social study, science, and mathematics) set their own research question, and had demonstration lessons and conferences to improve teaching. In particular, an awareness of lesson study for teachers were raised through four field works and two trainings in Japan, which was originally the first goal of this project constructing experimental organization and making

plans. In addition, it was observed that the teachers were more aware of the significance and effectiveness of lesson study and the importance of introducing collegiality in the statement of teaching portfolio and reflection sheet, or during the discussion in meeting. Specifically, the statement of portfolio in physical education offered new insight into Syllabus design, the quality and ability of teachers and teaching methods, and student learning.

D19-PO

The study of a course in pre-service education of Physical Education with Lesson Study as a core approach: A focus on the practice of “Apparatus Gymnastics”

TAKEDA Chichiro, IWATA Shotaro, HANATANI Yusuke, Hiroshima University, JAPAN

Keywords:
apparatus gymnastics;
synchronized performance;
lesson study; pre-service education

Physical education in Japan has apparatus gymnastics as a sub-area of the subject. However, students have relatively less experience of it during physical education class from elementary to secondary schools (Kakazu et al, 2010). It leads to the situation that the students in pre-serviced education program do not have the skills for apparatus gymnastics. However, it is important for them to have teaching performance for demonstration, instruction, and material interpretation of physical education as a P. E. teacher. The purpose of this study is to have learners gain diversified perspectives on materials by giving a course in which they learn synchronized performance from each other and realize the enjoyment and pleasure of it. The subject of this study was freshman in pre-serviced physical education student (n=41). Teaching Plan aimed to improve personal skills in first 10 class hours (90 minutes per class hour), and to prepare for synchronized performance in another 5 class hours. In this class, students had to make pairs of one freshman and one junior. The method of collecting data and analysis are as below: 1) Sport Competence scale (Okazawa et al, 1996), 2) Team Building scale (Komatsuzaki et al., 2001), 3) (modified) Metacognition scale in PE (Iwata et al., 2010). The KJ method was used for the classification of data into categories by conducting qualitative research on the statements from learners in reflection sheets. As a result, the score of five factors significantly improved in Team Building ($p < .05$). Also, positive statements toward the materials were found in free description such as the pleasure and the sense of achievement for completing performance in a group and the preparing process give us the chance to teach each other. On the other hand, Sport Competence scale showed the significant improvement on the feeling of acceptance and control ($p < .01$), although there was no significant difference in physical competence and metacognition. Therefore, it is suggested that synchronized performance can enhance the cooperation of learners, which affects the positive attitude and performance improvement of it and is proved to be valuable as a material.

D20-PO

The situation and trend of the quality assurance for Physical Education Pre-Service Education in Japan: a focus on the model of Hiroshima University

IWATA Shotaro, MAEDA Kazuma, KAKAZU Kengo, Okinawa University, Hiroshima University, JAPAN

Keywords:
quality assurance ; P.E. pre-service education ; assessment

Nowadays, teacher education has been put on the global agenda, and the assessment of curriculum for the quality assurance of teacher training is the subject of more discussion. The standards and assessments for teaching profession play an important role in the quality assurance of developing P. E. teachers in Japan. The purpose of this study is to reveal the situation in the assessment of physical education pre-service education curriculum, by investigating Hiroshima University as a case study. Galluzzo and Craig (1990) gained suggestions from four main factors (Accountability, Improvement, Understanding, Knowledge) for teacher education program research and assessment. In the context of P. E. pre-service education, Metzler et al. (2000) developed PETEAP and various methods were introduced. Some of them were used in this study: pieces of bio-data, reflection after micro-teaching,

documents of teaching portfolio, course grades(GPA), interview dates and the achievement level of the Professional Standard in Hiroshima University Model (PSHUM). Some analyses were conducted as below. The reflection in micro-teaching and teaching portfolio for the pre-service education program Teaching Method of Physical Education• was analyzed. The KJ method was used for the classification of data into some categories, the naming and making the concept chart. As another step, the results of students' reflection were assessed according to the standards PSHUM. One graduate student and two faculties had member checks (Patton, 2003). For the quality assurance, it is very important to have the opportunities of reflection as the form of portfolio (e-portfolio), and its standards which can be referred to. For instance, the category of "teaching method" and "lesson planning" intended to show a considerable gap between the early and late stage in Teaching Method of Physical Education and Teaching Practice• . However, the quality assurance requires much effort in examining curriculum and the specific method of assessment and building a common understanding in all faculties. At the same time, whether the government, the Board of Education, or university will take responsibility for the work makes a big difference.

E01-SY LT1

Chairperson: *WOLF Jeanne*,
Sophia University,
JAPAN

Discussant: *FANG Yanping*,
National Institute of
Education, SINGAPORE

Keywords:

Lesson study, lesson study
research, research review

A Global lesson and learning study research symposium (Review)

The global spread of lesson and learning studies over the last decade has been accompanied by the emergence of a large body of lesson and learning study research. As a result, it is now increasingly clear that researchers and teachers around the globe conceptualize lesson studies in diverse ways and pursue a multiplicity of goals and methods of inquiry, with different local forms, grounded in diverse ontological, epistemological and methodological orientations to ways of knowing (Orland-Barak, 2009). This symposium aims to extend current understandings of research introduced in WALS 2011 such as “A Critical Review of Research on Lesson and Learning Studies in the World”, in which the presenters identified 570 lesson and learning study citations in Chinese and English (Ko and Lo, 2011) and Akita’s keynote address in which she examined about 100 studies in Japan. It also explores the substantial new body of research and practitioner inquiries, as well as practical theories (e.g. Suzuki, 2011). The main foci will be an overview the lesson and learning study research strands in English, Chinese and Japanese from the WALS 1st conference in 2005 to 2012 in classrooms, schools and communities. Each presenter will provide an up-to-date overview of their country’s diverse, multidimensional literature from their perspectives.

U.S. Lesson Study research: From WALS 2005 to WALS 2012

WOLF Jeanne,
Sophia University,
JAPAN

Keywords:

Lesson study, lesson study
research, research review

The paper will provide an overview the lesson and learning study research strands in English in the United States, from the WALS 1st conference in 2005 to 2012 in classrooms, schools and communities. The presenter will provide an up-to-date overview of America’s diverse, multidimensional literature. She will focus on lesson and learning study definitions, mapping of the process(es) and aspects that take priority. In light of this, she will offer a characterization of the research. Discussion will then focus on the implications of the research in terms of ultimate purposes and values, and emerging research trends and future directions. Not only will this be a discussion of the U.S. literature, but it will also provide a forum to nurture global dialogue.

Lesson Study research in Japan: From WALS 2005 to WALS 2012

AKITA Kiyomi,
University of Tokyo,
JAPAN

Keywords:

lesson study research,
Japanese lesson study,
research review

The paper will provide an overview lesson and learning study research strands in English and Japanese in Japan, from the WALS 1st conference in 2005 to 2012 in classrooms, schools and communities. The presenter will provide an up-to-date overview of Japan’s diverse, multidimensional literature. She will focus on the lesson and learning study definitions, mapping of the process(es) and aspects that take priority. In light of this, she will offer a characterization of the research. Discussion will then focus on the implications of the research in terms of ultimate purposes and values, and emerging research trends and future directions. Not only will this be a discussion of the Japanese literature, but it will also provide a forum to nurture global dialogue.

Learning and Lesson Study research in Hong Kong: From WALS 2005 to WALS 2012

KO Po Yuk,
Hong Kong Institute of
Education,
HONG KONG

Keywords:

learning study research,
lesson study research, critical
research review

The paper will provide an overview of the learning and lesson study research strands in Chinese and English in Hong Kong, from the WALS 1st conference in 2005 to 2012 in classrooms, schools and communities. The presenter will provide an up-to-date overview of Hong Kong’s diverse, multidimensional literature. She will focus on the lesson and learning study definitions, mapping of the process(es) and aspects that take priority. In light of this, she will offer a characterization of the research. Discussion will then

focus on the implications of the research in terms of ultimate purposes and values, and emerging research trends and future directions. Not only will this be a discussion of the Hong Kong learning and lesson study research literature, but it will also provide a forum to nurture global dialogue.

E01-PP **LT2** **Understanding those dissonances: A self-study in organizing and implementing a Learning Study in Singapore**

TAN Yuen Sze Michelle
(Room Chairperson),
National Institute of
Education,
SINGAPORE

Keywords:
Self-study; Learning study;
Teacher professional
development; Curriculum;
Science Education

This paper reports insights gained from a self-study (LaBoskey, 2004; Loughran, 2007) of a researcher-facilitator's (author) experience of organizing and implementing a collaborative theory of variation-framed learning study in Singapore. With the object of teacher learning as the development of teachers' capability to teach new molecular genetics content in the prescribed Secondary 3-4 biology curriculum, four biology teachers' experiences of participating in the learning study (a variant of the lesson study approach) were compared against that of the researcher-facilitator's. Hewson and Hewson's conceptual change (1984) provided the framework to identify and analyze instances of dissonance in the researcher-facilitator experiences, and this surfaced new understandings pertaining to the organization and facilitation of learning study. This paper presents three noteworthy areas that have emerged through the data analysis, namely, (1) the importance of curricular fit between teachers' interpretation of the prescribed curriculum and new teaching practices, (2) the choice and role of learning theory in shaping teacher's approach to curriculum and their pedagogical practices, and (3) the necessity of ongoing tensions that would promote teacher learning and concurrently support learning study as a tool for large-scale curriculum reforms. Positing a focus on praxis, the dialogical and dialectical relationships between curriculum as institution (which can be interpreted as a top-down approach to curriculum) and curriculum as practice (a potentially bottom-up approach) (Reid, 2006) will also be discussed.

E02-PP **LT2** **Public Lessons in China for enhancing teacher learning in the process of curriculum change**

WANG Qiang, CHEN
Zehang,
Beijing Normal University,
CHINA

Keywords:
public lessons; demonstration
lessons; curriculum
innovation in China

Since the implementation of the new school curriculums in 2001, public lessons, also known as demonstration lessons, have been used as a prominent strategy in the Chinese context to demonstrate good teaching and illustrate how curriculum ideas can be put into practice. Although the benefits of public lessons are well recognised by both teachers and teacher educators as a way to promoting good teaching, they have also provoked quite a lot of criticisms for their often 'artificial' contexts, staged performances, and competitive nature. In this talk, I will give a brief overview of the use and development the public lessons in three stages since the 1970s and describe the different characteristics of each stage. Then, I will introduce a typical public lesson used during the 21st century curriculum reform and how they have been used to promote new curriculum ideas for teacher training along with discussions on the pros and cons about the use of public lessons by scholars and teacher educators. This is followed by a survey report on secondary English teachers' attitudes towards change, the difficulties they face during the curriculum change and their expressed training needs along with discussions on the need to reframe public lessons. Based on the above discussions, I move on to describe a reframed public lesson approach for enhancing teachers' professional learning developed in the last few years based on a more thorough understanding of the nature of curriculum change and the way how teachers can learn together professionally through public lessons. Finally, the conditions for the best use of public lessons and its underlying theoretical

basis are discussed and summarized.

E03-PP

LT2 Teachers' theoretical awareness after conducting one Learning Study cycle

PALLA Marta,
Kristianstad University
HOLMQVIST OLANDER
Mona,
University of Gothenburg,
SWEDEN

Keywords:
phenomenography, variation
theory, learning study,
teacher development

In this project two learning study cycles in two different groups of teachers and their students are the point of departure of this interview study. The three female teachers (n = 3) who were involved in the implementation of Learning Study Project 2011, were interviewed in 2012 with the aim of studying what kind of theoretical learning they seemed to have or have not developed. The theoretical framework used was variation theory, which is the guiding principle for conducting learning studies. However, the results showed decreased scores at the post test, instead of the expected increase, and the hypothesis was that the teachers might not have gained theoretical knowledge at a point where they could understand how to use it to design instruction. The following questions were used in the interviews: 1) What does variation theory mean to you? 2) In what way do you use the theory to guide your planning? 3) What implications does variation theory have on your teaching? And finally 4) What do you think are relevant to students' learning from a variation- theoretical perspective? The interviews lasted between 25-45 minutes, they were recorded and verbatim transcribed, which contributed to a familiarity with the empirical material. Phenomenography was used to analyze the outcomes, aiming to discern qualitatively distinct categories. The results showed a correlation between the students' learning outcomes in the learning study lessons and the teachers' theoretical knowledge in terms of those teachers expressing understanding the theory as an instrument to use methods instead of a way of seeing the learning object itself also have a lower increase in scores from the tests made by the pupils.

E04-PP

LT3 Lesson Analysis: Sharing the values of high quality lesson

KUNO Hiroyuki (Room
Chairperson),
Aichi University of Education,
JAPAN

Keywords:
Lesson Analysis; High Quality
Lesson; Mathematics; Child-
Centered Learning; Japanese
Lesson Study

Lesson Study is effective to promote Teachers Professional Development and to create Collaborative Community among teachers. However sometimes LS is misunderstood and narrow-minded as like "establishing P-D-C-A process of Lesson Study Cycle". After 10 years development of LS in the world, LS Pedagogy requires new perspective for High Quality Lesson and its distribution. Methodology: "Lesson Analysis" is a useful method for deeper understanding of lessons. This method is well-known and familiar among Japanese teachers to improve their INSIGHTS into lesson. Process of the Lesson Analysis: 1. to transcribe lesson from video or other recording equipment 2. to divide lesson into some sessions according to phase of lesson 3. to find some significant or meaningful points/questions from sessions 4. to read transcription carefully and to find out outcome (interpretation) 5. to observe video script for recalling lesson, if required. Data Collection and Analysis: The lesson "Time-Speed-Distance" for 6th grade mathematics was conducted in June 2009 by Mr. H. Hiwasa who is a skilled teacher at Nara Women's University attached Elementary School. The lesson has two significant characteristics: good quality example to clarify values of Lesson Analysis; and High Quality Lesson oriented by "child-centered" concept that is historically designated development in Japanese Lesson Study history since 1920's. Discussion: Benefits of LA for teachers: to be able to read the lesson transcript repeatedly and find out meaning of the lesson deeply; to be able to choose and concentrate on some valuable sessions in the lesson; to be able to store up the lesson long time; to be able to share the lesson to someone who did not observe it; to be able to look over whole lesson in one view. Conclusion: Presenter focuses not only on the practical achievements of LA, but also on its philosophical and pedagogical observation of "individual children" in the lesson. On the session presenter wants to share

and “re-experience” the values of High Quality Lesson with audience by way of Lesson Analysis.

- E05-PP** **LT3** **Lesson Analysis for changing landscape of research on teaching**
MATOBA Masami,
Nagoya University,
JAPAN
- Keywords:**
landscape of research on teaching, pedagogy, teaching practice, research method, lesson analysis
- The purpose of this paper is to examine the possibility of considering ‘Lesson Study’ as a scientific research in education. Emphasis is placed here to recognize different perspectives of applying lesson study, especially in different educational contexts, and how we can expand outcomes of ‘Lesson Study’ process and hence call as generalized knowledge. From a pedagogical perspective, lesson study lies somewhere between the discovery of pedagogy and the rediscovery of it, at the same time lies at the discovery of the true nature of pedagogy (as pedagogy). For classroom practitioners, lesson study is a way to try to resolve the problems that are directly confronted in classes, and is an opportunity to build a potential of future teaching practices (as teaching practice). Therefore, lesson study, viewed from the perspective of research into teaching practice, gives the practitioner an awareness of difficulties in practical situations, and creates the opportunity for reconsidering them with greater clarity (as research on teaching). Viewed from the perspective of research methods, lesson study is an opportunity to develop and refine tools and research methods that are found in practical research (as research methods).
- E06-PP** **LT3** **Lesson Analysis: Tool for skilful teachers to unravel students' black box?**
JEE Elaine, NG Ding Zhong,
LEE Jessie, DING Ying Jye,
TAY Hester,
Bukit Panjang Government High,
SINGAPORE
- Keywords:**
Lesson Analysis; Future Problem Solving; 21st Century Competencies; Professional Development
- This is an action research project on Lesson Analysis. It is an extension of the Bukit Panjang Government High Sschool (BPGHS) Talent Management Programme (TMP) 2011, and a follow-up to the NIE-BPGHS Lesson Analysis Collaboration by Ms Elaine Jee, a Teach Less Learn More (TLLM) *Ignite!* Research Activist in 2011. Lesson Analysis, which is based on observation and recording of lessons, provides a research method for identifying potential features of teaching and learning to obtain meaningful findings that can be widely shared by teachers, and educational stakeholders [Shibata, WALSO7]. It has three purposes: to improve lessons, for professional development of teachers, and to create a theory in pedagogical research. This action research project aims to provide more heuristic and hermeneutic evidence about the benefits of explicit instruction of future problem solving skills on students’ learning motivation and academic competency. In particular, lesson analysis develops teachers’ capacity for self-assessment so that they can become reflective practitioners and ‘Skilful Teachers’ [Saphier et al., 2007], who can effectively facilitate students’ higher order thinking. This is in line with the school’s Strategic Thrust 3: ‘A Community of Teacher Leaders’. Incidentally, the project also aims to examine the impact of future problem solving on holistic engagement of students in English Language, Mathematics and Science education for their attainment of the Curriculum 2015 Learning Outcomes.
- E07-PP** **LT11** **Creating a meaningful composition in Art**
ONG Hui San Eileen (Room Chairperson), LIN Kaili, LIM Kah Pheok, Salihah JALIL,
Northbrooks Secondary School,
SINGAPORE
- Keywords:**
creating; meaningful composition in art; art
- Under the constraint of time, Art teachers sometimes provide too much assistance to students in composing a design. As a result, students’ creativity may be stifled and they may not have strong ownership of the artwork they create. Students are unable to understand and compose a design that is aesthetically pleasing using elements of art and principles of design. Usually when tasked to compose a layout, students do not put in much consideration of what they have learnt. Very often, the layouts created by them are rigid and lack creativity. Having observed this common difficulty faced by students in

composing a design and their lack of confidence, the teachers reviewed ways of teaching to enhance students' learning of principles of design, dominance, contrast and rhythm. In the lesson planning phase, the team explored a variety of strategies such as show-and-tell via whiteboard, ticket-to-leave, introduced students to various artists' work, used the Feldman approach to increase their visual literacy and included hands-on activities to engage and ensure students' learning. At the end of the lesson, the team gathered students' responses on 'post-it' notes and found that they had better understandings of design principles. Also, their final artwork designs displayed their ability to compose more confidently. In addition, the students displayed a sense of joy (through their facial expressions) when they saw their final work.

E08-PP LT11 Use of Lesson Study to improve the pedagogical approach for idea conceptualization for D&T

YAP Kim Hon, HU Bishi,
Bedok Town Secondary
School,
SINGAPORE

Keywords:
D&T, Idea Conceptualization

Idea conceptualization in Design and Technology (D&T) coursework often involves higher order thinking processes which can be challenging for our Secondary 4 Normal Academic students. To address this learning need, the D&T Professional Learning Team (PLT) embarked on Lesson Study to seek ways to improve the facilitation of idea conceptualization in coursework. The PLT proposed a pedagogical approach, which uses simple Cooperative Learning (CL) techniques and Shape Borrowing of basic geometric shapes to better engage students. This approach allowed students to work in synergy with one another thus increasing their confidence. This sharing would bring participants through the lesson study process, findings and improvements made by the team. From the post-lesson students' survey and teachers' review, it is observed that: (1) the lessons were well received by the students with improved engagement levels, (2) students communicated their ideas more effectively through their sketches which improved their confidence level for design related activities, (3) use of CL techniques reduced students' dependency on teachers to facilitate their ideation process, (4) higher order thinking is more evident as students readily displayed abilities to analyse the functionality and aesthetics of their ideas. Positive outcomes were also evident in teachers' reflections about the lesson study process, namely: (a) creating engaging lessons and units customised for their students, (b) gaining insights from other teachers through discussions thus improving professional learning and practice, (c) becoming more reflective and benefiting from immediate feedback on lessons from students and peers, (d) improved questioning techniques as scaffolding for students is important, especially with the use of CL to foster deeper understanding of concepts, (e) enhanced abilities to improve instructional approaches, as clear instructions and dissemination are essential for students to carry out CL in their lessons. Overall, teachers developed a greater repertoire of pedagogical tools for more effective facilitation of idea conceptualization and development.

E09-PP LT11 Enhancing students' learning of analysis skills through the use of multimodal texts

LEE Jo Ann, CHEONG Michelle, FERNANDEZ Dora, WEE Julie,
Singapore Chinese Girls'
School,
SINGAPORE

Keywords:
Lesson Study; Professional Development; Language Arts;

This paper seeks to share how a team of Language Arts teachers used Lesson Study (LS) to enhance students' learning of analysis skills through multimodal texts. The lessons were conducted with Secondary 2 (Grade 8) Language Arts students as part of the curriculum on propaganda. In these lessons, students learnt to analyse unconventional texts and recognize that the analytical skills taught can be applied to the wider world around them. In designing the lesson, the team adopted a student-led approach, where students learnt analytical skills through hands-on interaction with a variety of texts, preceded by a short

teacher-facilitated introduction. In addition, some elements of action research were included: (1) worksheets for students to record their learning and reflections, (2) worksheets for teachers to note areas for improvement. These measures allowed for the evaluation of the learning, and the lesson. The lesson study process had a positive impact on participating teachers. They have gained deeper insight into students' misconceptions and are better able to correct them from the beginning. Through lesson study, teachers have been given the opportunity to reflect on their own processes of conceptualizing lessons, leading to better structured lessons and an ability to anticipate the problems they may face in classroom situations. Students have also commented that by formulating their own questions, and therefore directing their own learning, they are able to understand the process of analysis better. This then leads them to making stronger inferences and more relevant analysis. This presentation will shed more light on this lesson study, the related issues encountered and how challenges were overcome.

E10-PP LT12 Leading Lesson and Learning Studies: Exploring the critical lessons for leaders

ANDREW Vincent (Room Chairperson),
Ministry of Education,
BRUNEI DARUSSALAM

Keywords:
Lesson Study; Learning Study; Professional Learning; Variation; Object of Learning

Lesson Study and Learning Study are two emerging forms of school-based teacher professional development within the professional learning literature, yet there is relatively little research that has examined the leadership of Lesson Study / Learning Study. This study reports the experiences of the author who had the responsibility for leading Lesson Study / Learning Study in Brunei schools. The first part of the paper recounts how the author learnt to use Lesson and Learning Study as a platform to engage teachers to seek answers to the persistent problem of student underachievement in high school Science, Mathematics and Accounting. Using an action research methodology, the author and the teacher groups with the assistance of academic consultants from the local university learnt to identify what was critical for learning and learnt to use appropriate patterns of variation to help learners discern the object of learning. Of particular interest in this paper is how the teachers used variation in student understanding, and variation in teachers' ways of handling the object of learning to come up with patterns of variation and invariance in the design of the lessons (Lo, Pong and Chik, 2005). The second part explores the experiences of teachers who participated in the Lesson and Learning Studies. The teachers were interviewed about what and how they learnt and if their understanding of teaching had changed during the course of the Lesson/Learning Study. The analysis reveals the complexity of leading such professional learning teams but also provides important insights for leaders as to what might be critical in raising achievement amongst learners and why Lesson and Learning Study have the potential to help teachers develop their understanding of teaching.

E11-PP LT12 Making visible the entailments of Elementary Mathematics Staff Developers' practice: How Lesson Study Informs learning what practice-based Staff Developers know and do

PAINÉ Lynn, FERNANDEZ Clea,
Michigan State University
YOSHIDA Makoto,
William Patterson University,
USA

Keywords:
teacher professional development; teacher knowledge; mathematics education; cross-cultural dialogue

This paper reports on an exploratory study designed to make visible and analyze what elementary mathematics staff developers need to know, understand and be able to do when they teach teachers how to teach mathematics. We explore this question through analysis of what staff developers say as they view and reflect on modified lesson studies of staff developers' practices in the U.S., China and Japan. Lesson study, as a form of work among teachers, is now a well-documented approach to help teachers develop their knowledge and skills related to supporting student learning (Fernandez and Yoshida, 2004). Informed by this perspective, this study shifts the focus of collaborative inquiry to staff developers (as teachers) who work

with teachers (as learners). Staff developers worked together to support teachers around the teaching of mathematics lessons. Video records of the collaboration among staff developers became stimuli for focus groups of staff developers in each country. Using a video-based cross-cultural approach (Tobin et al., 2009), the study taps knowledge, beliefs and dispositions—what Herbst and Chazan (2003, 2006) call practical rationality—that are typically tacit. This study stems from the premise that staff developers teach and posits that understanding what is entailed in this type of teaching merits careful study, similar to the research that unpacks K-12 mathematics classroom teaching. Using a lesson study-informed approach allows us to make the thinking practice of mathematics staff development “studyable” (Ghousseini and Sleep, 2011). We note a severe gap in research literature in terms of systematic and detailed analyses of the entailments of staff development (Elliott et al. 2009; Koellner et al. 2011; Even 2008). Correcting this situation seems particularly important in terms of preparing staff developers in the area of elementary mathematics, where we know teachers need strong support to move towards the more ambitious teaching that current reforms encourage them to enact. The paper describes the development of stimulus tapes based on modified lesson studies conducted by Chinese, Japanese, and US staff developers of their own work and analyzes the within-country and cross-cultural dialogues of focus groups of staff developers reflecting on these lesson studies.

E12-PP **LT12** **Perception on Lesson Study among Middle and High School teachers, principals, and administrators in West Java: Should schools and teachers continue to implement Lesson Study?**

PURNAWARMAN Pupung,
Universitas Pendidikan
INDONESIA

Keywords:
perception; teacher;
administrator; critical thinking;
quality improvement; effective
learning

In Indonesia, and in West Java province in particular, Lesson Study has been implemented in secondary school levels for more than five years. Many success stories and best practices have been shared among schools and teachers in several districts in West Java and both the Provincial and City Education and Culture Offices have been showing their sincere support for the current implementation of Lesson Study and its sustainability in the future. However, not all schools and teachers are convinced, or confident, to implement Lesson Study in their schools for several reasons. Apparently, there have been some misperceptions among teachers and principals about Lesson Study, especially those who have not been directly involved in Lesson Study activities. There have been questions regarding the effectiveness of Lesson Study in promoting learning and achieving learning objectives as compared with “traditional” teaching and learning which has been practiced by teachers for years. There are also questions about its effectiveness in promoting student’s critical thinking, and in improving the quality of school, teachers, teaching and learning. This paper will report the findings of a study conducted to portray the perception of teachers, school principals, facilitators, and educational office administrators who have been involved in the implementation of Lesson Study in West Java. The study involved 120 teachers, principals, facilitators, and administrators in four districts in West Java. Subjects of the study were asked to voice their opinion, based on their experience, regarding several aspects related to the implementation of Lesson Study in relation to improvement of teaching and learning materials, effective classroom management, promotion of student’s proactive learning and critical thinking, school and teacher quality improvement, etc. Results, implications for implementation, and recommendations will be discussed.

E13-PP **TR503** **Collective creation of knowledge in English language teaching by teachers in project En-ELT**

CHUA Joyce JRoom

The Enhanced Support for English Language Learning and Teaching (En-ELT)

Chairperson), TAN-CHIA
Lydia, CHIA Dawn,
Ministry of Education,
SINGAPORE

Keywords:
professional development;
knowledge creation;
teachers' learning

project is a partnership between the Ministry of Education (MOE) and 7 secondary schools in Singapore. This project seeks to raise students' knowledge and effective use of EL by empowering teachers to build on their knowledge of EL skills, learner strategies, attitudes and behaviour (SSAB) through three selected strategies — Retelling, Process Writing and Reciprocal Teaching — and infusing critical, creative and inventive thinking (e.g. problem-solving, analysis and evaluation) in the use of these strategies. These strategies were tried out in the lower secondary curriculum and lesson study was used to allow teachers to systematically examine the application of the strategies in the classroom. The selected strategies build on approaches to teaching and learning which are familiar to Upper Primary pupils. In this regard, Project En-ELT seeks to facilitate the transition from Upper Primary to Secondary, especially for pupils from schools on the national STELLAR programme. The project serves to strengthen students' knowledge and skills in all the areas of language learning (i.e., listening, speaking, reading, writing, grammar and vocabulary) as well as enhance their 21st century competencies. The selected strategies are new to some teachers in the project schools. This paper focuses on how the project teachers actively construct knowledge and incorporate the use of strategies in their research lesson plans. They observe and analyse the impact of their teaching on student learning through the process of collaborative lesson planning, lesson observations and post-lesson colloquia. The dynamic creation of knowledge through the lesson study processes also help teachers to prepare students to handle the demands and expectations of Upper Secondary, as delineated in the English Language Syllabus 2010. Over 2 years, the teachers went through 4 cycles of research lessons to try out the selected strategies. Key findings on the impact of the project on teachers' work, what knowledge they create collectively, what becomes formalised practice, and implications for theory, practice and research will be shared from the exploratory study.

E14-PP TR503

LOW Leng, LOH Ming Woon,
Tampines Secondary School
LOH Jia Perng,
Bedok South Secondary
School,
OONNITHAN, Radha Devi
Hai Sing Catholic School,
SINGAPORE

Keywords:
Differentiated Instruction;
Collective Learning; ongoing
assessment

The DI Journey - Teachers as Learners

21st century teachers take ownership of their professional growth to nurture in students the competencies required for the 21st century. With this paradigm shift, teachers have to rethink their practices and reflect on their pedagogical approaches for students' learning. A network team (from 6 secondary schools) came together to share and collaboratively generate learning and teaching (Stigler & Hiebert, 1999) through the lesson study approach. With the recognition that every pupil is unique, educators have to understand that teaching and learning is no longer a one-size-fits-all affair. Differentiated Instruction (DI) promises to allow teachers to cognitively engage a class of students with diverse readiness levels, learning styles and interests. Using the Principles of DI, the team decided to plan and implement a differentiated Secondary Three Mathematics lesson unit on Circle Properties. Underpinned by Dr Carol Ann Tomlinson's five key principles of a differentiated classroom, our project documents the collective learning of the team as we experienced first hand how we planned and implemented a differentiated lesson. Beginning with categorising the desired learning outcomes into what students need to "Know", "Understand" and "be able to Do" (KUD) in order to sharpen pedagogy and assessment, our team progressed to differentiate our pedagogy and assessment in terms of process and product based predominantly on student readiness levels. Given the DI principle of "Ongoing Assessment and Adjustment", our considerations and the challenges we faced served as good reference points for planning and implementing subsequent DI lesson units. The team implemented the designed unit in the six secondary schools. Throughout the process, participating teachers worked together to refine the

unit plans, observe lessons and have post lesson conferences to discuss students' learning difficulties. This has helped to develop communities of practices amongst the teachers and contributed to students' learning.

E15-PP TR504 The transformation of teachers' awareness for improving Mathematical instruction: From 'Know-How' to 'How to Know'

*SARKAR ARANI Mohammad
Reza (Room Chairperson),
Teikyo University,
JAPAN*

Keywords:
lesson analysis,
conceptualizing mathematical
phenomena, student
mathematical understanding

This paper gives a comparative lesson analysis of two countries – Iran and the United States math lessons– based on recordings of lesson practice and transcript-analysis. The analysis investigates lesson improvement through the creation of student-centred lessons that allow students to discover, consider and understand the relationship and integration between the value of numeric answers (doing) or 'how to do it', and the mathematical meaning (understanding) or 'why things are', when they utilize various methods to 'understand, solve and analyse' mathematical problems. The transcript-based lesson analysis, consisting of research and training conducted within the school and the teaching improvement model, can improve the self-awareness of teachers themselves, and through this strengthen students' thought processes (transfer of students' understanding of mathematical concepts from something concrete to something abstract), expressiveness (conceptualizing mathematical phenomena), and judgment (interaction between 'understanding' and 'doing').

E16-PP TR504 Practising Mathematical Content Knowledge and Pedagogical Content Knowledge by implementing the framework of Learning Study in Teacher Education: A show case

*LAI Mun Yee,
Charles Stuart University,
AUSTRALIA;
LO-FU Priscilla Yin Wah,
Hong Kong Institute of
Education,
HONG KONG*

Keywords:
Preservice teacher education,
Pedagogical Content
Knowledge, Learning Study

Continuing critique of the disconnection between theory and practice in teacher education programs has brought in new developments in practice theory and attention to professional practice as a research area. From this position, questions arise as to what is the entry point for practice and what should be practised, all of which are relevant to actual classroom teaching by preservice teachers. We presume that practising the use of mathematical content knowledge and pedagogical content knowledge is the entry point for practice in teacher education programs. Shulman (1986) proposed a special domain of teacher knowledge, pedagogical content knowledge, which bridges subject matter knowledge, knowledge of pedagogy and classroom teaching. Shulman defined pedagogical content knowledge as "an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons" (1986, p.9). Though Shulman's work could provide a conceptual orientation and a set of analytic distinction on the nature and types of knowledge needed for teaching a subject (Ball, Thames & Phelps, 2008), the question about "what exact professional knowledge of mathematics for teaching, tailored to the work teachers do with curriculum materials, instruction, and students" (Ball, Hill & Bass, 2005; p.16) is still unsolved. Ball et al. (2008) extend Shulman's notion of subject content knowledge and pedagogical content knowledge to pursue a better understanding of his idea on the relationship between them. The analysis of the mathematical demands of teaching (Ball et al., 2008) further divided Shulman's content knowledge into 'Common content knowledge' and 'Specialized content knowledge'; and his pedagogical content knowledge into 'Knowledge of content and students' and 'Knowledge of content and teaching'. Building on this work, this paper suggests incorporating the framework of Learning Study, a theory-guided pedagogical principle, as an integrated subject of mathematics pedagogy and teaching practice in teacher education programs. In this paper, the learning journals of twenty-six pre-service teachers who took primary mathematics as their major teaching

training subject for their BEd. (Primary) program and who enrolled on Learning Study in Mathematics in 2009 will be analysed and reported. The show case aims to share the success of the program and to disseminate how pre-service teachers enhanced their Mathematical Content Knowledge and Pedagogical Content Knowledge by practising Learning Study.

E17-PP TR504 Assessing students' thinking in doing activity using group interviews

*AGAD Ma. Lourdes,
PUNZALAN Amelia, ULEP
Soledad,
UP NISMED,
PHILIPPINES*

Keywords:
assessment; group interviews;
box making; polynomial
functions; students' prior
knowledge

This presentation reports the results of a series of group interviews of students right after a lesson study session on polynomial functions which involved an activity on box making. The researcher cum documenter in the research team initiated the group interviews because she observed differences in the groups. For example, a group finished the boxes very fast, while another group was slow. This group interview of students was outside the usual lesson study procedure because, normally students are not interviewed--only the teachers. The interview questions probed the explanations of the students. Responses revealed the importance of students' prior knowledge and experience as well as clear instruction in doing an activity. Moreover, it seemed that left to themselves students are thinking differently on how to proceed with the activity, and would go back to the instruction when things were not coming out as desired. Implications and suggestions to improve lesson research, teaching and learning are provided.

E18-PP TR505 Implementation of teaching practice guidance based on Lesson Study to increase teaching practice quality of preservice teachers

*SUDARISMAN Suciati (Room
Chairperson),
Sebelas Maret University,
INDONESIA*

Keywords:
teaching practice; teaching
practice guidance based on
lesson study

Teaching Practice is an important training programme for pre-service teachers. Pre-service teachers go through an apprentice program, at the end of which the teachers are expected to be familiar with various aspects that are related to the implementation of lessons. The analysis of the teaching practice guidance activities in Biology Education shows that the supervisor has limited time to provide the apprentice programme. The number of complaints from the high school community about quality of pre-service teacher skills in teaching practice, indicate that Teacher Training and Education Faculty have to improve debriefing skills for pre-service teachers. The characteristic of lesson study was found to be appropriate to be applied in an effort to improve the effectiveness of the quality of teaching practice guidance. The pre-service teachers reported that they get nervous and not confident enough to teach when they go in to the class to teach the students for the first time. They expect the guidance lecturer to accompany them to the class. The aim of this study is to see the impact of implementation of teaching practice guidance based on lesson study to increase skills and confidence of pre-service teachers in teaching practice. This study is a descriptive study that was designed in four cycles consisting of the following activities: planning, implementation, reflection. This study involved eight 7th semester students of The Biology Education who became the guidance of the researchers and three guidance teachers (school supervisor). The sources of data included field notes, lesson observations, and interviews. Results of the research can be concluded that the implementation of teaching practice guidance based on lesson study in Biology Education can improve quality and effectiveness of supervisors (teachers and lecture guidance) in services to student teachers especially it can improve: self confidence, quality of lesson plan, teaching performance, interaction with supervisors, building a positive image of institution in view of the school as partners. Given the many benefits of this research, it is recommended that the teaching practice guidance based lesson study can be an alternative model of teaching practice guidance which can be implemented.

E19-PP TR505 The effects of studying the lesson strategy in developing the teaching skills of teaching practice students at Bahrain Teachers College

OSAMA Mahmood,
BAHRAIN Teachers' College

Keywords:

Lesson Planning, Teacher Professional Development, Teacher Education, Cooperating Teaching

The aim of this study is to identify the effects of using the strategy of 'studying the lesson' by the cooperating teachers in developing the teaching skills of Cycle 1 Teaching practice (TP) students at Bahrain Teachers College. The study examines the effectiveness of the feedback provided and responses of student teachers and their cooperating teachers who used this strategy during the Teaching Practice. Interviews were conducted with (10) cooperating teachers and (20) student teachers who implemented this strategy. In regards to the cooperating teachers, the study showed a change in their beliefs towards studying the lesson, and it also altered their understanding of the role of teachers towards student- teachers during TP. This is in addition to the opportunity it provided to stress on the values of cooperation and team work as well as improving thinking and reflecting skills while teaching. In regards to students teachers, the study showed an increase in their confidence while teaching, in addition to providing them with opportunities such as: Reflecting on Teaching practices in a cooperative and team effort, implementing and improving the lesson, how to design appropriate educational activities, analyzing the lesson in light of its goals, critiquing the lesson and evaluating teaching practices, the link between the strategy and students' needs. The study created a vision for developing the preparation of TP students based on the studying the lesson strategy.

E20-PP TR505 Lesson Study of mentoring student teachers' practicums

KEE Kiak Nam Norman, CHIA Kok Hwee Noel,
National Institute of Education,
SINGAPORE

Keywords:

Bakhtin; Dialogism; Semiotics; practicum; lesson study

Many student teachers lack depth of understanding and appreciation of feedback given by co-operating teachers and supervisors during debrief of practicum sessions. The current study is a lesson study by both authors to retrospectively reflect on and examine past and evolving experiences of mentoring students for understanding and improvement. Our findings reveal the critical need to appreciate Bakhtin's conception of dialogism, theory of utterance and voices of interlocutors. The study argues for the need to meet dialogical communication demands for clear communication of the semiotic domains of teaching and learning. The experiences to meet the needs of communicating the signified, the signifier and implied contextual social-cultural construction of knowledge are shared in this paper.

E21-PP TR506 Primary teachers' level of concern on the implementation of Lesson Study: A preliminary analysis

OSMAN Shuki, CHEW Cheng Meng (Room Chairperson), LIM Chap Sam,
Universiti Sains MALAYSIA

Keywords:

Lesson Study; primary teachers; level of concern

This paper is based on a study to introduce the Japanese model of Lesson Study (LS) as a teacher professional development programme to nine low performing primary schools in Malaysia. The study's main aim was to examine to what extent LS can improve the quality of teaching practices among science and mathematics teachers. The sample consisted of 97 primary mathematics and science teachers from three types of primary schools: the national type (SK); the vernacular Chinese (SJKC) and the vernacular Tamil (SJKT). Before the implementation of LS activities, the participating teachers were asked to fill in the Stages of Concern Questionnaire [SoCQ] so as to identify their initial level of concerns. The SoCQ was developed based on the Concern-Based Adoption Model [CBAM] by George, Hall & Stiegelbauer (2006), consisting 35 items to categorize teachers' concern into seven stages: Stage 0 (awareness); Stage 2 (informational); Stage 3 (Personal)); Stage 4 (Management); Stage 5 (Consequence); Stage 6 (Collaboration) and Stage 7 (Refocusing). The same SoCQ was also given to the participating teachers after every LS cycle to examine if there is any change in their levels of concern before and after the implementation. In this paper, data collected from the first questionnaire were analysed, and the data shows that there was

a similar trend or profile of teachers' stages of concern about the implementation of Lesson Study among the three different types of schools. Further analysis on the patterns of concerns among the teachers involved and its implications will also be discussed.

E22-PP TR506 Collaboration between School-University and its impact on professionalism of teachers

*PERMANASARI Anna,
SUKANTO Tedy,
Universitas Pendidikan
INDONESIA*

Keywords:
collaboration, teacher's
professional, lesson study

Since 2010, under the Lesson Study program, collaboration between Indonesia University of Education (UPI) and one of senior high schools in Bandung, West Java (SMAN 23 Bandung) has been established. In the beginning, the teachers were a little apprehensive as they felt that the collaboration would increase their work load and hence would be unable to reach the learning target set. Moreover, teachers felt uncomfortable to open up to a "a stranger". But after one year of collaboration, the teachers started to realize that the program helped in their professional development. Slowly more teachers showed interest in the program and started to give more attention to the program. However, majority of the teachers still lack the courage to be model teachers and, are not comfortable being criticized. But after two years of collaboration, a lot of changes can be seen among the teachers. They have become more confident in conducting model classes where they used various interactive methods. They also started to conduct classroom action research, disseminated the results of their research in national and international conferences confidently. The lesson learnt from the study is that "the collaboration will have a great impact on teacher development if we put the teachers as partners in parallel level with lecturers".

E23-PP TR506 YT2PD (Yishun Town Teacher Professional Development) - A community of leaders

*CHAN Poh Hoon, KRISHNAN
Gopala, HOWECarolynn,
MOHAMAD Habisah,
Yishun Town Secondary
School,
SINGAPORE*

Keywords:
Teacher Professional
Development

Our school learning direction: To enhance staff competency in curriculum knowledge and pedagogical skills for engaged and effective teaching. To build a culture of collaboration among staff through Learning Team to promote deep learning and leading to higher levels of student achievement. We focus on the Skilful Teacher Framework as well as Teaching for Understanding (TfU) to enhance our staff competency for engaged and effective teaching. We planned segmented learning programme for different groups of staff. To build a culture of collaboration, we believe in creating time, space and place staff in Learning Teams (LT) which deepen learning, and sharing can take place to achieve higher levels of student achievement. A Professional Learning Community (PLC) is composed of collaborative teams (learning teams) whose members work interdependently to achieve common goals linked to the purpose of learning for all (The DuFour Model). Every LT has to engage in activities which focus on Teaching and Learning based on the TfU framework. Lesson Study can promote greater collaborative professional learning among teachers. Every LT has to conduct at least one Learning Lesson (modified Lesson Study) which involved 4 components: (1) Plan a Learning Lesson: Select a Host Teacher (HT). The Learning Team will come together and plan a detailed Learning Lesson. (2) LEARNING LESSON: Actual classroom lesson; guest teachers observing student thinking, learning, engagement, behavior, etc. (3) Discussion of Lesson: Focus on data/observations of whether the lesson promoted the lesson/unit goals (4) Consolidate Learning: Capture information like lesson plan, and summary of discussion. Refine and re-teach the lesson if desired. A Teaching and Learning Handbook and YTPLC Toolkit were created to capture teachers' learning. YTSS also introduced the Open Classroom (OC) concept in our PD. The experienced teachers, KPs & Senior Teachers will open their classroom and send an invitation to all teachers to welcome them to enter their classroom. Through this OC, there were more opportunities for

teachers to learn, share & grow. All staff learning will be captured in their Teaching and Learning Handbook, feedback, suggestions & ideas on students' learning & teachers' teaching are always encouraged. In these small and little ways, we hope to build a Community of Leaders -Teacher Leader among us!

E24-PP TR507

TOH Chet Chee (Room Chairperson), LOW Siokhua, CHEN Xuelei, ZHANG Jing, ONG Yan Joo, LEE Fang Ting, FAN Po Khioe, CHEN Yafei, LIEW Ching Shyang,
Zhenghua Primary School,
SINGAPORE

Keywords:
Self-made comics to teach Chinese word recognition, infusing values education

Integrating Moral Education into Lower Primary Chinese language lesson

As follow-up to a 2011 lesson study on 'Creative Ways to learn Chinese Characters for Lower Primary School Children', which was presented at WALS 2011 in Tokyo, our school continues to develop the use of self-made comics to teach Chinese word recognition by infusing values education at the same time. Acknowledging the fact that English has become pupils' main language at home and that simplified scripts instead of traditional scripts are used in the teaching of Chinese Language in Singapore, we continue to use the main character 'Whity Rabbit' in a story form to bring out the vocabulary to be learnt for the lesson. Creative word recognition strategies are taught, which pupils can pick up, and apply in other lessons as well. Yet at the same time, the story and the lesson bring out an underlying theme of 'Loving Your Country'. This learning journey is made possible in collaboration with the Master Teacher from Singapore Centre for Chinese Language. Under the guidance of an expert from outside the school, our team of teachers zoomed in on the distinctive features of various Chinese words to develop an interesting story, helping pupils to learn creatively with increased word retention. As they enjoy their lesson, they also learn to appreciate what they have and to love the country they call home. The teachers involved in this journey had fun and enjoyed the process of identifying pupils' learning difficulty, preparing the lesson, perfecting the lesson plans, bonding and growing professionally.

E25-PP TR507

YANG Meijun,
The Teacher Training Institute
of Beijing West District
MA Lijun, LI Xue,
The Experimental High
School attached to Beijing
Normal University,
CHINA

Keywords:
《chushi biao》 and 《zhouji feng qi wang najian》
similarities and differences

Chinese Ancient "Quanjian" Art Research: Comparative Reading of 'Chushi Biao' and 'Zhouji Feng Qiwang Najian'

The case came from an opening lesson by teacher Liufan in The Experimental High School which is attached to Beijing Normal University. She used a text that featured a famous personality in Chinese history, Zhuge Liang. Some words from the original text were deleted. This was our first attempt in using variation to teach. The researchers interviewed the students after the Ms Liu's lesson. They could understand Zhuge Liang's "quanjian" art, but they could not summarize what it is. Most of the students could not identify the main feature of the article – focusing on the "tuī jǐ jí rén" to express "quanjian". They had no concept of Chinese traditional culture, such as "Li—manners". In order to make it clearer, we gave the students another article to read, and we helped students recognize the close relationship between two articles. The characters in both articles were ministers in Chinese history. But they were different in their manner of speech. How did they embody Chinese ancient quanjian "Art"? What was different in the way they advised the Emperor? The lesson study lasted two months with two cycles-- experimental and improved. The debut cycle was conducted by Ms. Ma and Ms. Li, who taught their own 176 students separately in four classes. After the "post-evaluation", the progress of the students helped us to improve the design of the "pre-evaluation" and the "post-evaluation". In the second cycle, the improved teaching method benefited the students enormously.

E26-PP TR507

LIEW Ziyi, LEE Annabel,
Kranji Secondary School,
SINGAPORE

Keywords:

Exploring the Internet, Blogger and Facebook as a tool for teaching and learning of Art

In today's society, information is easily available online and students are able to access a wide range of internet tools and applications. There are pros and cons. On one hand, learners can be independent in their learning and researching of information while on the other hand, learners are exposed to an

Art; Blogger; Facebook,
Internet

overwhelming variety of information and might not be able to filter what is important or necessary. Teachers need to facilitate students' gathering of useful resources to aid in their learning. We have explored how the Blogger and Facebook applications can be used as a teaching and learning tool for Art. We have also compared students' level of engagement for Blogger and Facebook. Blogger provides a useful platform for teachers and students to share information, in addition, students can also give their feedback and share with their friends what they have posted, thus providing more interaction and learning opportunities between teachers and students. Our intention is to use the Blog as a scaffold for students to understand the process of researching relevant and resourceful materials which can enhance their "filtering" of information. At the same time, students are cognitively and affectively developed when they constructively critique and give feedback for each other's work. The Blog is a preferred tool as students feel more comfortable writing their personal feelings and thoughts as compared with face to face interactions with a teacher in class. Through this case study project, we explored using the Internet, BLOGGER and Facebook as tools for teaching and learning of art, we will discuss the insights we have gained from this project.

E27-PP

TR508

*MURSADI Maryam (Room
Chairperson).*

Sampoerna School of
Education,
INDONESIA

Keywords:

Teacher; Teaching;
Profession; Teacher
Education

Teacher candidates' perceptions toward teaching as a profession

This study is focused on teacher candidates' perceptions toward teaching as a profession. It explores teacher candidates' opinions and understanding of teacher profession. The research was conducted in a private teacher education college in Jakarta. It involved 10 teacher candidates from 2009 cohort. The data were collected using interview and students' selection documents. The findings showed that the ways teacher candidates' perceive teaching profession were influenced by their experience as a student and as a teacher candidate. Before they entered teacher Education College, they viewed teaching as a profession that bring more benefits compared to other professions. However, their perceptions change as they experience teaching and learning as teacher candidates. They started to see teaching as a complex, challenging and prestigious profession.

E28-PP

TR508

MASANOBU Sakamoto,
Aichi Institute of Technology,
JAPAN

*FREDIE Avendano, SEDILLA
Carleen, GONZALES*

Corazon,
Department of Education of
the PHILIPPINES

HORAI Takaaki,
Takada Junior College,
JAPAN

Keywords:

job consciousness; pre/ in-
service teacher training

Job consciousness of pre-service and in-service teachers: Based on a comparative study of Lesson Studies in Japan and Philippines

In Japan, we have called teachers a "clergyman" before World War II, a "labor" after the war, and later a "professional". To understand the role which teachers have to fulfill or the competence which teachers have to learn as "professional" is to review the way of education in Japan, the manner of teacher-training, from micro perspective and knowledge of educational issues. We presume it's an important theme for teacher training in Japan to grapple with issue of teachers' competence. We divide teachers' competence into "as human", "for education or lesson", and "in society" in Japan. "As human" means teachers' humane, moral, or guardian-tic competence that is based on the assumption that "teachers are human before teacher". "For education or lesson" is a part of goals in most of lesson or learning studies. We can study it through observing and analyzing what, how, how long, or how much children learned in the lesson. And "in society" is not about moral competence only but also ethical competence which teachers must have as a member of society. The purposes of this study are to make clear the difference of job consciousness between pre-service teachers who take a teacher training course in college and in-service teachers who currently work in school; to make clear how the job consciousness is related to awareness of educational issues as they study the lesson. The job consciousness in our study means reasons why students/ teachers choose teaching as their vocation, competence expected from teachers, and person who influenced the students/ teachers to choose

teaching as their vocation. To clearly state the difference of job consciousness, we thoroughly analyzed the result of Sakamoto & Horai (2011, WAL2011) and Sakamoto & Horai (2011, AAVSET), and the result of a questionnaire survey for Japanese students and teachers, and teachers in the Philippines. Moreover, in order to supplement our analysis, we held interviews with teachers in Japan and Philippines. We asked them how they give meaning to lesson studies on their teacher-life. We will argue about “professional” as teachers’ competence, pre/ in-service teachers’ job consciousness, and their awareness of educational issues in WAL2012.

E29-PP TR508 Some strategies for teachers' professional development of three Japanese prefectures

YOSHIAZAKI Shizuo,
Women's University,
JAPAN

Keywords:
teachers' professional
development, lesson studies

In Japan, a national assessment of the academic abilities of sixth and ninth graders has been conducted since 2007, with the objective that the government, boards of education, and schools assess educational outcomes and develop better teaching and educational policies (MEXT, 2006). In this assessment, it was observed that students from three prefectures—Aomori, Fukui, and Toyama—among 47 others repeatedly attained top rankings. We organized a project team to investigate how the students from the three prefectures attained top rankings in mathematics and Japanese. Additionally, we observed classroom lessons and interviewed teachers from these prefectures. As a result, we observed four main factors: 1) instructional components (e.g., subject matter, formation of teaching faculties and learning groups, teaching methods, ICT, learning space and time) 2) discipline and order during classroom instruction 3) students’ learning and lifestyle habits at home 4) teachers’ professional development. Moreover, various strategies for facilitating the professional development of teachers from the three prefectures were determined: 1) conducting lesson studies in schools 2) public lessons by teachers in schools 3) team teaching to facilitate reciprocal learning by teachers 4) public lessons by expert teachers, authorized by the education boards of prefectures 5) conducting lesson studies in pilot schools 6) utilizing teachers’ communities for studying educational practices 7) developing partnerships between schools and universities.

E30-PP TR703 Think-Aloud in the P1 Math classroom

*SIVA Sangeetha (Room
Chairperson), JAMAL
MOHAMED Shakila, YAN
Adrian, CHUA Lisa,*
Da Qiao Primary School,
SINGAPORE

Keywords:
Mathematics: Think-Aloud:
Metacognition: Lesson Study

A Lesson Study was conducted for Primary One pupils on the Math topic of subtraction of numbers up to 20 using the Renaming Method. Currently, while pupils are given some opportunities to work in groups, they are not proficient in communicating their Mathematical thoughts and reasoning. With the school making headways towards Holistic Assessment, pupils are learning ways to describe their experiences through articulating their thoughts and feelings. They are more aware of themselves as individuals (Ericson’s Stages of Psychosocial Development) and understand more about their roles in the world through interaction with others. With this as the backdrop, the lesson is intended to provide opportunities for pupils to work together to express their Mathematical thoughts and verbalize them to their peers. The lesson was planned and developed by six Primary One teachers. The team came together to brainstorm the possible questions and responses of their pupils in order to refine their Lesson Plan. The team also discussed the type of data to be collected in order to triangulate and ascertain if the pupils have learnt. During the lesson, the subtraction concept was illustrated through story-telling, dramatization and the use of concrete representations. Problem-based learning was used to stimulate pupils’ learning of subtraction using the Renaming Method. The Renaming Method was clearly represented using the Concrete-Pictorial-Approach (C-P-A) approach. Using concrete representations and the place value table, pupils worked in mixed ability teams

to solve subtraction word problems. The team of teachers then observed for clarity in communication of Mathematical reasoning, in particular the Renaming Method, amongst the pupils. Upon completion, the pupils presented their solutions to the whole class. Post-conference findings showed that problem-based learning provided a platform for pupils to communicate their thoughts and learning from the lesson. The pupils were able to read and identify key information necessary for solving the problem. More scaffolding will be needed to illustrate the Renaming Method. Semantic cues (Mayer & Hegarty, 1996) to help pupils better understand the Renaming Method will also be explored. The semantic cues can also provide effective mathematical language that pupils can use during their group discussions for conceptualization of their mathematical ideas.

E31-PP

TR703

*GIRI Rosiah, JAMAL
MOHAMED Shakila, REMIE
Nur Fazlinda,
Da Qiao Primary School,
SINGAPORE*

Keywords:

English: STELLAR: Lesson
Study: Writing

Improving writing through Lesson Study

Lesson study is a collaborative tool used at Da Qiao primary School. It became a school wide approach after teachers saw how useful and effective it can be. LS helps to equip teachers to explore the best teaching method in order to address pupils' learning needs. LS is not about creating the perfect lesson, but about increasing our capacity to learn from colleagues, students and curriculum and research. During the P4 level discussions, teachers teaching the English Language raised the issue that the mid- and low-progress P4 pupils lack content in their writing. They tend to write without the audience in mind. As such, there are usually gaps in their stories. In addition, the teachers were also grappling with STELLAR strategies in implementing peer editing during the writing process cycle. To address this issue, the teachers decided to review their own understanding of STELLAR curriculum and their pupils' learning needs. The P4 English language teachers wanted to embark on a Lesson Study on the STELLAR writing process cycle, in line with STELLAR pedagogy that develops 21st Century Competencies. Critical and inventive thinking takes place when the learner listens to feedback on his thoughts. He also gains other perspectives and ideas from his teacher and peers during whole class and small group discussions in collaborative group activities. The learner expresses critical and creative thoughts and feelings by articulating them during oral presentations and writing about topics and issues during shared and individual writing tasks. Metacognitive thinking takes place as the learner provides oral and written feedback to his peers during peer conferencing. He also considers the thinking processes he uses when composing and editing writings. The LS team felt that the research lesson should not be about teaching pupils how to write but to develop pupils' current potential. With this in mind, the research lesson was designed through the rich sharing and input provided by members of the learning team. The research lesson was based on Carol Tomlinson' Theory of Differentiated Instruction. Tomlinson (2001) identifies three elements of the curriculum that can be differentiated: Content, Process, and Products. The Research Lesson Theme was 'to engage pupils in a creative- based learning so as to promote collaboration as they engage in group peer editing and instill a greater sense of accomplishment towards their writing'. The aim of the lesson was to get pupils to develop their content of the writing with the audience in mind so as to improve the fluidity of their stories. Our focus was on the process. We decided to provide personalized feedback to differentiate our instruction to each child. In addition, flexible grouping was consistently used. Strategies for flexible grouping are essential where grouping and regrouping becomes a dynamic process. Learners are expected to interact and work together as they develop knowledge of new content. Cooperative learning strategies were infused to engage students in learning and improving their attitude towards writing. The paper further discusses the pupils' learning process and learning outcomes as

a result of the carefully-planned research lesson. Implications of the research lesson were also discussed during post-observation.

E32-PP TR703 Some results of implementing Lesson Study by Chemistry teachers of Bayangol District

CHOIJILSUREN Nyamgerel,
National University of
Mongolia
JARGALSAIKHAN Enebish,
School No. 113,
MONGOLIA

Keywords:

lesson study, ability to work
with information, discussion,
curriculum, observation

Within the framework of "Teaching Methods improvement Project toward Children's Development in Mongolia" jointly implemented by MECS and JICA during the period 2006 –2009, Lesson study was introduced in Mongolia. Under the 2nd stage of the project implementation in 2010, the practice of Lesson study is being rapidly introduced among schools, teachers and scholars throughout the nation which helps in the dissemination of Lesson study practices. The results of Lesson studies, conducted in many different countries had proved that the Lesson studies conducted on advanced didactic grounds effectively contribute to the renewal of teaching methodologies and learning of students. The Bayangol district of Ulaanbaatar city has 17 state owned schools. In 2011-2012, the district's department of education organised 9 sessions for the secondary school teachers with the aim of disseminating the methodology and management of Lesson study to them. Within the scope of these activities, a chemistry lesson study team, comprising 16 chemistry teachers was established, for conducting joint lesson studies. This presentation will talk about the results of the joint lesson studies conducted in the academic year 2011-2012 by the Chemistry Lesson study team, with the intention of improving students' abilities to work with the given information (using, comparing, transforming and processing). Based on our pursued policy of selecting the abstract type topics with plenty of notion, making difficult for students to understand and requiring certain methodology from teachers, we have selected the group topic of "The atomic structure and properties of chemical elements" for 8th grade, elaborated the 20 hour program based on content study, jointly detailed the methodological didactic solutions for lesson topics of "Components of atomic structures" and "Atomic charge of chemical elements" and experimented on the students of Grade 8G of school number 113. During this experiment, the 11 team members participated as observers, and made improvements in these lesson programs by using the results of post lesson discussions and observations. The analysis of the data showed that during the first round, the teachers had not been able to make differentiation between the sequences of directing questions and basic questions, whereas after jointly elaborating and improving the next program, the directing questions and basic questions were planned separately and teachers had even thought through the alternative action that needed to be taken in case a student was unable to execute a given task. Also the analysis of data reveals that during the first discussion, teachers were able to make only general comments about the lesson without having a clearer idea of how and which areas needed improvement. Whereas during the subsequent discussions, there were able to talk about their observations in the changes of student's capabilities, their weaknesses and also the reasons for these. Based on these discussions, the subsequent lessons were improved. This proves that the teachers' methodology usually changes through lesson studies.

E33-PP TR704 The Preschool Learning Study process - A joint reflection on the use of contrast of critical aspects

LJUNG-DJÄRF Agneta
(Room Chairperson),
Kristianstad University,
SWEDEN

Keywords:

Contrast of critical aspects;
learning study; variation

The aim of the study is to describe the ways in which contrast of critical aspects of the object of learning is used to improve children's ways of discerning the concept twice as found by analysing a learning study process in Swedish preschool. By that, the attempt is to contribute to an expanded understanding of application of learning study and variation theory in preschool educational practice. One researcher, five preschool teachers and

theory; twice as; preschool

44 preschool children (6 year olds) participated in the project. The empirical material consists of verbatim transcriptions of three video documented interventions and 132 individual test forms (pre-, post- and delayed post-test). The preschool learning study process analysed in this study has been built up by a joint reflection on the use of contrast of critical aspects related to the intended object of learning. The study suggests that a developed use of contrast of critical aspects of the object of learning seem to have bearing on children's ways of discerning aspects of their surrounding world short- as well as long term. Main principles found seemingly emerging the children's ways of discerning the intended object of learning is discussed in terms of separation, contrast and generalisation. However, the study indicates the need of additional complementary learning study projects to further expand the knowledge of what it means and entails to take critical aspects of the intended object of learning into account when dealing with content focus in preschool educational practice.

E34-PP TR704 Preschool students' understanding of the function of objects and spaces in a number line

*PETTERSSON BERGGREN
Gunilla, BJÖRK Marie,
Sjästadsskolan,
SWEDEN*

Keywords:
Learning Study ; Preschool;
Mathematics; Number line

According to Swedish preschool curriculum, children should develop an understanding of space, shape, position and direction. In this Learning Study we have focused on children's ability to understand the relationship between spaces and objects on a number line. The Number Line is a graphic representation of the number system; it can vary in length, in the number of points or objects, in what parts are being shown or in the distance between the points. The capability to determine where to place numbers or fractions relative to existing numbers on the line is crucial for more advanced mathematics but can be difficult to teach. The object of Learning was defined to be the ability to place items evenly spaced on a given distance. The study was carried out by preschool teachers with a group of four- and five-year-olds at Sjästadsskolan in Stockholm, Sweden. The teachers at Sjästadsskolan, which is both an elementary school and a preschool, have expressed a need for curriculum-based discussions in order to coordinate teaching. Learning Study is used as a model for teachers to do research in their own practice and to develop collective knowledge on teaching and learning. We found it to be crucial for children to realize that the space between the points vary depending on the number of points and the length of the line. They must also understand that the length of the line varies according to the space between the points relative to the number of points. In the third lesson the children showed an independent ability to handle varying distances on the Number Line by first placing five stations along a three meter long railway and then placing ten streetlights along the same railway.

E35-PP TR704 Learning Study projects in Swedish Childhood Education: Possibility and challenge

*TULLGREN Charlotte,
Kristianstad University,
SWEDEN*

Keywords:
Learning study; Pre-school

Traditionally Swedish pre-schools have been awarded full value, where a path of development and education has often been included. School preparatory learning was rarely emphasized (Brembeck, Johansson & Kampmann, 2004). In recent years pre-school has been given a clearer and partially changed mandate related to children's learning and development (Swedish National Agency for Education, 2010). This new tradition of increased focus on learning and goal achievements is challenging for the teachers (Ljung-Djärf & Tullgren, 2010). With this background the aim of the presentation is to give an overview of Swedish Learning Study projects among pre-school children and how these could impact on the teaching and learning in pre-school settings. The presented studies are Learning Studies and consist of two or three micro-

cycle studies. Theoretically they are based upon variation theory and the concepts discernment, simultaneity and variation (Marton & Booth, 1997; Marton & Pang, 2006). When learning it is important for the learners to discern critical aspects of the learning object, discern different aspects simultaneously and what variation and contrast in representation forms. In the studies special focus is put on generative learning (Holmqvist, Gustavsson & Wernberg, 2007) which could be described as the ability to develop knowledge about the learning object beyond the learning situation in the learning study. The studies show that it is possible to accomplish a Learning Study among young children. Learning Study offers the children, and the teachers, to put focus on a certain object of learning. Also more complex and compounded learning objects are possible for the children to gain and develop knowledge about. Learning Study not only enables the teachers to be aware of their own expectations of the children's learning, but also spot the importance of the teachers and the teaching when it comes to the children's learning.

E36-PP TR705

HENDAYANA Sumar (Room Chairperson), YULIANI Yeni,
Universitas Pendidikan
INDONESIA

Keywords:

Strengthening, Chemistry teacher, Community, teaching capacity, lesson study

Strengthening activities of Chemistry teacher community

Strengthening Activities of Chemistry Teacher Community Sumar Hendayana¹) Yeni Siti Yuliani²) Subject-based teacher community as a non-structured organization has been established in Indonesia according to the government regulation No 38/1994. It is expected to improve teaching capacity of teachers at all levels. However, they meet irregularly and activity was limited to prepare lesson plan to be submitted to principal for administrative purposes. Best practice of lesson study has been introduced to strengthen activities of chemistry teacher community in Cimahi city. Regular chemistry teacher meeting was established twice a month to prepare applicable lesson plan, implement it at real class, and reflect it for lesson improvement. Progress of development of chemistry teacher community will be shared.

E37-PP TR705

RAHAYU Sri,
University of Malang,
INDONESIA

Keywords:

hydrocarbon; lesson study; prospective chemistry teachers; practicum

What prospective Chemistry teachers learned from Lesson Study activities: Exemplary case of Chemistry lesson improvements

Practicum is often regarded as the most important component of the prospective teacher education program. In their practicum, the prospective teachers need most guidance on their teaching of subject content effectively, and on their classroom management. So, the prospective teachers need not only to understand the content deeply, but also to know how content is taught and learned. One way to achieve this goal is through involving them in lesson study activities since the lesson study process shows great potential as a mechanism for bridging theory and practice, a method of initiating future teachers into the practice of collaborative planning, teaching, observation and reflection and to give teacher candidates the opportunity to learn from one another, and to think deeply about content and student learning. The study used qualitative research methodology, particularly a single case study of multiple lesson study activities. The inquiry itself called for an exploration which would illuminate the experiences of prospective teachers in teaching high school chemistry topics. The purposes of the study were to explore what prospective chemistry teachers learned from lesson study activities and how they made some improvements on teaching a hydrocarbon topic within the context of their practicum experiences. The role of researcher was as a participant-observer and set up three cycles of lesson study activities on the hydrocarbon topic with six prospective chemistry teachers who took practicum in a public SHS in Malang, Indonesia. Data were collected through videotaping lessons, interviewing prospective teachers, tape-recording de-briefing meetings, collecting field notes from all observers and lesson plans. By triangulating the data, we find that: (1) what the prospective teachers learned

most are: peer tutor and/or modeling from student is very helpful in smoothing the flow of the lesson, good preparation for a lesson is important, and the need to emphasize safety issue in a laboratory especially when the activity involves fire; (2) some improvements of hydrocarbon lessons made by prospective teachers concern with improvement of lesson flow on their lesson plans and time management, changes some aspects on worksheet, demonstration of laboratory activity by student, and put safety issue on their lesson plans.

E38-PP TR705 Establishing learning communities among Science teachers: The social mechanism of learning together through Lesson Study

LEE Shok Mee, SEAMEO RECSAM;
OYAO Sheila Gamut, University of Tartu, ESTONIA

Keywords:
lesson study; collaboration;
collegial relationship; learning community

The fundamental philosophy embedded in lesson study is the collaborative practice of teachers working together to plan, teach, observe, reflect and refine lessons. It has been well established that collaboration strengthens teacher collegial relationships and enhances pedagogical content knowledge in improving teaching. While teacher collaboration seems to be a norm in Japan and some other parts of the world, a similar teacher practice in lesson study, such as opening the classroom to their colleagues, is uncommon in Malaysia. This paper aims to provide an experiential narrative of the science lesson study project initiated by SEAMEO RECSAM highlighting the practical means of establishing learning communities among science teachers in five schools, at primary and secondary levels, located in Penang. The research team members were diverse: eight science educators comprising of four Malaysians, three Filipinos and a Japanese, and the school science teachers, reflecting Malaysian multi-racial composition. The research enterprise attempted to address two questions, namely: (1) what is the nature of collaboration shared by the members of the science lesson study team, and, (2) how did teacher collaboration cause learning. In describing the collaborative features, three core components of teacher collaboration in a community or group identified by Wenger (1998), namely, joint enterprise, mutual engagement, and shared repertoire were used as a framework. Hence, this paper intends to share its success story in establishing learning communities among some science teachers in Penang through participation in the lesson study work. By engaging in their respective communities, members strengthen their bond and develop a habit of improving their practice by working and discussing with their colleagues.

E39-PP TR706 Critical thinking and reflective capacities of Nursery School teachers: A case study of the development of training programme for Nursery School teachers in Japan

MURASE Masatsugu (*Room Chairperson*), Azabu Research Institute Of Education, *MASAMI Furuya*, JP-Holdings Inc JAPAN

Keywords:
critical thinking; nursery school teacher; professional development; teacher education; reflection

This study discusses a case of development of training programme for nursery school teachers with a special reference to critical thinking and reflective capacities in Japan. The programme was, as below, to grow teachers' critical thinking style for enhancing their expertise in reflecting practice. The aim of this study is divided into two, namely: (1) to discuss how the new training programme for nursery school teachers was developed in order to let them develop critical thinking style and reflective capacities, and (2) to assess the effects of that programme. The programme was conducted for, two days, and twenty in-service teachers participated after their work. In order to evaluate the impact, pre- and post- assessments were implemented. The activity of this programme had two parts. In the first part, the participants observed a short video clip from actual nursery school practices. The participants were expected to write down what they observed and what they reflected on the observations. The second part was a lecture and discussion. The lecturer of this training programme demonstrated to teachers how to distinguish fact and thought to analyse and to improve their daily practices. In other words, the

lecturer gave teachers basic framework of critical thinking for reflecting on their practice. At the same time, this programme activity included observation of and reflection on the real practices as shown above and it can be categorised as a type of video conference (Inagaki, 1995), one approach of lesson study. Basically lesson study activity should be conducted in school-based settings. However, it often becomes difficult for teachers to do it due to constraint of available resources, time, and labour. That is why this extra off-site in-service training was conducted. This case study will show the potentiality of off-site training to assist nursery school teachers to deepen their knowledge on lesson study practice. Regarding the research methods, the procedure was as follows; the participants of research were the aforementioned twenty nursery school teachers. Then, in this study, those three kind of data were collected: first, surveys on teachers' critical thinking style were conducted before and after the training programme. Second, so-called 'quasi-reflection sheet' was delivered to each participant to see how they reflect on photos of some parts of a real nursery practice on the paper. Third, teachers' notes on the video clips used during the programme for three times were also collected. Results showed three significant points. First, the score of the scale for critical thinking attitude increased. Second, the number of responses to the 'quasi-reflection sheet' also increased. Third, the number of utterances in their observation notes on the video clips increased as they started to understand the framework of critical thinking. For further research, there should be an analysis on the ways of growth of reflective capacities in those participants, by investigating interlinks between all three data sets.

E40-PP

TR706

Parents' conceptions of learning in a Parent Education Program: A basis of Learning Study for parent education

GO Luis, PANG Ming Fai,
The University of HONG
KONG

Keywords:

learning study; parent
education; conceptions of
learning; phenomenography;
secondary school; Hong Kong

Understanding the conceptions of learning from the learners' perspective is indeed beneficial for educators and to providers of educational programs to various types of learners. Numerous studies have been conducted on this subject and many would refer to the six conceptions of learning put forward by Marton, D'Alba and Beaty's (1993). These are: learning as (a.) increasing one's knowledge, (b.) memorizing and reproducing, (c.) applying, (d.) understanding, (e.) seeing something in a different way, and (f.) changing as a person. However, as of this date, most research on conceptions of learning are conducted in academic settings. So far, there is no known research on parents' conception of learning in parent education programs, which could have important implications to the effectiveness, the fundamental design paradigm of programs, and the basis of learning study for parent education. In recent years, the growth of parent education programs in Hong Kong is increasing rapidly. Educators and leaders in society, with increasing frequency, are considering and seriously discussing the need to offer programs that help parents to be parents or good parents to be better parents so as to educate better the young people of the city. In this study, the focus is on the conceptions of learning of parents of adolescent children in a parent education program in a secondary school in Hong Kong and phenomenography was employed as the research approach. Semi-structured interviews were conducted with 20 parents in the program. Transcripts of the interviews were analyzed following the phenomenographic convention. Seven categories of description regarding parents' conceptions of learning have emerged. These are: (a.) learning as awakening, (b.) learning as recall, (c.) learning as another way of seeing the problems, (d.) learning as change in parenting approach, (e.) learning as reflection, (f.) learning as another way of seeing parenting, and (g.) learning as a change of attitude.

- E41-PP TR706 Placing the constitution of Lesson Study practice in Indonesia**
SURATNO Tatang,
 Universitas Pendidikan
 INDONESIA
Keywords:
 lesson study, Foucauldian,
 discourse analysis
- Lesson Study in Indonesia has been introduced since 2000 through several technical cooperation projects with Japan International Cooperation Agency (JICA). This paper illustrates an attempt to recontextualise lesson study practice in Indonesia in a time of significant change when it comes close to the end of project implementation. By drawing on Foucauldian methodological tool, the author uses dis/solving, disembedding and dis/continuing tactical analysis (after Lingard et al., 2003) to work within and against lesson study discourses and to explore how they operate to produce the effect of power/knowledge relations within particular forms of lesson study practice. The author aims to place the constitution of lesson study practice under scrutiny and to question the taken-for-granted status of its forms and how they function. Three constructs discussed are: 1) locating problems within solutions (e.g. interrupting 'teacher professional community'); 2) opening up fault lines (e.g. couplings effect of 'community'); and 3) imagining other forms of lesson study practice (e.g. disrupting 'sustainable teacher learning'). Then lessons learned for reconstituting lesson study practice in Indonesia will be discussed.
- E42-PP TR708 Investigating the effect of MLEA 2+ on Primary 3 students' ability to provide relevant and detailed content for their continuous writing task**
TAN Elwirandi Zakiuddin
(Room Chairperson), SHAH
Uma Haridas, KONG Jaslyn,
 Yu Neng Primary School,
 SINGAPORE
Keywords:
 Lower primary English;
 Writing approach; Action
 Research
- It is observed that many Primary 2 students encountered difficulties in generating sufficient story ideas for their essays during lessons. To address the learning gap, a group of lower primary teachers conceptualised a writing approach titled MLEA 2+ to provide scaffolds through additional activities in the writing process. By modifying the current MLEA 2 approach, students are given opportunities for co-operative and collaborative learning, with each group taking on the task of working on one of the four given pictures. The different paragraphs would then be synthesized and evaluated before independent writing was assigned to students. The revised writing approach has resulted in pupils displaying greater confidence in generating story ideas for their writing, and they were able to express their thoughts in three paragraphs with ease. The transition from class-based discussion to group-based collaborative effort to independent writing has provided students with the necessary scaffolds in completing their writing tasks with greater confidence. Leverage on the MLEA2+ successful implementation in the lower primary, the Primary 3 teachers decided to take on the enhanced writing approach for their Action Research in 2012 in an effort to extend the work done by their predecessors as well as to obtain tangible data that can be analysed and discussed with regard to the effect that the pedagogy has on students' writing.
- E43-PP TR708 The use of annotation through Lesson Study in improving the teaching and learning of English Language Reading Comprehension in a Primary school**
SIVA Jessi, MENON Mumtaj,
 Huamin Primary School,
 SINGAPORE
Keywords:
 Lesson Study; Annotation; EL
 Teachers; Teaching &
 Learning; Pedagogical
 Knowledge; Reflection
- The performance trends of the Primary 5 and 6 pupils in Huamin Primary School revealed that they were not performing fairly well for the component on open-ended reading comprehension which constitutes 21% of the English Language (EL) paper 2. The pupils lacked a powerful strategy to help them comprehend the texts and which encourages active reading. Bearing in mind the school's key strategic thrust, 'Pursuing Curriculum Excellence', the P6 EL teachers decided to initiate a Lesson Study team (LST) to investigate if teaching annotation skills to P6 higher-ability and P5 lower-ability pupils would lead to effective understanding of texts. "Annotation helps readers reach a deeper level of engagement and promotes active reading" (Carol Porter-O'Donnell, 2004). The two classes were taught by different teachers. The LST was involved in lesson planning, implementing and observing, discussing and

reflecting which enabled the teachers to adapt, integrate and apply some strategies from *The Skilful Teacher* (Jon Saphier, Mary-Ann Haley-Speca & Robert Gower) in their lessons. Invaluable lessons were learnt during the course of the lesson study in terms of how one can best deliver the understanding and cater to the different abilities and learning needs of the pupils since Lesson Study does indeed have the potential to promote individual improvement for participating teachers (Perry and Lewis 2009). The learning experiences provided the teachers valuable insights in the teaching of open-ended reading comprehension with the use of annotation skills. Through lesson study, the team members have also grown in their pedagogical knowledge and understanding of their pupils' learning, to become effective classroom teachers. In fact, by drawing on the knowledge of group members, written resources, and consultation with knowledgeable outsider, successful lesson study teams increase knowledge of subject matter and instruction in ways that are immediately useful to their teaching (Catherine Lewis, 2002).

E44-PP TR708 The teaching of inferential skills to Primary 2 pupils: A teaching package developed through Lesson Study and the processes of open innovation

CHIN Shirleen, SAIBON Sri Burdiasih Ahmad SAIBON, Haig Girls' School, SINGAPORE

Keywords:
inferential; Open Innovation;
mental imageries;
collaboration; innovative;
progressively

Teaching inferential comprehension as a strategic process enables pupils to make connections and move beyond literal recall (Keene & Zimmermann, 1997). This Lesson Study project was initiated by a team of Primary Two teachers after an analysis of the Primary Two year-end English Language results showed the need to develop the pupils' skills in answering inferential questions for reading comprehension. During the initial problem-solving stage, the team engaged in the processes of Open Innovation (Henry Chesbrough, 2005) which involved collaboration in the generation, review and selection, and implementation of ideas. This then progressed to the designing stage, where much was done to ensure the materials created were not only visually stimulating, but also relevant to the teaching of the required skills. The product was an innovative Inferential Comprehension package which scaffolded teaching and learning progressively using pictures, short notes and narratives, from which learners infer rich meanings. Creative imageries such as Treasure Hunt and Rocking Chair were also used to complement the teaching of reading strategies. This presentation builds on what was presented at WALIS (Tokyo) in 2011 to provide a discussion of the effective employment of Open Innovation and the Lesson Study protocol used to support teachers' use of Open Innovation processes. It includes addition of two other inferential skills and recommended follow-up for a smooth transition in learning from Primary two to Primary three. Video clips of our pupils immersed in the learning process will be provided as evidence of students' learning. This project has brought about an improvement in our pupils' skills in answering inferential questions and the teachers' skills in designing the questions. The collaboration amongst the team members has also developed an innovative teaching culture and provided opportunities for teacher leadership in the design and evaluation of a learning package.

E45-PP TR709 Teaching of composition writing using animation – Emphasis on the use of transitional words and phrases in composition writing

LIM Buay Tiang (Room Chairperson), LIM Kwee Hua, TAN-LEE Yoke Kew, CHEN Kaiying, LIN Qizhen, NG Pei Rong, Horizon Primary School, SINGAPORE

Keywords:
Animation; Transitional words

To acquire writing skills, Primary 1 and 2 pupils start off by writing sentences followed by a single paragraph, based on a given picture. In Primary 3 and 4, pupils progress to write short passages, consisting of 3 to 4 paragraphs, based on a set of 4 pictures. A common challenge for these pupils is to link the various paragraphs through the use of transitional words and phrases. Very often, omission of such words and phrases affect the flow of the passage, making it difficult for readers to see the connection between paragraphs and comprehend the passage. Despite putting in their best efforts,

and phrases; Composition Writing

pupils are unable to produce a well-organized piece of writing with rich content. To enable pupils to use appropriate words and phrases to link the various paragraphs, and to better understand the pictures, teachers have designed animated picture compositions using words that pupils have learnt. Through animation, pupils are able to see how one picture leads to the next and the flow of events between pictures. This helps them better understand the plot, thus they are better able to expand on the content of their writing. The teachers have used Lesson Study platform to carry out a lesson plan in teaching composition. After conducting lesson observations, reflections and fine-tuning of the lesson plan, it was found that using animation has indeed helped the pupils in composition writing, especially for pupils who have just started writing in paragraphs, and the lower-ability pupils. This has provided a structure for the pupils in learning composition writing. The teachers strongly believe that using animation in composition writing has aroused pupils' enthusiasm and interest in learning the skills of good writing. This method of teaching can definitely help pupils overcome their phobia for writing and ensure that learning takes place in a fun and engaging way. It strongly supports our vision of promoting the love for learning and effective use of Chinese Language in the pupils. Lesson Study has indeed been a useful platform for teachers in carrying out the above lesson plan.

E46-PP TR709

*MOHAMED Asar Ali, LIOW
Zhong Fa, SUWANDI Mohd
Hisham,
Pei Tong Primary School,
SINGAPORE*

Keywords:

Writing; Story,
Communication

Cultivating creativity through drawing in pupils' writing

The purpose of this Lesson Study was to improve the content aspect of pupils' writing. Through this, we also wanted to enhance professional development of teachers in the teaching and learning of English writing. The Primary 3 teachers were concerned about pupils' poor composition results. Thus, we decided to brainstorm some ideas and share pedagogical skills which proved effective in our class. One teacher shared how pictures can be used to stimulate pupils' thinking. He shared how weaker students in his class could write more when they were given opportunities to draw. The teacher observed that children love drawing, even up to the age of 9 or 10 when they are in Primary 3 or 4. Thus, he decided to tap on their love for drawing in order to improve their writing. For example, when the pupils were asked to write about their family, some pupils would struggle to include details. They would simply write general statements such as listing down family members' names, their occupation, and how much they love them. However, when the same group of pupils were asked to draw their family portrait, they included more details like what types of clothes each family member usually wears, details of their facial appearance such as a father having a beard or a sister wearing earrings. Information like hobbies was also evident. When the pupils of this class were asked to write about their family again, they were able to include a lot more details and their composition as a whole improved. The pre-activity of drawing gave them visual scaffolding which activated their creativity and content. The primary 3 teachers subsequently created a writing package/booklet which was designed to give opportunities to express their creativity in terms of both drawing and writing. Obviously, the drawing section was meant to aid pupils in their writing. And as much as the teachers want pupils to be as creative as possible and do not want to restrict their imagination, the teachers understand that assessment will be based on exam format where pupils will be restricted to a given title as well as four pictures in a sequence. The writing package is thus very relevant to the Singapore education and assessment system and the four-picture format incorporated into the package. In the actual lesson study conducted, pupils have to cut out the pictures, paste them into the booklet and add their own drawings between pictures to 'create' their content through visual means. This method is especially useful for lower-middle pupils and based on our analysis, the implementation of this package has shown very

good improvements in the writing ability of our pupils. More importantly, pupils enjoy writing when they use this package and the love for writing is inculcated in them through this.

E47-PP TR709 The impact of giving feedback on areas for improvement to help better writers to improve their composition writing

*NG Lay See, KOH Debbie,
SARBINI Norasniza,
Yu Neng Primary School,
SINGAPORE*

Keywords:
Primary English, Writing Skill,
Feedback

One of the desired outcomes for English Language proficiency in Singapore is to have students attain a good level of competence in writing. However, to express ideas clearly and communicate them in writing are challenging for non-native English writing students. Teacher's feedback on student writing is therefore important to support students' writing development and nurture their confidence as writers. This quasi-experimental study investigates the effects of teacher's feedback and student's revisions on their writing performance for a group of Primary 4 students in a neighbourhood school. Results show that teacher's feedback encouraged students to revise their writing and hence improve their writing abilities. Through surveys and written reflection, students expressed their enthusiasm to write and desire to know how to improve their writing. Most of them commented that the teacher's feedback guides them, giving them some directions for specific areas of improvement. However, due to their proficiency level, some students might not be able to effectively revise their writing. Given more scaffolding and explicit teaching of vocabulary related to the given topic, the teachers stimulated rethinking, developing ideas, and provided opportunities for these young writers to reflect on their work. This helped students to perceive writing as a means of constructing meaning for an audience and as a thinking process rather than as merely writing correct sentences. The teachers found that marking all errors did not improve students' writing skills as errors still persisted even though teachers meticulously corrected them, and that corrections may have a negative effect on student attitudes toward writing. The experimental group which received comments and questions rather than corrections showed more progress and had more positive attitudes towards writing. The teachers found that holistic response on content is more effective than on form as students who received comments on content showed improvement in the quality of their writing.

E48-PP TR710 How does the use of manipulatives help pupils with varied learning abilities to develop conceptual understanding in decimals and help them articulate their thinking and learning?

*LIM Kathy (Room
Chairperson), KANG Zhenlin
Dallon, GOH Mai Leng, NG
Shin Yee Cindy, TAN Hui
Ping May,
Yangzheng Primary School,
SINGAPORE*

Keywords:
division; decimals;
manipulative; C-P-A
approach; procedural
understanding; conceptual
understanding

At the Upper Primary grade levels, we realized that pupils are still displaying the misconception of writing '3.14' as '3¼'. As such, this study aimed to explore how the use of manipulatives can help pupils with varied learning abilities to develop conceptual understanding and to articulate their thinking and learning. Our research methods involved the use of Jerome Bruner's Concrete-Pictorial-Abstract (CPA) approach. We started the lesson by using number discs (concrete) and decimal discs to illustrate the concept of division of decimals. We then made connections between the concrete representations to the formal algorithm (abstract) so that pupils could develop conceptual understanding instead of merely procedural understanding. Our findings can be categorised in terms of 'What went well' i.e. there is conceptual progression in leading pupils to make correct deductions and pupils have the basic concept and knowledge of Decimals, whereas 'What went wrong' was evident in 'Perceptual variability' i.e. the same concept was presented using too many forms of representations. Manipulatives were not typically used by pupils in the classroom, thus pupils did not know what to do with the manipulatives when provided with them. In conclusion, the choice of manipulatives and making strong connections between concrete and abstract representations is paramount to helping pupils build conceptual understanding in mathematical

concepts such as division of decimals. This lesson study also surfaced students' misconceptions in the topic and led teachers to discuss intervention measures to enhance students' understanding.

E49-PP TR710

*CHAO Warren, SAMAT Irfan,
ROHANI Siti, TAN Abi, NAIR
Nina, MOHAMED Mahiran,
Fuhua Primary School,
SINGAPORE*

Keywords:

Social Constructivism;
Concrete-Pictorial-Abstract;
Engagement through audio,
visual and concrete

A Lesson Study on teaching equivalent fractions

This lesson study investigates common misconceptions about equivalent fractions among Primary Three pupils and seeks to clarify them. It has been observed that pupils see fractions as distinct whole numbers and understanding fractions in equivalence is a new concept. In order to address this learning need, the teachers have collaboratively designed a series of lessons to identify common misconceptions about equivalent fractions and clarify them. Using an eclectic mix of teaching methods ranging from teachers' demonstrations to collaborative group work as well as independent work, children were engaged in learning activities on the topic of equivalent fractions. Conducted in a mixed-ability class, the lesson study also aims to engage the pupils through video presentation, concrete hands-on activity and providing appropriate contexts. The most meaningful outcome of this lesson study is that the teachers were challenged to handle unanticipated pupils' responses to the questions raised. At the same time, teachers were motivated to improve their own teaching methods innovatively through learning how their students learn in class.

E50-PP TR710

*TAN Mavis, ANG Joyce,
MOK Sze Hui,
Nanyang Primary School,
SINGAPORE*

Keywords:

Music, Learner-Centred
Teaching, Song-Writing,
Lesson Study approach,
Promote creativity

Designing a song writing unit with learner-centered teaching using Lesson Study approach

Music involves the dimensions of performing, appreciating and composing. In a poll taken of our pupils in 2009, about 67% of them indicated that they play a musical instrument outside curriculum time. Hence, our music curriculum has to stretch the capabilities of these pupils by providing opportunities for them to further develop and harness their musical skills. The school then decided to call for original songs written by our pupils and to compile them into a publication for distribution within the school and to our stakeholders. With more teachers on board teaching song composition in Primary 5 (P5), a more structured unit of lessons was needed. This presentation is a sharing of our Lesson Study on a P5 song writing unit with lessons based on the theme 'Singapore'. The Music committee wanted to promote Learner-Centred Teaching; this refers to instruction which places students at the centre of learning. The student assumes the responsibility for learning while the instructor is responsible for facilitating the learning (Brandes and Ginnis, 1986). Hence this paper aims to explore how we can best design a musical experience or essential scaffolding for our students so that they will be able to grasp the fundamentals of song writing as a concept and be empowered to compose a song independently in groups. This holistic process stretches thinking, promotes inter-connectedness and develops independent learning which is in line with one of the five dimensions of learning and teaching as prescribed by the PETALS framework. Our Lesson Study (LS) theme is 'Empowering learners to develop Creative Thinking' and the research question is 'How do we promote creativity through Learner-Centred teaching?' Our team attempts to use the LS stages (drafting research theme, planning lessons collaboratively, conducting research lesson, post-lesson discussion and lesson plan revision) to conceptualise a 'Learner-Centred' song writing unit. We will share our lesson development process and discuss how Learner-Centred approaches can promote creative thinking, drawing on teacher observations and pupil surveys. The presentation will include photographs, teacher reflections, lesson plans and post lesson discussions.

E51-PP TR711 Understanding by Design (Ubd) in teaching of Malay Language and Tamil Language oral conversation through Lesson Study

ISMAIL Nurisham (Room Chairperson), VASANTHAN Lavenyah, RAMAN Meenachi, SAMSI Suhainis, HUSSAIN Zanariah, KULASEGARAN Sangeetha,
Jing Shan Primary School,
SINGAPORE

Keywords:
Teaching of Oral
Conversation

This study describes the involvement of a team of Malay Language and Tamil Language teachers in adopting a pedagogical approach to teach oral conversation to their Primary 5 Malay and Tamil Language pupils through their lesson study project. The project is to improve pupils' communication skills and enhance their confidence in speaking and expressing their thoughts. This paper was initiated due to a group of educators' concern that students were not performing well in the 2011 Semestral Assessment 2, Oral Examination, conversational component. The educators found that pupils' limited ability in articulating their thoughts in the oral examination, manifested their low level of vocabulary acquisition, conversational skills as well as the level of confidence in expressing themselves aloud. They were unable to articulate their thoughts fluently and coherently. Pupils also had the tendency to avoid eye contact whilst speaking. The team decided to adopt the Understanding by Design approach espoused by Wiggins and McTighe in this lesson study project. A pre-test was conducted to determine pupils' abilities. This lesson study was conducted after students had been taught the steps to oral communication such as identifying the main ideas or theme of the picture conversation, listing words and organising the order of the points to be elaborated. Pupils were also taught to have proper intonation and non-verbal communication such as body posture and eye contact; important elements for self-expression and confidence. The intended outcomes of the lesson study was that pupils were able to elaborate their ideas, give responses based on the conversational topic given and overcome their fear when giving responses. A set of rubrics were prepared to evaluate pupils' progress during the lesson study. The evaluation helped to determine the variance in pupils' performance in the oral communication in Malay Language or Tamil Language. The 2012 Semestral Assessment 2 Oral Examination results would be used to track pupils' performance and to measure the extent in which the teaching approach meets the objectives.

E52-PP TR711 Tackling the conversation component of the MTL oral with 5W1H1F and re-creation of real-life settings

TAN Chew Shie,
Catholic High School,
SINGAPORE

Keywords:
Chinese language;
Conversation; Oral; Speaking;
Real-life Settings

Over time, the language environment in Singapore has evolved significantly; many more students are coming from households where English is predominantly the home language. The Ministry of Education (MOE) has since encouraged schools to give greater attention to developing the listening and speaking skills of students for Mother Tongue Languages (MTL), which calls upon the teachers to perform new instructional roles. In our school, the Primary 5 Chinese teachers made use of 5W1H1F (Who, What, Where, When, Why, How and Feel) to train pupils to observe people, things and situations around them and set them to think, to feel, and to understand the world that they live in. This also equips them with critical thinking and analysing skills. Tackling the Conversation component of the MTL Oral also requires the re-creation of real-life settings for students to learn the language. Though teachers are the ones with the expertise, every individual student's interpretation, comprehension and acquisition of the language is unique and usually influenced by social interaction within a context, setting or culture. With teachers creating social settings for students to build knowledge together, they are also given opportunities to learn, discuss and use the language in class, through communicating and collaborating with one another. When students use everyday language to interact with their peers, this makes the language a "living" language. To be able to feel and experience the language as being functional and vibrant, cultivates an interest in the learning of the language and

improves learning outcomes. As students build up on their knowledge and link what they had been taught to life itself, they will be able to use the language with assurance. This inspires pupils towards continuous lifelong learning, i.e. learn to use Chinese and use the language to learn.

E53-PP TR711 Teaching guided Chinese oral reading using the emotional index and peer assessment in the 10'C Pedagogical Approach

*CHIONG Sin Ee, TEO Siok
Hoon Candy, NGAUW Cui
Qin,
Haig Girls' School,
SINGAPORE*

Keywords:
Chinese; Guided Oral
Reading, 10'C, Emotional
Index; Peer assessment, Self-
directed learning; ICT

Reading aloud involves a student reading a given passage with correct pronunciation, appropriate pace of reading and expression. While the traditional form of reading aloud teaching strategies provides sufficient guidelines to pupils on criteria for doing well, pupils might not be able to comprehend the required emotions in the passage thus hindering their reading expression. 10'C is a Chinese Language ICT-Based Learning and Teaching Programme pioneered by the Ministry of Education's Educational Technology Division (ETD) in 2008 and adopted in our school in 2010. The 10'C pedagogical approach adopts a 50% teacher-led and 50% self-directed learning model which emphasizes formative assessment strategies, engaging pupils in self and peer assessment in reading and writing activities. This lesson study pilots how we can adopt the 10'C pedagogical approach to teach guided Chinese oral reading. Our team explored how guided Chinese oral reading can be taught explicitly through the use of emotional index and modelling. The study focuses on how the emotional index can aid pupils in identifying the appropriate emotion to express the passage and thus the correct tone to use when reading aloud. In this study, pupils are first taught the 3 criteria of pronunciation, reading speed and intonation. Subsequently they listen to the recordings of their peers and assess their peers' performance. Teacher-observers will examine how pupils evaluate their peers' performance and how guided Chinese oral reading, through modelling and practice, can help improve their reading skills. The study hopes to provide deeper insight into how pupils can improve their reading skills through comparisons and modelling of 'fluent and expressive' reading. This study may help teachers better craft future Chinese oral reading activities so that pupils will understand that different emotions and tones of expression are required for different passages.

E54-PP TR712 Thinking Mathematically

*MUSA Norhuda (Room
Chairperson),
Tampines Primary School,
SINGAPORE*

Keywords:
Mathematics, Lesson Study,
Cognitive Thinking, Teaching
Strategies

This study looks into encouraging learners to reason mathematically and become engaged with concepts through mathematical tasks. These tasks can be easily transformed into tasks suitable for reasoning, thinking and communication in classrooms via the use of "What" strategies; "What could be better" (alternative strategies), "What's wrong" (misconception) and "What if..." (think and create). These mathematical tasks with high cognitive demand often require students to make their thinking explicit and these tasks are necessary for the advancement of reasoning, thinking and communication in classrooms. This study was carried out on a group of high attainers in Primary 5 mathematics and data in the form of surveys, interviews and written tests were collected. From the results gathered, it was apparent that the "What" strategy had a positive impact on students' learning.

E55-PP TR712 The process of being reflective learners in Mathematics lessons

*MASAMI Kasano,
The University of Tokyo,
JAPAN*

Keywords:
mathematics, discourse
analysis, reflective,
teaching/learning process

This study investigates the teaching/learning process in Mathematics lessons for enhancing students' ability to express their thinking and understanding of Mathematics, focusing on how an expert teacher helps his students to be reflective learners through lessons and tasks at home. In recent years, there has been growing interest in collaborative learning and dialogical practice, moreover, the Teaching Guidelines of Japan encourages enhancing capacities for thinking and expression in all subjects. As such there has been

increasing interest among teachers about how to design collaborative and dialogical lessons i.e. how do teachers conduct such lessons and how do students interact and learn in such lessons? To examine such questions, this research conducted a case study of lessons by an expert teacher of dialogical practice. This study examined 1) how an expert teacher designs teaching/learning for dialogical practice, 2) how students develop learning through such lessons. It examines changes through classroom discourse and learners' notebook descriptions via mid-term lesson observations of learning units such as 'Division' in May, 'Decimals' in September, and 'Multiplication of Decimals' in February of the 4th grade year (in Japan, the academic year begins in April). Lesson observations were conducted for the introductory lessons of the learning units, the lessons were recorded by video camera and IC recorders placed on group desks during group-work. Transcripts were made to generate discourse data which together with field-notes clarified the lesson structures. This study clarified the process of being "reflective learners" and features of the teacher's lesson approach. Both in classroom discourse and in the comments of notebooks, he emphasized the same points consistently, this means the task structure of lessons and homework are the same, students learnt to think deeply and carefully through the teacher's consistent use of dialogical practices. This is different from the usual practice of mathematics learning in school, where even if dialogical practice occurs in class, student homework tends to feature skill training only. This study shows an exemplar of dialogical practice and the effectiveness of dialogical practice in Mathematics education.

E56-PP TR712 Teaching of Maths - The subtraction of numbers (within 40) with regrouping using the Concrete-Pictorial-Abstract Approach' (CPA)

*MOHD YUSOFF Hawa,
ABDUL KADER Khalisah,
WONG Hsiao Sien, Lisa,
Haig Girls' School
SINGAPORE*

Keywords:
maths; regrouping;
manipulatives; place value

This paper examines the work of a lesson study group in addressing the problem of Primary 1 pupils having difficulties comprehending mathematical concept of the regrouping of tens and ones during subtraction. Specifically, this paper explores the effectiveness of the Concrete-Pictorial-Abstract Approach (CPA) in learning subtraction with regrouping; whether this approach would enable pupils to develop greater conceptual understanding of this process. This research study gave teachers opportunities to gain better understanding of their pedagogical practice. Teachers employed the use of unit cubes in helping their P1 pupils to have a better enduring understanding of place values and the concept of regrouping. Previously, the concept was taught without the unit cubes, but with other manipulatives (e.g. bundles of ice-cream sticks). Will the use of unit cubes enhance pupils' understanding of regrouping in order to perform subtraction of numbers (within 40)? Mathematics instruction intended to promote conceptual understanding needs to include a variety of modes of representation. Educators should represent concepts in multiple ways to ensure meaningfulness and generalisations of concepts (Cathcart, Pothier, Vance & Bezuk, 2000; NCTM, 2000; Tlicker, Singleton & Weaver, 2002) The investigative 'Concrete-Pictorial-Abstract Approach' (CPA) allows pupils to move gradually from actual objects through pictures and then to symbols (Jordan, Miller, & Mercer, 1998), thus developing greater conceptual understanding. This research project enables teachers to quantitatively and qualitatively evaluate the effectiveness of the above strategy in enhancing pupils' understanding of abstract concepts; through the use of pre and post-tests and also from observation of pupils' performance when doing the tasks. It has enabled teachers to further develop their pedagogical skills and also deepen their professional expertise as collaborators. The weekly reflective discussions amongst the teachers generated insightful findings as teachers clarified their strategies and understanding of how pupils learn Maths. This reflective process reaffirmed teacher's belief that helping students understand

the underlying meaning of mathematical concepts promotes acquisition, retention, and generalisation of many mathematical objectives.

E57-PP TR713 The use of Lesson Study in designing a package for solving Mathematics word problems through the use of manipulatives (Multisensory Maths Kit) and model drawing

*LEE Michael (Room
Chairperson),
Haig Girls School
SINGAPORE*

Keywords:
lesson study; Mathematics;
word problems;
manipulatives; model drawing

This Lesson Study project was initiated after Maths teachers noticed that some of their pupils have difficulties in understanding and solving word problems involving the use of 'more than' and 'less than' operations. During the initial problem-solving stage, a team of Primary Three Maths teachers were involved in idea generation, collaboration, review and selection, and implementation of the project. In the course of designing the package, the team realised that students often get frustrated when teachers present mathematical problems only in the abstract way. They then realised the importance of organising content into concepts and provide instruction that allows students to process the new learning in meaningful and efficient ways. The project was thus planned using 'The Concrete-Pictorial-Abstract Approach' (CPA). The CPA approach benefits all pupils but has been shown to be particularly effective with students who have mathematics difficulties, mainly because it moves gradually from actual objects through pictures and then to symbols (Jordan, Miller, & Mercer, 1998). Manipulatives (Multisensory Maths Kit) were used to scaffold the pupils' understanding of the word problem (Concrete). Models were then drawn to show visual representations of the concrete manipulatives and thus help pupils visualise mathematical operations during problem solving (Pictorial). Lastly, pupils were required to write out the proper mathematical statements of the word problem (Abstract). By investing time on the incorporation of concrete manipulation and pictorial representation, students were hence able to internalize and visualize mathematical concepts. It also helped to hone pupils' skills in answering complex Math problems. Through rich discussions of lesson preparation and execution of lessons; as well as observation of pupils work, teachers were able to gain useful insights into a more effective pedagogy in Math problem solving. Teachers thus emerged as more reflective and confident practitioners.

E58-PP TR713 Primary 4 students solving Linear Equation using the 3R approach

*YEO Peng Seng, LEE
Edmund Jian Feng, FOO
Wendy, TAN Eric, LEE
Vincent,
St Andrew's Junior School,
SINGAPORE*

Keywords:
linear equation; mathematics;
positive attitudes; connection;
algebra

As mentioned by Sutherland (2002) in his research about how 10 year old students solve linear equations, there is relatively wide agreement among mathematics educators and among policy makers that algebra should become part of the elementary school curriculum. In view of the many concerns that students are unable to translate word problems into model drawing and from model drawing to linear equation, our team aimed to investigate how the Primary 4 students' use equations to describe and represent word problems. The reason why we did this lesson study is because we believe that developing positive attitudes towards problem solving is a central focus that helps all students to feel better about learning Mathematics. If students were exposed to an algebra focused mathematics curriculum from the onset of their education, it is likely that by the time they are older, they would be able to deal with a lot more complex mathematics. We conducted this lesson study (LS) on 37 students from a Primary 4 classroom in an elementary school located in Singapore. These students were selected from the middle to low mathematical achievement levels and none of them received formal instruction in linear equation. Pre and post test were conducted where each student was presented with three word problems of familiar contexts. Each student response was independently read and analyzed. There were 2 rounds of LS each lasting about 90 minutes. Our results suggest that dealing with equations is not beyond primary four students' mathematical understanding and that

much more could be achieved if similar activities become part of the daily mathematics classes offered to elementary school children. In conclusion, students are able to make connections between model drawing and linear equation. There was improvement in students' performance. Using linear equation provides an alternative way of solving a word problem.

E59-PP TR713 The impact of scaffolding student visualization using model drawing on solving word problems

*WONG Chian Woon,
MUHAMMAD YASIN
Muhammad Ali, CHEONG
Mei Mei, SALLEH Saudah,
YEO Ah Choo Irene, CHUA
Zhen Long Mark, RAHIM
Mohamad Raizal, MOHD,
NEO Koon Seng Jeremy,
YEO Chee Meng, SAAT
Nurharyati,
North Spring Primary School,
SINGAPORE*

Keywords:
Mathematics; Model Drawing;
solving Word Problem

With the introduction of the model drawing heuristics in Singapore Schools to address students' difficulties in solving word problems, students often face issues in presenting and linking mathematical ideas or key information from the question stem to the diagrammatic representation and its translation to mathematical statements. North Spring Primary School embarked on a Lesson Study (LS) to examine the effects of scaffolding students' visualization and focused on the use of a structured approach to teach students to solve word problems when using model drawing heuristics. The study targeted Primary Five students of differentiated abilities in a Singapore Primary School. Teacher-researchers planned and implemented a LS programme that aimed to teach students skills such as the use of color coding, sub-dividing, 'zooming in and out', and surfacing hidden information. These skills are intended to bridge the model drawing representations with suitable strategies, computations and procedures that students can use when solving problems. The observations provided us valuable insights as educational practitioners about our own pedagogical approach to model drawing. This study is pertinent to educators and administrators seeking to understand how effective Singapore's model drawing heuristics are, and also gives a suggested approach to the teaching of model-drawing that we believe is more effective than the current standard approach being used in schools.

E60-PP TR714 A plant's diary: A Research Lesson on Primary Science lower block - plant systems

*HAN Choon Boon James,
ISMAIL Faridah, LEK Li Ping,
WONG Weng Si Kristie,
KUTTY Mariya (Room
Chairperson), STEPHEN
LOUISESAMY Grace,
St Anthony's Primary School,
SINGAPORE*

Keywords:
Primary, Science, Plants

This project is about a research lesson conducted by the Primary 3 Science Teachers in St Anthony's Primary School. The topic was on Plant Systems, in the Singapore Primary Science Lower Block syllabus. The nature of the lesson was to encourage our pupils to learn about the functions of plant parts through an inquiry based approach. Before embarking on the research lesson, we held discussions on the topics and read literature on the use of questioning in Science lessons. We decided to use the Lesson Study (LS) protocol and our teaching and learning framework, Reflect, Inquire and Share to Engage (RISE), to guide us in the development of this lesson package. The lesson package involved creating a plant diary, where our pupils observed the germination of a seed throughout a 5-day period. After the observation period, we conducted 2 research lessons, one in a higher ability class, and one in a mixed ability class to observe how the pupils were engaged in our lesson material. At the end of our observation lessons, we discussed and finalized our lesson package. In this LS, we learnt that we needed to provide different levels of scaffolding to guide our pupils in Science inquiry. We learnt that we needed to differentiate materials beyond providing extension and exploratory activities, to also differentiate in the lesson pedagogy as well. We learnt that we needed different levels of questioning for different levels of pupil ability and that the exploration of pupils' conceptions and misconceptions were vital in ensuring that they understood the material taught to them. We propose that scientific process skills be specifically embedded into Science lessons to help our pupils understand and apply their knowledge to the varying contexts they encounter in their lessons and everyday life.

E61-PP TR714 The Naturalist Classroom: An innovative and natural environment for learning

*WONG Elaine,
SWARNAPALA Naurana
Badalge, ABAS Mariam,
MOHD YUSOF Nadiyah, PAO
WEE BOON Melvin,
JIAUDEEN Saheerabanu,
Jing Shan Primary School,
SINGAPORE*

Keywords:
seed dispersal; naturalist
approach; outdoor learning;
adaptation; science
curriculum

This lesson study began with teachers critically analysing the primary Science curriculum. One of the goals of the Science curriculum is to nurture pupils who are curious and keen to explore the things around them. With reference to the Science syllabus, the team identified the learning opportunities that can be designed to support pupils' learning as well as achieve the Science curriculum goals. The team agreed on the naturalist approach to teaching and learning. Literature reviews on naturalist teaching and learning highlighted the many advantages of the approach in improving pupils' cognitive abilities and resistance to negative stress and depression. A research lesson was developed to enhance pupils' learning of 'Seed Dispersal' under the overarching concept of 'Adaptation'. During the lesson conducted at a park, pupils searched for different kinds of seeds and learned scientific field practices such as sorting and identifying methods and the 'Clean Hands-Dirty Hands' technique for bagging samples. Post-fieldwork, pupils analysed data to develop conclusions about different seed dispersal methods and presented their findings in a tabulated form. Pupils' achievement of the lesson goals were analysed through their field assignments, a quiz paper and a post-lesson student survey. This paper highlights the opportunities, benefits and challenges of naturalist teaching and learning experienced by the teachers in the research lesson and the refinements made to the lesson package after the implementation of the first lesson. The main finding from this lesson study was that the outdoor component of the curriculum enhanced coherence and connectedness across Science concepts, activities, and learning environments. Field experiences were seen as a tool for learning, and all pupils achieved substantial learning gains. The teacher viewed the role of the outdoor experiences as a way to engage pupils, and promote connections across the unit through firsthand authentic experiences.

E62-PP TR714 Using Inquiry and 5E instructional model based on the constructivist approach to improve students' observation and classifications skills

*LIN Kee Wee Winston,
NORSAM Jumia, CHUA Lu
Yen Lilian, AL-ATTAS
Sharifah Fadillah Syed Mohd
Ismail, CHEW Wei, HOR
Swee Peng, TAN Xuening
Ellena, POON Kar Tung,
ABDUL LATIFF Diyana, POK
Susan,
North Spring Primary School,
SINGAPORE*

Keywords:
inquiry; 5E instructional
model; constructivist
approach; process skills;
primary science

the learning of Science, students often face problems when asked to describe what they observe and to classify items according to a criterion. Often in assessing the students, teachers lament that the students lack observation and classification skills. In our research, we found that good questioning techniques used by teachers help students to review their existing knowledge and understand new concepts better. The Primary 3 Science teachers decided to use Lesson Study to examine the effects of inquiry and the use of the 5Es (Engage, Explore, Explain, Elaborate and Evaluate) on the students' observation and classification skills. The Lesson Study targeted Primary 3 Science students in a Singapore Primary School. As the Science curriculum is modular in nature, the teachers planned and implemented lessons that involve different topics but with the same principle of improving students' observation and classification skills. The first lesson study cycle focuses on leaves, which forms part of the Primary 3 topic of Plant Systems. Students learn to apply their observation skills to classify leaves into different groups based on the types of edges, vein patterns and shapes of leaves. The second lesson study cycle focuses on the human digestive system, which forms part of the Primary 3 topic of Human Systems. Students learn to apply their observation and communication skills to define digestion, identify the parts of the system and its functions. Approximately 235 students of differentiated abilities from Primary 3 took part in both lesson studies. The teachers planned and carried out a public lesson with one class while the rest of the classes conducted the lesson after improvements on the lesson plans were made based on the observations made by the teachers during the public lesson. In using lesson

study as a platform, the teachers have become more aware of the need for good questioning techniques and the students have benefited through the improvement of their observation and classification skills.

E63-PP TR715 Fostering students' learning and development through research based projects: Reflection from Raffles Institution Year 1 students

*ILUYOMADE Raphael
Funwa, SINGH Jai (Room
Chairperson), LIM Joycelene,
Raffles Institution,
SINGAPORE*

Keywords:
Research, Learning, Student
Development, Data Analysis,
Motivation, Self-Concepts

Using responses to Research Education questionnaire and teachers' observation, this paper will focus on the analysis of how Raffles Institution (RI) Year 1 Research Education program affects students' learning and development. The development of students will be evaluated from the standpoint of learning attitudes, competency, task commitment, achievement, time management, self-concepts and values, especially with respect to how to handle diversity. While attempts will be made to show how the Raffles Institution Research Education program has helped students learn skills needed for data collection, analysis and interpretation, we will also engage in a systematic discussion of how approaches to the outside the classroom component of the Research Education has fostered the Raffles Institution Year 1 students' development. To facilitate our discussion, we will be focusing on the methods used to instigate and sustain students' interest and performance. Ultimately, this paper hopes to highlight for teachers strategies to process and sustain learning and goal directed behaviour, especially when students are engaged in extensive and rigorous studies.

E64-PP TR715 Using Lesson Study to develop Inquiry-Based Learning material to improve critical thinking skill at Junior High School

*RAMDANI Agus,
Mataram University,
INDONESIA*

Keywords:
lesson study, inquiry-based
learning, critical thinking skill

This paper describes the writer's experience in developing inquiry-based learning materials through lesson study integrated with the 4-D Model in order to enhance student's critical thinking skill. At the stage of development, lesson study was commenced, in which it was started with the first phase, "plan", that is, the researcher and teacher collaborator developed inquiry-based learning materials. The next phases "do" and "see", were conducted in the classroom after the inquiry-based learning materials were developed. The last stage in the 4-D model was done through a quasi experiment. The population of the study was all eight graders in 23 junior high schools. The sampling technique employed was stratified random sampling. The sample selection was carried out, firstly, by determining the criteria for selecting sample schools, which were based on the National Examination Scores (UASBN) at the elementary school education of the student input. Based on the criteria, 8 schools were selected, and from each of the schools, one class was randomly determined. From each of the eight classes, 25 students of high academic ability and 25 students of low academic ability based on their UASBN scores were chosen as the sample of the study. The number of the sample was 200 in total. Four treatments in the study were the implementation of inquiry-based learning material of level 1, level 2, level 3 and conventional teaching material. The data were analyzed using ANCOVA at significance level of .05. The developmental research provides invaluable experience, that is, the production of learning materials which were optimal in making the students learn by inquiring, increasing the teachers' motivation to conduct the instruction, and eventually increasing the students' critical thinking skill. The result of the experiment showed that: (1) there was a difference in critical thinking skills between students taught with inquiry strategies and those taught using conventional strategy; (2) there was a difference in critical thinking skill between the students of high level of academic ability and those of low academic ability level; and (3) there was an interaction effect between learning strategies and students' academic ability toward their critical thinking skill.

E65-PP TR715 Revitalizing Lesson Study in Japanese Senior High Schools through redefining the process: A case study

*WATERFIELD Marc,
LASKOWSKI Terry, HABU
Hiroshi,
Buntoku Senior High School;
Kumamoto University,
JAPAN*

Keywords:
Lesson Study; Revitalizing;
Redefining; Process

This is an ongoing Lesson Study (LS) research project being conducted over the course of the 2012 / 2013 academic year. The material presented in this paper describes the first cycle in what will be a four cycle process upon completion. Lesson Study originated in Japan as a method to facilitate professional development among teachers. At the elementary school level the LS projects are conducted successfully in collaboration. However, the opportunity to collaborate with peers decreases in the actual practice of LS in Japan in junior high school, and reduces drastically in high schools. The purpose of this research project is to revitalize LS, specifically the collaborative aspect of the process in Japanese secondary school LS through redefining the process as it is practiced. Through introducing the collaboration aspect of LS in the initial stages of planning, greater impact in terms of positive professional development was attained. Qualitative data to explore the impact of going through a collaborative cycle on teachers participating in the LS were collected in the following ways: lesson plans were written and presented, the planning stages and demonstration classes were video-taped, interviews with the participants were conducted and subsequent data were gathered through the use of questionnaires and field notes. Even after the first cycle, positive professional growth has been determined among the participants as a direct result of redefining the practices of LS. This case study compares the previous practices of LS as conducted by the English teachers at a private high school in Japan to the current collaborative approach to LS as introduced in the same school.

E66-PP TR716 His-Story, Her-Story, Our-Story: Place-based learning in History

*MANSOR Mardiana (Room
Chairperson),
Jurong Junior College,
SINGAPORE*

Keywords:
Field Trips; History; A level;
Experiential Learning; Place-
Based Learning; Teaching of
Skills

Local field trips are rich resources for teaching and learning of history. However, one of the problems faced in the teaching of A level History in Singapore was that after 4 years of exposure to Social Studies and History at Secondary School, most students would have visited many historical sites in Singapore. Previous local field trips conducted were often a rehash of content that students have already internalized and may not have achieved its intents of seeing connections, motivation and deep learning. In addition the A level History syllabus lends very little to the local context. Thus, the main approach of adopting the place-based framework was to move away from experiential learning which was structured on content delivery or reinforcement to constructivist learning. In 2011, the History Unit in Jurong Junior College designed a Local Experiential Learning Programme in the Civics District and Chinatown based on Smith's "Place-Based Education: Learning to be Where We Are" (2002). Smith illustrated the example of a Cultural Studies programme in which a group of teachers and students created a highly successful series of magazine, Foxfire, which investigated and documented regional cultures in the US (Smith 2002: 587). Our programme aimed at showing the connection between concepts on which nation state were built on and the actual problems faced in developing nation state. Emphasis was placed on creating a learning experience that allowed the students to become the producers of knowledge instead of merely receiving content. The activities focused mainly on investigative, questioning, interpretation and higher order thinking skills that required students to position themselves as historians to develop their own perspective of the history of Singapore's nation building process. In 2012, the History Unit refined the Place- Based Learning framework and involved community resources, to further cross the bridge to the main tenet of place-based learning which is to connect students' learning experience in history to local and eventually global phenomenon.

E67-PP TR716 Lesson Study in History: Changing students' attitude towards History through multi-tasked strategies

*ROS Rossana,
VAAHIDALISHA Pakiri
Muhamm, ABDUL AZIZ
Farouq,
Junyuan Secondary School,
SINGAPORE*

Keywords:
changing students' attitude;
multi-tasked strategies

Attitudes towards Humanities appeared to have an impact on results. From the survey, students revealed that they learn better in groups through group discussions and tasks like writing letters, newspaper articles, drawing posters and interpreting sources. The most effective History lessons were when they were engaged in group work and when the teacher told them his/her personal stories and provided summary of the lesson. Our lesson study project aims to change students' attitude towards History through multi-tasked strategies - video clips, analogy, songs etc. By capitalizing on the different types of resources - pictures, text and visuals, we hope not only to arouse students' interests but also to sharpen their analytical skills and increase their knowledge of the subject. This is in line with "Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand" (Confucius).

E68-PP TR716 Collaborative learning using ICT to promote thinking and reasoning skills in the teaching and learning of History

*LIM Mathew, CHENG Jaclyn,
SHARIF ARSHAD Ali, OON
Yongfu,
Tampines Junior College,
SINGAPORE*

Keywords:
History, Junior College, High
School, Collaborative
Learning, ICT, Facebook

A Lesson Study (LS) conducted by the History unit of Tampines Junior College (TPJC) aimed to find out how ICT-facilitated classroom discussion can assist and improve students' reasoning and critical thinking skills in analysing and exploring debates about a particular historical phenomenon—the end of the Cold War. Embarking on LS for the first time, with Teachers Developers from Marshall Cavendish, and involving non-History TPJC teachers and a 'Knowledgeable Other', Anglo-Chinese Junior College History teacher Kevin Ang as LS observers, the LS team sought to find out if Facebook™ could be a better ICT platform for students to articulate and effectively exchange their ideas on History topic in a classroom setting. It was found through the LS that ICT collaborative learning had indeed contributed to more active students' participations in the classroom than traditional classroom collaborative learning. Furthermore, both synchronous and degrees of asynchronous collaborative learning could take place within and outside the classroom using ICT as a collaborative platform. Still, using the TPACK framework as a reference point for post lesson discussion, it was noted that choice of ICT platform does affect the quality of students' interactions. Facebook, though ubiquitously used, might not be the best online platform for discussion as it does not allow double-threading. Secondly, combining a multiplicity of non-ICT and ICT tasks into a single lesson required a great deal of multi-tasking, which might also be too dexterously and cognitively taxing for students. Thirdly, the team realised that it was important for history teachers to delineate and define otherwise equivocal historical terms before the onset of classroom discussion, so that students' online responses on historical issues can be more cogent and coherent. Fourthly, despite the lively online discussion, students were unable to produce decent paragraphs with adequate factual materials and relevant elaborations on the topic in their post-lesson assignment. Finally, through this LS process, TPJC teachers as a Professional Learning Community (PLC) have grown to appreciate the heuristic value of Lesson Study as a PLC research framework and methodology. LS would certainly be used in future Professional Learning endeavours.

E69-PP TR717 Lesson Study incorporating phase-based instruction using Geometer's Sketchpad and its effects on Thai students' Geometric thinking

*ADULYASAS Lilla (Room
Chairperson),
Universiti Sains
ABDUL RAHMAN Shafia,
Yala Rajabhat University,
MALAYSIA*

Keywords:

Geometry has in many countries, proved to be one of the topics in mathematics that is problematic for students to understand. This article reports on a pilot study that was carried out to investigate the effects of Lesson Study incorporating Phase-Based Instruction using Geometer's Sketchpad (GSP) on Thai students' geometric thinking. The effectiveness of the Lesson Study

Lesson Study; Phase-Based Instruction; Geometric Thinking; Geometer's Sketchpad

approach within the targeted context was assessed in a quasi-experimental research approach involving three groups of mixed ability Grade 7 students (twelve year olds) in one of the schools in Yala province, Thailand. These groups (Group 1: N=30, Group 2: N=28 and Group 3: N=29) were taught the topic of Properties of 2D and 3D geometric shapes in turn by three different teachers, observing the Lesson Study teaching protocol. Data was collected using pre-test and post-test to assess students' van Hiele level of geometric thinking devised by the researcher based on Usiskin's (1982) test and scoring criteria. Findings revealed that the Lesson Study approach was exceedingly effective in improving students' geometric thinking. Analysis of paired sample t-test showed that there was a significant difference in the pre-test and post-test scores in each group after each cycle of teaching and learning. In addition, analysis of covariance showed that there was a significant difference in the post-test scores among the three groups of students. This suggests that the Lesson Study approach was effective in developing and enhancing students' geometric thinking.

E70-PP

TR717

Use of ICT, self-directed and collaborative learning styles to teach Kinematics in Additional Mathematics

MALIK Maslinda, WONG Chee Wai Edwin, KUPPUSAMY Divakaran, OON Tze Ying Joel, HENG Tze Wei William,
Sengkang Secondary School,
SINGAPORE

This lesson study explored how the use of 'Information and Communication Technology' (ICT) can help support self-directed and collaborative learning in the Additional Mathematics classroom. The topic kinematics was chosen to help students who have difficulty visualizing word problems related to kinematics. Three Secondary Four classes were selected and lessons were conducted by three different teachers. Specific learning activities were incorporated in the lesson plan for each lesson. The learning activities were chosen to create visual experiences for the students. The lesson plan was improved upon after each teacher's lesson delivery. Teacher observers were on hand with a record sheet to make observations on students' behaviours during the lesson. In each lesson, students contributed ideas via the Wall-wisher which is a collaborative means of gathering information, followed by a hands-on exercise using Graphmatica. Graphmatica was used for discovery learning where students learnt about the relationship between displacement, velocity and acceleration. To aid in checking for lesson effectiveness, a test item was implemented to test for solving techniques. A VARK profile study was also conducted to check for correlation between teaching method used and students' learning styles. A qualitative survey was used to find out students' perception of their own learning. At the end of the three lesson cycles, teachers responded to a video recorded during one of the lessons to observe students' aptitude, attitude and conversations during the lesson. The study will also share follow-up activities that the teachers intend to conduct in future lesson cycles.

Keywords:

ICT; self-directed; collaborative; survey; lesson study

E71-PP

TR717

Assessment as learning (AaL) in the learning and teaching of Science

WIDAYAH Othman, CHEONG Tien Beng, NG Jun Jie, TAY Zhi Xiong, PREETI Vikas Palkar, WONG Li Juan, CHONG Kin Mun Joseph, CHOY Mun Kheong Nicholas,
Compassvale Secondary School,
SINGAPORE

In 2010, the Ministry of Education (MOE) implemented the 21st Century Competencies Framework to enhance the development of 21st century competencies in our students. One of the four key outcomes in the framework is to develop our students to be independent and self-directed learners. The attributes of a self-directed learner is one who will question, reflect, persevere and take responsibility for his or her own learning. This paper shares some of our experiences and findings in developing students to be independent and self-directed learners through the use of Assessment as Learning (AaL) strategies. The team chose to work on AaL as it extends the Assessment for Learning (AfL) strategies already employed by the school a step further by encouraging the students to take greater ownership and accountability of their learning. When they see a connection between learning strategies and

Keywords:
Assessment as Learning; Assessment for Learning; Science; self-directed learners, self-monitoring

assessment outcomes, it will motivate them in the learning of the subjects. The 3 components of AaL are self-monitoring, self-evaluation and self-correction. We focused on the self-monitoring strategies as the first phase of our exploration of AaL. In the next phase, we plan to extend to the other two components. Self-monitoring strategies require students to collect 'evidence' of their learning and to keep track of their progress. These evidences can be assessment tasks designed and assigned by teachers to probe student learning. These tasks could be in the form of short quizzes or practical work. The team explored various self-monitoring strategies such as success criteria and checklist and they were used across the three science disciplines of Chemistry, Biology and Physics. We collected data to capture evidence on the extent of increased students' independence and self-directedness in learning through lesson observations, focussed group discussion and reflections. Our project involved eight teachers and a sample population of eighty secondary three students. We would share our preliminary findings of this cross-subject collaboration for professional development in pedagogy innovation, some of our challenges in our implementation and future plans to improve and extend these strategies.

E72-PP TR718

*ONG Hwa Hiong (Room
Chairperson),
St Hilda's Secondary School,
SINGAPORE*

Keywords:

Inquiry-based learning;
statistical data

Electrifying experience

This study investigates whether a hands-on inquiry-based lesson would better address the difficulties faced by students in identifying and grasping the enduring understandings associated with the topic of Electricity. The study involves Secondary Two Express classes in a Singaporean school. Observation of the first research lesson was conducted with class 2G while the second research lesson was conducted with class 2F. The 2nd lesson study cycle featured an improved version of the lesson package based on qualitative feedback from the first lesson study cycle. Quantitative data from various sources (e.g. pre/post-tests, topical test and end-of-year examination) were also analysed. The pre- and post-tests were designed to diagnose students' ability to address essential questions crafted for the topic of Electricity. The study also reflects students' confidence level with regards to understanding key concepts and knowledge using the Certainty Response Index (CRI) to help surface students' misconceptions for teachers to target specific intervention areas. The post-lesson observation discussions from the 1st and 2nd cycles focused on qualitative analysis of students' learning and the effectiveness of the inquiry-based lesson. Findings suggest that students from 2F benefitted more from the revised lesson package than students from 2G although data from both classes registered significant changes when statistical tools (i) Dependent t-test and (ii) Effect Size were used in data analysis. There is also a general increase in correct answers with high CRI for both classes.

E73-PP TR718

*LIM Irene, LIEW Siew Mui,
LEE Yihui, TIAN Yilin, LIAO
Litng, LEW Simon,
Commonwealth Secondary
School,
SINGAPORE*

Keywords:

chemistry; bonding; covalent;
structures; properties; models;
molecules, express, normal
academics

Improving conceptual understanding of chemical bonding

Through our years of experience in the teaching fraternity, we have identified covalent bonding as a topic that is challenging for our students. We wonder why students tend to face difficulty in answering questions that relate structure to the physical properties of the substances and are puzzled by the common misuse of certain chemical terms when describing the structure. We gathered that students might have difficulty in associating the difference in the structures – simple and giant molecular – to the physical properties of these substances. To address this issue, a group of chemistry teachers in the science department embarked on lesson study as a tool to find out how our students learn in a typical classroom setting. As a professional learning team, we pooled our resources and shared ideas to re-craft and modify the instructions to cater to the learning needs of our students. The team discussed the use of different modes of instruction that might be deemed suitable for the students based on

the class profile. We also explored the use of various types of molecular models and materials to be presented to students that would best and accurately represent the structure of substances. A specially designed activity with an accompanying worksheet was then crafted based on our discussions, where students would be engaged in experiential learning. Students have to handle the various molecular models on their own to examine the difference in the various types of attractions present in each model. Through this lesson study, the team managed to achieve a positive outcome where students are able to identify and differentiate the two attractions present in covalent substances – covalent bonds and intermolecular forces. In addition, the team also surfaced some underlying issues as to why students underperform in chemical bonding and will further our research to examine the root cause in our next round of lesson study.

E74-PP TR718 Enhancing students' experience of learning the concept of Mole in Chemistry

*ZAINULABIDIN Aqilah,
PERERA J S H Quintus,*
Paduka Seri Begawan Sultan
Science College;
University
BRUNEI DARUSSALAM

Keywords:
Mole Concept; Chemistry

This study was an attempt to investigate the use of design research and learning study to enhance students' experience on the learning of the mole concept in Chemistry specifically for Year 9 students. The research took place in Paduka Seri Begawan Sultan Science College in Brunei Darussalam. Following a preliminary cycle, two cycles of learning study were carried out on two classes of 14 and 22 students respectively, each utilising a different lesson design. The data were collected by using suitable pre- and post-test instruments which consisted of questions aimed at diagnosing the conceptual understanding of the students. The theoretical frameworks of phenomenography, constructivism and variation theory were used as the main tools for the lesson design. For the preliminary cycle, the percentage marks for the pre-test was 33.5% (SD = 22.1%) and for the delayed post-test was 45.3% (SD = 17.9%) ($t = 2.68, p < 0.05$). Whereas for the first cycle, the percentage marks for the pre-test was 37.0% (SD = 16.8%) and increased to 56.2% (SD=18.8%) ($t = 4.02, p < 0.05$) for the delayed post tests. The highest difference in percentage marks were seen in the second cycle where the percentages were 39.5% (SD = 15.8%) and 78.7% (SD = 11.9%) with ($t = 9.56, p < 0.05$) for the pre-test and delayed post tests respectively. Overall the students gained an enhanced conceptual understanding of the mole concept with the use of the improved lesson designs thus indicating that the learning study approach and design based research could be used to develop lessons to enhance the students learning experience of the mole concept. An implication of the study was the pre-defining of the lesson objectives for the learning of the mole concept.

E75-PP TR719 Lesson Study on helping low achievers in the teaching and learning of Mathematics

*MOHD ZAINI Imi Karen
(Room Chairperson), CHIA
Alexander, ONG Yao Teck,*
Bukit View Secondary School
LEONG Yew Hoong,
National Institute of
Education,
SINGAPORE

Keywords:
Low Achievers; Mathematics,
Algecards

For many years, teachers have observed poor performance of low-achieving students, stemming from low motivation or lack of opportunities to learn Mathematics in a fun and sustainable way. Thus, the Mathematics Department set out to determine which methods and approaches are effective with these students. In 2008, the Mathematics Department developed a set of manipulative called 'Algecards' in the teaching and learning of Algebra. Since then, teachers have carried out Lesson Studies on the topic of expansion and factorisation of algebraic expressions. The Concrete-Pictorial-Abstract (CPA) approach using Algecards had positively impacted students' learning and teachers' competency. Hence, a Lesson Study group was formed. Targeted at low-achieving students from the Secondary 1 Normal Academic stream, we used Algecards to introduce the concept of Real Numbers, a chapter taught early in the Mathematics syllabus. We recognise that teachers are important in

creating interest and for creating opportunities for immediate small successes/achievement through confidence building. This was discussed extensively during pre-Lesson Study discussion which led us to determine our four main learning objectives (LOs) in tackling low-achievers: (1) Feeling towards the Learning of Mathematics (FLM); (2) Maths Content Resources (MCR); (3) Study Habits (SH) and (4) Problem Solving Disposition (PSD). Based on past observations, most students grapple specifically with approaching negative numbers despite exposure to the concept of number line in Primary school. The underlying reason for this could be an aversion to learning and understanding of Mathematics. It was discussed that the primary objective of this project would be to cultivate interest and Positive Feeling towards the Learning Mathematics (FLM) using Algecards as well as inquiry through teacher-led discussions. In this study, we will share the impact and effectiveness of Algecards and the role of the teacher as a facilitator in meeting the main objective; Feeling towards the Learning of Mathematics. We will also share challenges and feedback by (1) students on their learning experience and (2) teachers on collaboration and professional development. In conclusion, we will also share future plans to further help low-achievers in Mathematics with the four learning objectives as our guide.

E76-PP TR719 Teaching Algebra through learning experiences

TAN Meow Tang, LEI Peishan, WU Calvin, LEONG Meng Wai, ZAINOL Muhamed Nazied, SHEA Ka Yan Jenny, CHAN Seong Hung, CHUA Seow Ling, JAYASAMBOK Vaissnavi, Compassvale Secondary School, SINGAPORE

Keywords:
Lesson Study, Algebra, Learning Experiences

This lesson study documents the journey of a group of teachers in addressing the lack of conceptual understanding of Basic Algebra among students. The teachers explored if students could better understand and apply basic algebraic rules to expand and simplify algebraic expressions through meaningful learning experiences. This approach is based on a constructivist theory of learning which advocates that knowledge has to be constructed by learners and not merely 'delivered' by teachers. The meaningful student-centric process/experiences were purposefully created by teachers to engage students in active learning and construction of knowledge. This lesson study explores the use of such learning experiences to re-introduce basic algebraic rules. The research lesson starts with a decoding exercise where students are given a set of mathematical equations and invited to decode what the ancient symbols represent to allow students to appreciate that Algebra involves the use of symbolic representations. This exercise is extended through the use of a worksheet which allows students to see how basic mathematical rules can be applied to generate basic algebraic rules. The students were also given opportunities to use the 'Algetools' software to help them visualise Algebraic concepts and principles. The research lesson ends with a 'Snakes and Ladders' game where student teams apply the concepts learnt to answer questions, throw the dice and progress in the game. Through this lesson study, it can be concluded that the use of learning experiences improves student development of conceptual understanding of Basic Algebra. Students understood concepts better as seen in their application of basic algebraic expressions. Furthermore, the use of learning experiences can be both engaging and effective with careful planning and implementation.

E77-PP TR719 An analysis of a problem solving activity in a Year 9 Mathematics class

LANDRITO Lydia, UP NISMED, PHILIPPINES

Keywords:
Problem solving; Teaching through problem solving; Quadratic Equations

The paper focuses on the analysis of the content of the problem activity in a year 9 mathematics class of one school. The problem activity was a part of a lesson collaboratively developed implemented, critiqued and revised by four mathematics teachers in a project: Collaborative Lesson Research Development (CLRD). The lesson was on Solving Quadratic Equations utilizing teaching through problem solving approach. Teaching through problem solving is an approach wherein the focus is on teaching mathematical topics through problem solving contexts and is characterized by students' deep

construction and understanding of mathematical ideas and concepts. The problem in the lesson used a real life context and it involved different ways to solve it. This allowed the students to apply their previous knowledge and skills and experienced thinking skills like representing, looking for patterns, and generalizing. The analysis was qualitative, giving interpretation of the content to analyze the progress of the students during the activity, investigating specifically on how the students arrived at the different solutions. The result indicated that the students experienced difficulty at the start. However the difficulty was regulated when the teacher provided the necessary scaffolding. The students were able to generate multiple representations leading them to complete the activity.

E78-PP TR720 Improving the quality of Biology education Master's theses through Lesson Study-based classroom action research at Graduate Program State University of Malang

INDRIIWATI Sri Endah
(Room Chairperson), *SUSILO*
Herawati,
University of Malang,
INDONESIA

Keywords:

The improvement of master's theses quality, Lesson study-based CAR, biology education

So far, master's theses of biology education study program have been written by various researches, especially experimental research and classroom action research (CAR). In order to improve the quality of theses written with a CAR design, a breakthrough suggested by Susilo (2009) had been carried out in Graduate Program State University of Malang which combines CAR with Lesson Study (LS). The idea is to let the students practice to do LS as a way to promote teacher professionalism on how to help students learn and try new strategies of teaching. At the same time they learn how to do research in the classroom by doing CAR as a way to solve classroom problems. Through this combination, it is expected that the quality of the master's theses can be improved. This action research attempted to study students' competence in implementing LS-based CAR in relation to the preparation of master's theses. Data was collected from 5 students in 2011 and 7 students in 2012. The entire LS-based CAR was done at the high school level. The results showed an improvement in students' competence. The improvement was obvious in their professional and pedagogical competences in carrying out CAR: 1) analyzing classroom situation to find out problems, 2) determining classroom actions suitable for the problems, 3) making lesson plans based on the contrived and chosen actions (learning scenario, learning facilities and supplies, learning tools), 4) implementing learning (simulation, evaluation), 5) observing, analyzing the results of observations, and 6) reflecting. Through LS, some improvement of students' competence were observed in 1) collaboration with teachers at schools, 2) learning together, teaching and caring for each other, 3) being more competent in teaching certain strategies which are more student-centered, 4) improvement of the CAR quality as the actions given are realized in better ways from time to time, 5) a good rapport among teachers who learn to improve their professions as teachers, 6) sharing/discussing problems with peers, 7) improvement of self confidence, and 8) awareness of the importance of being well prepared.

E79-PP TR720 Using University-level Lesson Study to change the beliefs of researchers and University students about lessons: From Educational Psychology Lecture

SAKAMOTO Atsushi,
FUKAYA Takenobu,
Seijoh University,
JAPAN

Keywords:

University-level lesson study;
Beliefs about lesson;
Collaborative reflection;
Lesson study researcher

This study examined changes in beliefs about lessons among a university researcher (the presenter) and students through a university-level lecture, titled "Educational Psychology," that covered such concepts as Piaget's theory of cognitive development, Vygotsky's ZPD, and so on. According to these theories, learners have a sense of agency. Thus, the lecture's main focus was on problem solving as a way to encourage active learning and aim to change students' belief that learning is a unilateral process in which students listen to teachers talk. The lecture was also aimed at educating the lecturer about the

experiences of the teachers who actually conduct lesson study (LS). Although the lecturer majored in teacher learning in LS and has supervised LS in primary schools, he has not conducted LS by himself. Therefore, the lecturer conducted this LS with a retired expert teacher, Mr. Fukaya, who has practiced LS for a long time. The fifth lesson, titled "Theory of Learning and Development: Part 2" addresses research. The lecturer and Mr. Fukaya collaborated to design this lesson, which was then video-recorded by Mr. Fukaya. After the lesson, the lecturer engaged in personal reflection, after which he and Mr. Fukaya engaged in collaborative reflection while viewing the video. During personal reflection, the lecturer focused on his own behavior and thoughts; during collaborative reflection, the lecturer came to realize that student comments were important parts of the lesson. Through LS, students begin to change their beliefs about lessons. In addition, the lecturer comes to recognize the difficulties involved in teaching, especially in carefully listening and responding to students' utterances to deepening their understanding. Furthermore, the lecturer develops an appreciation of the difficulties involved in teacher education, especially with regard to understanding students' opinions and connecting them with the content of the lesson by writing on the blackboard. This research demonstrates the difficulties experienced by practitioners of LS as they objectively reflect on their own lessons, highlighting the importance of collaborative reflection as an effective approach to objective reflection and as a way to shift perspective from teacher education to student learning.

E80-PP

TR720

SUWONO Hadi,
University of Malang,
INDONESIA

Keywords:

Lesson Study, Learning
Outcomes, University

Lesson Study improves student learning outcomes at the University level

The impact of lesson study (LS) in two courses, Research Methodology and Educational Research Methodology, in Department of Biology State University of Malang has been observed from 2009 to 2012. The research is focused on improving the students learning outcomes. The learning outcomes are defined in terms of four skill levels- understanding research concept, creating research proposal, conducting and reporting research project, and the final grade. The research approach in this study is classroom action research guided lesson study. The data is analyzed by comparing students learning outcomes with the minimum requirement and the improvement of learning outcomes from courses that are provided from 2009 to 2012. Based on the lesson study researcher decided to implement the model of project-based instruction (PBI) to facilitate students learning. PBI is an authentic instructional model or strategy in which students plan, implement, and evaluate projects that have real-world applications beyond the classroom. The research showed that LS improved the students' learning outcomes. The mean score of understanding research basic concepts increased from year of 2009 to 2012. Understanding of research basic concepts indicated by experimental practices had scores of all students higher than the minimum requirement and all the students passed the minimum requirement. The implementation of project-based instruction improved the ability of students to create research proposal, to conduct research based on their proposal, and write a report. The percentage of students who got the final grade of A and A- increased. On the contrary, percentage of students who have final grade C, D, and E was reduced. The study showed that LS improves the ability of students to achieve learning outcomes, comprehend research basic concept, creating research proposal, write report research, and get higher final grade.

E01-WO SR05-01-04 In conversation with editors of the International Journal of Lesson and Learning Studies (IJLLS)

ELLIOTT John,
University of Exeter, UK
LO Mun Ling,
Hong Kong Institute of
Education,
HONG KONG

E02-WO TR 501 Lesson Study on the teaching of sequential indicators for Chinese Language composition writing

*CHAU Sook Kuan, CHEN
Meiqing, LAI Pey Chyi,*
CHIJ Our Lady Queen of
Peace, SINGAPORE

Keywords:
Primary School; Chinese
Language; Composition
Writing; Sequential
Indicators

The current primary school Chinese Language syllabus does not offer a structured instructional guide on the teaching of composition writing. Therefore, a team of Chinese Language teachers initiated a lesson study on the effective ways of teaching composition writing. Students begin to write compositions in Primary 3, however, the teachers found that many of them had difficulties in organizing their compositions, especially when doing picture composition, the linkage between pictures was often missing. Therefore, the team had the objective of helping the Primary 3 students grasp a set of sequential indicators and use them when describing a set of pictures to depict a story. The objective was to bring about seamless paragraph transitions. Teachers in the research team collaboratively created a structured learning package in which a variety of teaching strategies were used. They included differentiated instruction, use of media, participation in games and oral presentations. The package included the use of resources like the 18 Degree Space Readers, a publication (the original publication being a collaboration with Teachers Network in 2007) which consists of a series of Chinese supplementary readers written by the teachers themselves. CPDD officers were invited as knowledgeable others. Feedback gathered from all the observers helped the team to fine-tune the lesson package. Students were observed to be highly engaged during both research lessons. The evaluation components in the research lessons showed that the students were able to use the sequential indicators correctly and smooth transitions of ideas were evident in their compositions. The team would like to share the learning package with other teachers during the workshop. In addition, through the network established in this workshop, it is hoped that the participants can also value-add to this research project.

E03-WO TR 502 Lesson Study as a teaching tool in teacher training for Special Educational Needs

DE WEERD Nathalie,
Windesheim University of
Applied Sciences,
GOEI Sui Lin,
Vu University Amsterdam;
NETHERLANDS

Keywords:
Teacher Training Pre-service
teachers Special Educational
Needs

Growing heterogeneity in mainstream schools requires teachers to be pro-actively responsive to the diverse (special) educational needs of their students. The design and implementation of differentiated instruction and classroom management that cater to these differential needs is the most complex task for 21st century teachers nowadays. Two years ago we started to implement Lesson Study as a teaching tool at the School of Education of Windesheim University of Applied Sciences, The Netherlands, in order to prepare student teachers better for the diversity of (special) educational needs in their classrooms. The domain involved was teaching mathematics. In The Netherlands teacher training for primary education is a four year course which leads to a Bachelor of Education. In year two, Lesson Study is introduced. Students are asked to study the specific topic on teaching mathematics at home. Groups of 4-6 students prepare a lesson study plan. Next, they give the lesson to their student peers. The lesson is video-recorded and immediately discussed in class. Specific focus is placed on catering to special educational needs, such as how can I design the instruction for the weaker students, but also how can I give challenging instructions for the gifted students? After the

lesson study sessions at the teacher training institute, students implement their lesson plans in their classrooms during their internship. In the workshop, the educational infrastructure in The Netherlands is sketched, and how Lesson Study is used as a professional tool in education and teacher training institutes. Next, inclusion trends are discussed and more specifically, the (special) educational needs of pupils in mainstream primary education. Participants are asked to fill in a questionnaire to assess (special) educational needs for mathematics for an imaginary case and to design a lesson study plan. We will end with a case study of professionalising pre-service teachers regarding teaching mathematics in primary school.

E01-PO

*TAN Ching, LOH Yuhui, EU
Hong Leng,
River Valley High School,
SINGAPORE*

Keywords:
self-directed learning, inquiry
based

Self-Directed Learning with Inquiry-Based Approach

Self-Directed Learning (SDL) is listed as one of 21st century competencies (Partnership for 21st century, 2006) that prepare us for the fast-changing and globalized world. Instructional approaches can be designed to better facilitate students' learning by tapping into this natural process of learning (Gibbons, 2002). The study aims to examine if an inquiry-based lesson promotes SDL amongst students by providing students with an opportunity to display their natural curiosity and generate questions and inquires. Students were introduced to a reaction where froth was produced on addition of aqueous hydrogen peroxide to liver and the challenge was to slow down the rate of froth production. At each station, groups of four students were provided with different sets of chemicals and materials. In order to complete the challenge, students had to learn about various factors that affects rate of reaction by planning and conducting experiments. The Jigsaw method (Aronson & Patnoe, 1996) was employed in the lesson on rate of chemical reaction to promote collaboration and encourage engagement. Teacher observers were provided with a template to facilitate the observation. At the end of the lesson, students completed a worksheet to consolidate the content knowledge. There was a reflection component in the worksheet to surface students' thoughts of the learning process. This allowed teachers to check for students' understanding and any misconceptions. Students shared that they enjoyed the learning process where they get to construct knowledge through problem solving.

E02-PO

*LEE Han Kiat,
Chestnut Drive Secondary
School,
SINGAPORE*

Keywords:
Building capacity, Lesson
Study

Building capacity of Physics teachers through Lesson Study

In 2009 & 2010 Physics teachers of Chestnut Drive Secondary School embarked on Lesson Study to build capacity of Physics teachers especially Beginning Teachers through Lesson Study. Physics teachers jointly plan, observe, analyse and refine actual classroom lessons called research lessons together with Master Teacher Irene Tan. Lesson Study provides an avenue for teachers to collaborate and jointly develop teaching resources so as to decrease teachers' isolation. It actually helps to reduce preparation workload among teachers and tap on each other's expertise. Lesson study focuses on successful teaching strategies to increase student learning through fun- filled activities, hands on practicals and relevant use of technologies to make science lessons come alive. Students give very positive feedback and score better in tests and examinations. Teachers agree that the lessons are more engaging and they are more satisfied teaching the students. As teachers, we need to continue to innovate and collaborate to keep up with changing profile & learning styles of students yet effectively increase student learning. Participants will be walked through our learning process in this presentation to have a better insight.

E03-PO

YULIATI Lia,
University of Malang,
INDONESIA

Keywords:
lesson study, prospective
physics teacher, teaching
practice

Development of prospective Physics teachers' competencies through teaching Practice-Based Lesson Study

Teaching practice is an activity of prospective teacher to integrate and implement the knowledge and skills obtained in the college in a real teaching. The teaching practice which conducted of prospective physics teacher at the Malang State University, East Java, Indonesia, is integrated with lesson study. Prospective teachers learn and work to plan, implement, and reflect on teaching and learning. This article reports the activities of teaching practice-based lesson study and its impact on the competence of prospective physics teacher. Data is obtained through observation of physics learning, observation of lesson study activities, and interviews with prospective physics teachers, teachers, lecturers, and students. The results showed that prospective physics teachers more receptive critique from peers, teachers, and lecturers; prospective physics teachers feel better appreciated than before, thus increasing their confidence. Competences of prospective physics teachers in teaching materials and teaching methods to be better than before.

E04-PO

*LOH Yoke Ling, GUO
Fengling, ONG Yen Ping,
NURFAZILAH Abdul Aziz,*
Sengkang Secondary School,
SINGAPORE

Keywords:
IBL, Learning Stations

Inquiry Based Learning (IBL) Learning Stations in Physics for Secondary Three Express Students

This study examined how a lesson built based on Inquiry Based Learning (IBL) learning stations would improve students' academic achievement scores and engagement in Secondary Three Express Physics students. Two cycles of the lesson study were carried out on two project groups (cycle 1: N = 26 and cycle 2: N = 33). The project group underwent the IBL learning stations cycle using the S.P.I.C.E cycle, while the comparison groups (cycle 1: N = 26 and cycle 2: N = 27) learned the same topic by direct instruction teaching method. The results showed a very large negative effect in students' achievement scores for cycle 1 but showed a large positive gain for cycle 2. Student surveys and reflections revealed students' preference for the IBL learning stations.

E05-PO

*JAGAFFAR Jarina Banu,
LIANG Ruishan, ENG Rachel,
YEO Kim Lian Irene, TAN
Hwee Ling,*
Sengkang Secondary School,
SINGAPORE

Keywords:
outdoor lesson, lesson study,
student development

Sec 1 Lesson Study @ Sengkang Floating Wetland

In this lesson study, teachers jointly drew up a detailed lesson plan and resources for an outdoor lesson on the concept of Place Based Learning on the topics graphical skills and pressure. Looking at the Secondary One topics to be covered, the teachers came to a consensus to apply Science and incorporate 21st century skills to real life situations. Research teacher 1 will conduct her lesson at Sengkang Floating Wetland for the class of 1E3 as the group members observe the lesson. The group then comes together to discuss their observations of the lesson. The group then revises the lesson and Research teacher 2 will implement the revised lesson at Sengkang Floating Wetland for the class of 1E2. The group will then come together again to discuss the observed instruction. Finally, the teachers produce a report of what their study lessons have taught them, particularly with respect to their research question.

E06-PO

*KOH Li Keng, MOHD ABDUL
ALIM Gamar Annisa, ENG
Lee Huang, NG Yu Rui,*
Dunman High School,
SINGAPORE

Keywords:
Models for visualisation;
levels of protein structures

Bend, twist and clip! A Lesson Study on protein structures for A-Level Chemistry

The chemistry of protein structures, under the topic of organic chemistry is one that students often have difficulty with, as they are unable to visualise the different levels of protein structure. In order to enhance students' understanding of how interactions between organic functional groups affect the folding of protein structure, a lesson with hands-on activities was designed. Students were guided to accurately model the interactions between organic functional groups, and gained a first-hand understanding on the

folding of protein structure through these activities. This understanding was then extended to drawing of schematic diagrams of protein structure, which is a specific instructional objective in the A-level syllabus. A total of two rounds of lesson study were conducted. During the first round, the students' response and observers' feedback were collected, evaluated and analysed. The lesson was modified to better scaffold students' learning of protein structures in the second round. The feedback collected from the second round reflects evidence of student learning, in particular towards the visualisation of the folding of protein structure.

E07-PO

*CHUA Pei Tzeun, WONG
Wai Mun, SONG Zhenying,
SINGAPORE Chinese Girls'
School
SINGAPORE*

Keywords:

Modeling; DNA; Biology;
motivation, student
understanding; abstract
concept

Using modeling to increase student motivation and understanding of DNA structure in Biology

This paper discusses the use of modeling to facilitate the understanding of DNA structure by lower-ability students. The concept of DNA structure lies within the topic of Molecular Genetics and students generally have difficulty visualising how different components interact with one another to form the helical DNA structure. In this lesson study, teachers tasked students to take on the role of individual building blocks (nucleotides) and work as a class to form a 'human DNA' model. As students analyse how to position themselves relative to one another to derive a stable molecule, it was hypothesized that an originally abstract concept would be translated into a physical construct that students could readily visualize and understand. Students involved in the lesson study had also sat for the Myers-Briggs Type Indicator (MBTI) test six months prior, and majority were found to be Extroverts. This collective activity in model construction was therefore also targeted at increasing students' level of motivation for learning. In the course of the first lesson, all students were noted to participate actively in the model-building and, as a class, were able to decipher with guidance how two polynucleotide chains had to be arranged to form a collective DNA molecule. During the subsequent theory discussion, another significant observation was that the flexible seating accorded by this open-space activity provided more opportunities for student discussion and peer-learning. Students took initiative to help clarify each other's understanding and to ask one another questions, thereby reflecting a positive shift towards greater student ownership in learning. The lesson study also allowed the teachers to consequently fine-tune their instructional strategies to facilitate greater student involvement e.g. the decision for a student to demonstrate how specific body parts represent different subunits of a nucleotide, rather than for the teacher to do so. Student surveys indicate that all students found the lesson refreshing and were able to better appreciate the DNA structure through their personal involvement. Majority continue to draw reference to their human DNA model when required to answer questions related to DNA structure. Teachers plan to carry out the activity with the middle-ability classes in future to study if it would similarly benefit students in their learning.

E08-PO

*FOO Li Ming,
Fuhua Secondary School
IMRAM Mohammad Hafiz,
Ministry of Education,
SINGAPORE*

Keywords:

Thinking; Innovative;
21CC; Critical Thinking;
design; pedagogy; skills;
lesson study

Observe-Interpret-Imagine: A Thinking protocol for new perspectives

Developing students' ability to make new connections, generate unique perspectives and innovative ideas from everyday observations of the routine and commonplace is an endeavor among educators to promote the 21CC skills of critical and inventive thinking. Through Lesson Study, Fuhua Secondary School's Craft & Technology (C&T) department explored the use of the Seeking Design Opportunities (SDO) resource to help students develop skills in identifying design opportunities. Designed by the Design & Technology Unit at Curriculum Planning and Development Division, Ministry of Education, the SDO resource incorporates visual references and an Observe-Interpret-Imagine (OII) thinking protocol. The objective of the Lesson Study

was to investigate how SDO can be used effectively to promote authentic learning and creative thinking. The presentation explains how Lesson Study was utilised to examine students' response to the SDO resource, in particular how it develops their skills in observation interpretation and questioning. It also highlights the teacher's role as facilitator and considers the pedagogical devices to bring about authentic learning and raise the intellectual quality of students' experience.

E09-PO

*TAN Melissa, TAN Helen,
SIM Dominic, MOHAMED
SALLEH Yuslina, PHANG
Anna, AGIL Abu Bakar,
Coral Secondary School,
SINGAPORE*

Keywords:

Creative Pedagogy; Curiosity;
History

Developing curiosity in the classroom through creative pedagogy

Having an inquisitive mind is one of the crucial characteristics of motivated and engaged learners in all disciplines, and also essential to the development of responsible and self-efficacious adults. It is also one of the hardest traits to foster or to measure in a classroom setting. A lesson was designed to inculcate this trait within lower secondary students, using the content on the life of immigrants in colonial Singapore as an inquiry platform. Students were not given any prior instruction on this topic, with the aim that a creative, student-centric approach would encourage an inquiring mind. The aim of this was for students to seek out and process information on an independent level, with role-play as a platform for them to access this content in an interesting and engaging fashion. They were to take charge of their own learning on the topic, and specifically told that the content in this lesson would not be reiterated by a teacher later. In the focus classes, students did group work using props and sources over a series of three lessons. They first made inferences based on given sources, aided by the props. Next they wrote a script from their assigned immigrant's perspective and nominated representatives to dress up and deliver the speech. Their learning was further cemented by the creation of job advertisement posters which listed pros and cons of each job as well as a brief job description. These students showed greater retention of the material covered, mentioning specific content in subsequent written assessment. They were also more engaged in the following lessons, asking probing questions pertinent to the subject areas covered, often inquiring after the human experience of particular situations. This was in contrast with control groups, who were more passive in equivalent classes. Control groups also showed greater reservation in working with source material, where the study group was less inhibited. While a trait such as inquisitiveness may be hard to measure objectively and would need consistent reinforcement, such behavioral signals are good indication that the creative and student-centered pedagogy has aided in the development of this trait.

E10-PO

*KONNO Takayuki,
Mejiro University,
MAKIKO Kishi,
Kyoto University of Foreign
Studies,
JAPAN*

Keywords:

Activity System, Educational
Development Projects,
Palestinian Refugee

Factors promoting school-based-teacher-training in an educational development project: a case study of Palestinian refugee schools in Syria

This study clarifies the factors of promoting school-based-teacher-training in a field of international educational development. The authors introduced Lesson Study as a school-based-teacher-training that originally developed in Japan. Pedagogies and teaching strategies developed in specific countries and cannot be adapted smoothly into other sites. Generally, some conflict will occur in Lesson Study. Therefore, it is necessary to identify what kinds of conflict occur in applying new pedagogies and teaching strategies into other sites. In this research, the authors identify what kinds of conflict will occur in introducing Lesson Study into Palestinian refugee schools in Syria. The authors employed an activity system as a framework of analysis. Activity system is an analysis framework, which is useful to identify ways of interpretation to resolve conflicts. It enables us to understand the process of how Lesson Study was accepted in a site. This study was conducted at Palestinian refugee basic schools in Syria from 2008 to 2010. The data was

collected through classroom observations and interviews. In the process of conducting Lesson Study, teachers encountered conflicts and tried to resolve them. As a result of data analysis based on activity system, the authors identified three factors of promoting Lesson Study, which were, cooperation by a small number of teachers, cooperation with a local community, and the initiative of an administrator. The respective factors come under Rules, Community and Division of labor in activity system. These factors helped resolve conflicts of teachers and advance lesson study. For a future direction, the authors suggest that the knowledge of this study needs to be compared with other examples in order to be more general knowledge.

E11-PO

*KAUR Harpreet, SULTAN
IBRAHIM Sabina,
Temasek Secondary,
SINGAPORE*

Keywords:
Literature; Reciprocal
Teaching; Journal

Infusing 21st Century skills in Literature through reciprocal teaching in an 'Iamrticulate' Journal

This study describes a team of Lower Secondary Literature teachers collaborating to help Secondary One students understand and analyse a poem using the SMILE and PEE framework. Their interpretations based on these 2 frameworks are then portrayed in an IamRTiculate journal which encompasses skills utilised in Reciprocal Teaching. The topic was chosen based on team members' observations that students experience difficulty in analyzing and inferring poetic devices and thus is unable to answer essay questions. The SMILE (S Subject, M " Mood, I " Imagery, L Language, E Elements) and PEE (P Point, E Evidence, E Elaboration) framework will assist students in dissecting the poem, understanding it and drawing parallels between the various devices used within the poem. The student's predicament has become a major source of concern for teachers. The Literature Department decided to leverage on Lesson Study to help the student's: (i) overcome their psychological barrier of seeing poetry as tough and senseless; (ii) analyse and mark-up texts to show understanding of poetic devices using SMILE and PEE ; (iii) play the roles of questioner and clarifier in Reciprocal Teaching; and (iv) answer inferential questions given by the teacher. Through collaboration, a critical element of Lesson Study, the teachers (both experienced and inexperienced) got together to co-design the lessons, tapping on each other's pedagogical expertise to devise activities that aim to equip students with the skills to apply and also enhance their self-confidence in reading and interpreting poetry.

E12-PO

*LEE Samsudin Szaryna,
KOH Yoke Peng Eunice,
WEE Shen Sze, LIM Mei
Chen Joani, GOH Lee Choo,
OEN Siew Yock,
Sengkang Secondary School,
SINGAPORE*

Keywords:
PBL; History

Knowledge construction in a Secondary Two History PBL classroom

The objective of this study was to measure how knowledge develops in the History PBL classroom. Two Secondary 2 Express classes (N = 80) underwent the PBL cycle in the learning of History, specifically on the topic of 'The Fall of Singapore'. In our study, knowledge was measured at critical moments during the 4 Phases of the PBL cycle: (1) when students came to class before the problem was given to them (i.e. their prior knowledge); (2) after brainstorming about the problem and conducting self-study; (3) after consolidation of their findings; and (4) at the end of the process, after each team had presented and elaborated on their findings. Apart from this, we also studied the impact of homework in PBL and whether PBL aids in long-term retention in the learning of History. Students' knowledge gained was measured using the Concept Recall Test (CRT) and their Self-Reported Knowledge (SRK). The results revealed that knowledge was gained at every phase of the PBL cycle, with the deepest gain occurring between Phases 1 and 2. The results showed that homework had the most significant effect only when students were preparing for their presentation and that PBL does aid in long-term retention of knowledge.

E13-PO

*BERGENTOFT Helene,
Kristianstad University,
SWEDEN*

Keywords:
tenseness; variation theory;
learning study; discern;
variation

Regulation Of Tenseness - An object of learning to achieve self-awareness for students in Upper Secondary School

The key objective of this study has been to study how upper secondary school students develop knowledge about how tenseness affects their health and performing capacity. The way the students are offered to understand the object of learning, i.e. regulation of tenseness, is designed and analyzed by variation theory learning study. The design of the first lesson (A) was based on interviews. The remaining three lessons (B, C and D) were based on the analysis of the lessons and learning outcomes in the previous lessons (A, B and C). Students' understanding of regulation of tenseness depends on which critical aspect they are aware of. The students did not intentionally discern different responses of bodily tension, and had a limited number of ways to influence the levels of tenseness. The results show an increased learning outcome in all four groups. Results from the last lesson, D, show a very healthy increase (129%) in learning outcomes, and all students in that lesson improved their results. The effect of varying only the most important aspects appears in the last cycle, where the features (e.g. heart rate, respiration, muscle tension) contrasted more clearly, which developed the students' learning of the object of learning. The physical activities were kept invariant, and different responses of the sympathetic nervous system were contrasted, one at time, to establish knowledge of different bodily responses to tenseness. It appears sufficient to vary two critical aspects in one lesson to achieve the most powerful learning. Awareness about how the body responds to different kinds of pressure, physically or psychologically, is important for understanding the impact tenseness has on health and performing capacity. However, how the students are offered the aspects critical for developed understanding is crucial to increase their learning. The results show how the teachers, during the iterative process, discover what it takes to learn progressively during the learning study. The students' results increase due to the more precise way the teachers pinpoint what is critical for the students' understanding. The more familiar with how to design learning situations based on variations theory the teachers were, the more fruitful it was for the students' learning outcome.

E14-PO

*LUA Yik Pin, GOH Kwee Lay,
CHEONG Sock Ching,
HUANG Li His, LIM Chan
Tuan,
Singapore Chinese Girls'
School,
SINGAPORE*

Keywords:
Picture Discussion; Mind Map;
Mnemonics; Lesson Study;
Chinese Language; Critical
Thinking

Enhancing critical and perspective thinking in a Chinese Language class

Creating an environment that engages students in the learning of Chinese Language is an uphill task for many. This paper aims to show the effect lesson study (LS) had on a team of Chinese Language teachers and their students. The questions posed to the team were: (1) How to enhance critical and perspective thinking in a Chinese Language class? (2) Does the participation in LS as a form of professional development serve as a catalyst for building a culture of open sharing amongst the teachers? The participants for this study comprised five experienced Chinese teachers with varied expertise. The lesson objective was to scaffold students' development in critical and perspective thinking so as to enhance their skills and competencies in picture discussion. To achieve the objective, the group decided to use mind map and a self-devised mnemonic, PEAR (Places, Environment, Activity, Reason) to scaffold students' thinking to improve students' performance in picture discussion. The group adopted Bloom's taxonomy as well as the use of inquiry-based learning to help refine the quality of the students' questions and responses. At the end of the first lesson, it was reported that students did not manage to identify the Big Idea from the stimulus given. Upon reflection and further discussion, the team realised that there was a need for more teacher facilitation in order to guide the students in the synthesis of information and arrive at the big ideas. This was then implemented in the revised lesson carried out with another group of students. The results of the study highlighted the importance of development of

facilitation skills in teachers to help students deepen their learning.

E15-PO

*MOHAMED Idma Hanita,
TAN Lin Mien,
Mayflower Primary School,
SINGAPORE*

Lesson Study to increase teachers' competency and enhance students' learning

Keywords:
lesson study; teachers'
competency; students'
learning

In this presentation we will share how Lesson Study was used in the primary 5 level's Professional Learning Community (PLC) in Mayflower Primary School to achieve 2 big goals; increasing teachers' competency and enhancing students' learning. Our research theme is Developing reasoning, reflective thinking and decision-making skills in our pupils. This is in line with the Ministry of Education's (MOE's) framework for 21st century competencies and student outcomes. It is also in line with one of our school's three learner-centered approaches; which is Making Thinking Visible. The presentation is divided into 3 parts: i)How lesson study was facilitated to achieve the 2 big goals. We will share how we aligned our research theme with our school's vision, mission and thrusts and how we brainstormed the descriptors to unpack how we want to see 'visible thinking' in our pupils using the Standards and Benchmarks for 21st CC document. ii)How lesson study has provided support for new teachers and enabled teachers to test new ideas. We will share how we grouped our level teachers into 2 learning teams and how we scheduled the discussions, research lessons and colloquiums such that every teacher had the opportunity to become a research teacher and try out new pedagogies. iii)How pupils have benefitted from the expanded pool of ideas, materials and methods. One of the teachers in the learning team will share her research lesson, highlighting the structures that have been leveled up during the lesson planning to enable her students to have opportunities for collaborative learning, self-directing learning and critical and inventive thinking.

E16-PO

*CHITRA Selina, GAN Ping
Fong,
Fuchun Primary School,
SINGAPORE*

Building confidence and teamwork in pupils through unique Music curriculum while performing different rhythmic patterns with percussion instruments

Keywords:
Build confidence; teamwork in
pupils through unique Music
curriculum

This Lesson Study was conducted to explore the use of percussion instruments to perform the various rhythmic patterns in a small group as a Holistic Assessment in Music Curriculum, in line with MOE's PERI Recommendations. One of the Desired Outcomes of Education is to develop pupils into confident persons. Along with our journey through Holistic Assessments, greater emphasis was given to holistic development of a pupil. As Music is our niche area, we would like our pupils to graduate from our school with basic skills in Music. Most of our pupils come in with minimal music background and knowledge. It is through the unique music curriculum of our school that enable pupils to acquire basic theory knowledge and be given the opportunities to perform and unleash their musical talents. The teachers in this team came up with effective teaching strategies which ensured that pupils performed the different rhythmic patterns correctly and confidently. This study was a good platform for the team to address the weaknesses of the new mode of Music assessment before rolling out to the entire school as a whole-school approach in Music Curriculum. The findings showed that pupils' confidence level was raised and they are now more competent in performing rhythmic patterns after the teaching strategies were introduced.

E17-PO

*KAWASHIMA Satoshi,
The University of Tokyo,
JAPAN*

Maintaining Classroom order and overt teacher authority in Elementary Schools

When students do not behave as instructed by teachers, teachers can rely on utterances to maintain classroom order (UMOs) (Kawashima, 2011). Indeed, teachers repeat instructions when children do not adjust to phase-shifting in class. Within phases, teachers may instruct students to abide by the rules.

Keywords:
elementary school; classroom
order; teacher authority

These two types of utterances are examples of UMOs. We analysed utterances selected from video data obtained in elementary school classrooms in Japan. Although UMOs were commonly observed in most classes, two elementary school classes that I observed did not contain any UMOs. Each teacher in these classes had a different way of asserting authority. One teacher conveyed an apology or suggested his/her limitations (e.g., sorry for disturbing you but please stop your writing and look at the blackboard.). Because this communication acknowledges the fallibility of the teacher, it would be expected to decrease the teacher's overt authority (Kage et al., 1997). The other teacher did not stand in front of the blackboard but rather sat in a chair. She responded to student comments but did not evaluate them, acting more as a moderator than as an authority in the class. This study demonstrates how teachers who regulate their overt authority without UMOs enable classes to proceed smoothly.

E18-PO

KOBAYASHI Minoru,
Kyoto University of Education
NANBU Masatoshi , INOUE
Hisayoshi,
Joetsu University of Education
URANO Hiroshi,
Akita University
MITSUHASHI Koichi,
Hokkaido University of
Education
JAPAN

Keywords:
improving teaching
ability ,workshop-based in-
campus
training ,Collaboration and
Reflective

A study on the effects of collaboration and reflective action-derived workshop-based in-campus training on teaching ability

Regardless of time and place, improvement of learning contexts for children and student academic ability are common issues in education. Enhancement of teaching ability of teachers is an integral part of the approach to the resolution of such concerns. Over the past decades, schools in Japan have regularly conducted on-the-job based in-campus training sessions with the primary objective of improving teaching ability. Such training is generally carried out by having one or more teachers implement proposed classes, to which various opinions of other teaching staff would be summarized for the purpose of supervision and guidance by the principle, vice-principle and members of the board of education. However, based on the hypothesis that in-campus training based on collaboration of teachers across all position levels would result in a training model better suited to furthering the growth and development of teachers, this intervention research conducted workshop-based in-campus training on repeated occasions in schools that were selected as subjects of study. Results of the study indicated achievements such as positive changes to the awareness of teachers with regards to lesson improvements. Details and conclusions of the study will be reported on the actual day.

E19-PO

ENDOHI Hiroshi, GANAHA
Yurika, SHUMA Akadoh,
KOTA Nomura, ETOH
Makiko,
University of the Ryukyus
KOBAYASHI Minoru,
Kyoto University of Education
NANBU Masatoshi,
Joetsu University of
Education
YOGI Yukitomo,
Kobe University,
JAPAN

Keywords:
Waterside Activities; Teacher
Education

A study on teacher awareness regarding education for waterside activities and their teacher education curriculums

Large-scale tsunamis triggered by the Great East Japan Earthquake on 11th March 2011 caused the loss of many lives, including those of children. While there have been predictions for the historical occurrence of earthquakes and tsunamis of such scale and magnitude, disaster contingency measures of schools located in the areas affected by the tsunamis were utterly inadequate in the face of damage. The number of children affected by this disaster could have been reduced if Japan, as an island nation, had carried out better implementation of education regarding waterside activities in school curriculums. This is because educational efforts lead to a possible deepening of children's awareness and understanding concerning natural phenomena, as well as higher levels of participation within such natural environments. This, by extension, leads to expectations of better coping techniques towards water hazards and disasters. In order to activate efforts in education concerning waterside activities that include countermeasures for floods and water-based disasters, there is a need to school teachers in such education. For the purpose of obtaining leads to aid in the development of such educational curriculums, this study conducted a survey on the awareness levels of teachers with regards to education for waterside activities. Results of the

survey will be presented in the poster.

E20-PO

MAKIKO Kishi,
Kyoto University of Foreign
Studies
KONNO Takayuki,
Mejiro University,
JAPAN

Keywords:

Myanmar, Pre-Service
Teacher training, higher
education, International
Cooperation

Outcomes and issues of Lesson Study to promote learner centered approach at Education College In Myanmar

In this paper, the authors clarify outcomes and issues of Lesson study based on a case of Lesson Study (LS) conducted at Education Colleges (ECs) in Myanmar in the field of international cooperation project. To improve quality of education, many international aid organizations allocate an effort on pre-service and in-service training for teachers. This project was a collaborative effort between Myanmar government and Japan International Cooperation Agency (JICA) to improve teacher education at ECs. In this project, LS was introduced to Myanmar on March 2009, with two objectives, First, EC instructors will be able to understand newly introduced concept, Learner Centered Approach (LCA) and second, EC instructors will be able to practice LCA at his/her classroom through LS. LS has been conducted for three years at all twenty ECs in Myanmar since 2009. The research clarifies outcomes of LS from perspectives of interest in LCA, understanding on LCA, motivation to apply LCA and skill to practice LCA, and issue from perspectives of what difficulties and stress that EC instructors felt in LS. Two kinds of data were collected. First was data of questionnaire with free writing about (1) outcomes of participating LS to understand and apply LCA. (2) Issues of LS, which hinder EC instructors to understand and to apply LCA. Second was data of four points likert scale questionnaire about interest in LCA, understanding on LCA, motivation to apply LCA and skill to practice LCA. The data was collected from 300 EC instructors in total, 15 EC instructors in respective ECs. As a result of data analysis, 78% of EC instructors got more interested in LCA through LS, 58% were able to understand LCA more deeply 75% got confidence in practicing LCA and motivated to apply LCA and 43% were able to practice LCA with solving problems that EC instructors faced in applying LCA at their classroom. The issues, which hinder EC instructors to understand and to apply LCA, were (1) lack of collegial and collaborative relationship among EC instructors and (2) lack of support and understanding of administration.

E21-PO

SIM Chin Chin, LOW Janne
Ni Yen, KOH Yi Huak, TEH
Yiyuan, THNG Shuyun,
Kranji Secondary School
SINGAPORE

Keywords:

Mathematics; Secondary
School; Beginning Teachers

Mathematics Recipe for Secondary School Beginning Teachers

The Mathematics Recipe is a distillation of wisdom from experienced Mathematics teachers to help beginning teachers understand the common misconceptions students have about Mathematics topics and includes effective strategies to teach certain concepts. Beginning teachers were interviewed to find out the problems they face in classroom teaching and these were addressed in the Recipe. Students tend to form misconceptions easily at the beginning of certain topics. If not addressed, they will continue to make the same mistakes throughout their years of schooling. Even if addressed subsequently, these mistakes are not easy to eradicate. It is therefore better to avoid them in the first place. As beginning teachers may not be aware of these misconceptions due to their lack of experience, they need guidance to help them address this tendency of students to form misconceptions. As teachers, we want to be able to anticipate and address misconceptions right from the start. With the effective strategies provided by experienced teachers, all teachers will be able to benefit from the wisdom of experience, thereby purposefully planning their lessons to help students avoid making the common mistakes. With this mathematics recipe for beginning teachers, we hope that teachers have a ready guide for planning lessons that anticipate and address possible common misconceptions with the infusion of effective strategies. This will facilitate students to be more engaged in learning the correct concepts. This will help beginning teachers to avoid the vicious cycle of students making

common mistakes and teachers having to correct misconceptions made by students. Beginning teachers will be able to gain experience through this recipe which is the distillation of the experiences and effective teaching strategies of senior teachers. This will accelerate the learning curve of beginning teachers.

- F01-PP** **LT2** **Complex object of learning - How to improve learning democracy at school by the use of Variation Theory and Learning Study**
- SANDBERG Birte (Room Chairperson),
Kristianstad University
HOLMQVIST OLANDER
Mona,
University of Gothenburg,
SWEDEN*
- Keywords:**
variation theory, learning study, democracy, learning, instruction
- The aim of this study is to test in what way variation theory (VT) can serve as a guiding principle when learning an abstract concept like democracy. The model Learning study is used, which is a kind of lesson study in combination with the theoretical framework of a learning theory (LT). The iterative process means designing the forthcoming lessons based on the results and analysis of the data from the previous lessons. The data consists of pre/post-tests and video-observed lessons. The study contains four research sessions with four different groups of pupils in three different schools in grade 6 at the compulsory school. In total two teachers and 78 students participated during the four research sessions, one lesson per group. The first lesson (A) included 21 students, the second (B) 17 students, the third (C) 21 students, and in the final session (D) there were in total 19 pupils. The research sessions were 80 minutes each, and the planning was guided by the variation theory. The results show that the teachers' different ways of presenting aspects on the object of learning – democracy - different aspects where possible to discern. The different patterns of variation used are described in relation to differences in the students' learning outcome. In all lessons democracy was contrasted against dictatorship. In order to facilitate learning different aspects of the object of learning were designed in a pattern of variation to see if and in that case what kind of differences this meant for the students. The results show that in group A the test scores increased by 63%, in group B the increase was 32%, group C 29% and in the last group (D) the test scores increased by 91%.
- F02-PP** **LT2** **Pedagogical content knowledge in Biology generated by the use of Learning Study**
- OLANDER Clas,
HOLMQVIST OLANDER
Mona,
University of Gothenburg,
SWEDEN*
- Keywords:**
Learning study; biology; genetics; pedagogical content knowledge; guided learning
- The point of departure in this paper is a learning study performed in an upper secondary school, focusing on the biological topic of genetics. The research design in the intervention started with a screening of students' ways of explaining important concepts in genetics and their relations. On the basis of that screening, the specific object of learning was formulated: "to understand the relationships between genes and traits". This was followed by an iterative sequence of three videotaped research lessons within three different student groups (N=27; A9, B10 and C8), which all included joint planning and evaluation by two teachers and two researchers. The results of the previous research lesson was the base for further improvements in the following research lesson with a new group of students, however the same teacher taught all three research lessons aiming to minimize the effect of teachers' personality as an important factor for the changed results. With a pre-and post-test design, accompanied with a delayed post-test six weeks after teaching, it was concluded that it was only during the third research lesson that the students' answers improved in a statistically significant way (paired T-test; $p=0,048$), which almost prevailed also six weeks after the research lesson ($p=0,087$). The aim of this paper is to suggest contributions to the field of pedagogical content knowledge that can be made through an analysis of the iteratively developed teaching strategy, specifically the strategies used in the successful third research lesson. The argument we put forward is that explicit pointers towards whole/part relations are essential, for example by guided learning towards discernment of different biological organisation levels; levels that are expressed with specific technical terms. School science makes use of numerous technical terms in order to explain, for example the relationships between genes and traits. However, technical terms are embedded in thematic

patterns and in the actual case it was found that chromosomes/genes were important terms but only if they were accompanied with the term allele. We suggest that this is due to the fact that genetic inheritance is a process that shapes both similarity (then chromosomes/genes are important terms) and dissimilarity (then allele becomes an important term because alleles are variants of a gene).

F03-PP

LT2 From a single lesson to a series of lessons: The contribution of Learning Study to re-design the pedagogy of teaching the whole unit on the topic of subject-verb agreement

CHAN Wing Yan,
Hong Kong Institute of
Education,
HONG KONG

Keywords:

Learning study; redesign the pedagogies; object of learning

Some Cantonese speakers have great difficulties with learning the concept of “Subject-verb agreement” as there are no functional equivalents of the English Subject-verb agreement in both spoken Cantonese and written Chinese. This grammatical feature is one of the common learning difficulties among Hong Kong Primary school students. This paper illustrates how a group of P.5 primary English teachers, starting from identifying the object of learning of a single research lesson in an institute-school collaborative learning study, then extended to redesign the pedagogies of teaching the whole unit of “Subject-verb agreement”, finally not just helping students to understand the concept better, but also enhancing their reading and writing abilities. By making use of the platform of Learning study, at the end, a whole series of lessons on teaching “subject-verb agreement” had been developed which led to significant improvements on the students’ learning outcomes in all teaching cycles.

F04-PP

LT3 Introduction of Lesson Study in the Philippines at the midst of K-12: Search for the appropriate model from the Japanese tradition

*AVENDANO Fredie (Room
Chairperson), SEDILLA
Carleen, GONZALES
Corazon,*
Department of Education,
PHILIPPINES
SAKAMOTO Masanobu,
Aichi Institute of Technology,
JAPAN

Keywords:

Lesson Study: K-12:
Philippines: Japan: Education
Reforms: Curriculum:
Methodology

According to the movement of lesson study (LS) in order to adopt the said educational methodology, systematic information of lesson study in Japan-its origin, history, theory and research method are required (Nakano, 2011). It is necessary to understand the real and deeper meaning of the scheme in the search for better methods in education practice. This concern is very much significant since the Philippines is currently undergoing major education reforms under the K-12 program. It intends to adopt a basic education curriculum that is more responsive to the needs of the present society and to address the problem of education and industry mismatch by adding additional two years of vocational-oriented senior high school. In the process, the current Philippine basic education curriculum which is squeezed in the ten-year basic education cycle has to be overhauled. The need to try a new paradigm to gather valuable insights as possible contribution to the K-12 enhancement, which is described by its proponents as a work in progress, is very timely. In order to apply appropriately LS as an attempt to make the Philippine education more relevant will demand the understanding of various approaches that exist in Japan. It is for this reason that this research will deal on which possible approaches could be feasible in the Philippines. It will attempt to answer the question based on teachers’ perception in selected schools in the City of Caloocan. It will cover both the quantitative and qualitative dimensions being analyzed in the convention of lesson study. For example, this research will find out which is more acceptable among Filipino teachers; LS involving randomly selected topics in one school year or a definite unit with LS being held in series. It will examine the acceptability of documenting school children’s learning and interactions inside the classroom as well as the procedures of documentation. The Philippine classroom setting like many countries in the world is dependent on lesson plan hence this research will analyze also the impact of LS on the refinement of lesson plan as described by Lewis (2011) as one possible goal of LS. Finally, this research will involve direction-setting as

to whether LS in the Philippines will be slant on the analytic process focused on improving lesson design and pedagogy or as a tool to comprehend students' motivation to learn.

F05-PP

LT3 Development of teaching methodology through Lesson Study in Primary School of Mongolia

OYUNAA Purevdorj,
Ministry Of Education,
MONGOLIA

Keywords:
lesson study, primary
mathematics

Lesson study plays a significant role in improving the quality of teaching and it has the potential to bring about improvements to the actual classroom lessons as being able to offer hints and suggestions which would be of use to the educational development (JICA, 2004). Through the lesson study activities, teachers are able not only to share what they have experienced and how they taught lessons to students but also learn how to improve the teaching and learning from each other. Until the development of student-centered curriculum for school in 2005, Mongolia had been trying to improve the quality of teaching by using various strategies and one of them was the "Open Lesson". Originally, the Open Lesson aimed to improve the quality of teaching through promotion of the good practice to other teachers and schools. Yet, in practice, its aim gradually turned into judging teachers and schools as good or bad. In the Open lesson, teachers and head teachers observe the lesson and criticize a teacher who taught the lesson based mainly on how many tasks were given, if the objectives were achieved and whether the students were obedient while performing the tasks. As time went on, educators and school teachers tended to criticize the Open lesson as it affected teacher confidence and started to become a burden on the teacher. Since 2006, Japanese Lesson Study has been introduced as one of components of the educational project by Japan International Cooperation Agency (JICA). The project was dedicated to improve teaching methodology and as a consequence, to promote student learning in primary schools. The lesson study was implemented in 14 primary schools in Mongolia. In Mongolian primary school context, one of the aims of the Lesson Study implementation was to improve the mathematics teaching methodology of primary school teachers. The implementation of the Lesson Study had three stages namely development of the lesson plan, teaching and observing the lesson and discussion of the lesson. After three years, very notable changes have appeared in the teaching methodology of sample school teachers. First of all, teachers became aware of the effectiveness of working in groups in developing the lesson plans. Teachers also learned how to set up the lesson objectives, how to develop sequence of activities that encouraged students to create knowledge on their own, how to produce resources using hands-on materials and predict student responses. It was found that teachers were encouraging students to propose the objectives of the lesson by themselves, and also supporting students to express their thoughts and ideas. Teachers questioning ability also improved and they learned how to link students' responses with the lesson objectives. The most important observation was that the teachers were seemed to have become aware that they need to be patient to listen to students' responses. In Mongolia, it is a common practice for the observers to criticise the teachers during the post lesson discussion, which discouraged the teachers to "open" their lessons to colleagues. In sample schools, this traditional culture is broken down. Nowadays, teachers who are involved in the project are very confident to discuss their lessons and share their lesson with other teachers. It enables the teachers to reflect on their lessons. In addition, observers also learnt how to give constructive recommendations.

F06-PP

LT3

Lesson Study made easy: Structure and processes

WOO Ching Nee, TOH Lay Hoon, TAN Jin Sha, YONG Lai Yee Michelle, LIM Lymin Joel,
Chung Cheng High School (Main), SINGAPORE

Keywords:

Lesson study; teachers roles; facilitation; resources; structures; processes; sustainability

In 2010, one of the Professional Learning Teams (PLTs) within the Mathematics department embarked on Lesson study. The two main objectives were: (1) To enhance professional learning by adopting a systematic and evidence-based approach, and, (2) To develop an alternative platform for collaboration among teachers through the skills, processes and structures put in place when conducting lesson study. In the process, teachers adapted and used a contextualised checklist to guide the facilitation of Lesson Study. This checklist helped teachers to keep in view and develop the essential aspects of Lesson Study implementation. Various factors contributed to the sustainability of Lesson Study in the Mathematics department, one key factor is a supportive school management approach. The school management supports Lesson Study through time-tabling PLT sessions and lesson observations into teachers' workloads. In addition, adopting the 'Lesson Consultation' approach to allocate roles within Lesson Study teams helped to clarify the nature of the process. Lesson study in Chung Cheng High School (Main) has involved a total of 15 teachers for 16 cycles since its inception. The various Lesson Study teams have helped to refine many pedagogical approaches in the teaching of Mathematics and Additional Mathematics, particularly in areas where students usually experience difficulties. In 2012, Lesson Study was recognised as one of the key learning enablers in the school, this presentation will discuss the structures and processes involved in leading Lesson Study for sustainability.

F07-PP

LT11

Developing better conceptual understanding through collaborative and self-directed learning

ANG Gua Hong, KOH Xinwei (Room Chairperson), ABDUL RAHMAN Nadiah, ONG Wuan Seah, JAYAKUMAR R, TAN Wan Sim, YAP Siew Phing,
Montfort Secondary School, SINGAPORE

Keywords:

conceptual understanding; collaborative; self-directed learning; expert and home groups

This paper documents the use of Lesson Study (LS) as a Professional Learning Community (PLC) tool to make the learning of Mathematics interesting and relevant through collaborative and self-directed learning. The LS team planned a unit on the topic Mensuration in the Secondary Two Normal Academic (NA) syllabus. In the research class, the students in the expert groups had to explain and share information they have researched on solids like cone, sphere and pyramid with members of their home groups. The control class received traditional teacher-centered instruction. The paper will also discuss the key learning points and challenges encountered while carrying out the research and lesson study. The teachers benefitted in terms of gain in content knowledge and pedagogical knowledge, in particular focusing on the pupils' learning through collaborative and self-directed learning. The research might be able to provide Mathematics educators and researchers some insights into the role of lesson study in supporting classroom innovations that improve the quality of learning.

F08-PP

LT11

Enhancing students' learning experience in rationalising ratio in Mathematics

LEE Donny Wee Sion, YONG Janson Kiam Ham, TOH Chin Hwee, LEE Ching Fong, TAY Liyan,
Northbrooks Secondary School, SINGAPORE

Keywords:

enhancing students' learning experience; in rationalizing ratio in Mathematics; ratio in Mathematics

In order to improve educator's professional practice and the effectiveness of experiences in learning, there is a need to focus more on the individual students, particularly their behaviour and responses. Hence, lesson study was adopted to enhance the learning experiences of the students. The focus of this lesson study is to improve students' engagement in learning. The topic chosen was ratio for Secondary 1 Express Mathematics. This was because many students have the misconception that fractions, decimals and unlike quantities can be used in ratio. To engage the students, group work and Think-Pair-Share strategy were used for students' collaborative learning. Students also used deductive skills to conclude that ratio is a comparison of like quantities and used ratio to solve real life problems. Students were assessed throughout and beyond the lessons through worksheets, questioning and an individual check-out activity. Observations on the students' responses and behaviour in

class were made, followed by the reflections done by the teachers in the team, and these were taken into considerations in the reviewing of the lesson plan. The teachers found that such customisation of lessons can better engage the students. Students became more engaged and responsive than usual. Furthermore, students demonstrated a higher level of understanding through their performance in their assignment. Lesson study has shown to be an effective method to improve the professional development of teachers as it allows teachers to better understand each and every student through their behaviour and responses in class. It has also helped to improve the learning experiences of the students. Given the positive results and responses of the students, the team will extend such similar study to other Mathematics topics, for students of various levels or streams.

F09-PP LT11 Lesson study: Use of Geogebra in graph sketching of quadratic functions

TAN Eric, ANG Kai Jie,
Cedar Girls' Secondary
School,
SINGAPORE

Keywords:
Lesson Study; GeoGebra;
Graph Sketching; Secondary
School

Students often encounter problems in applying the concept of quadratic graph sketching with the use of the completed square form. A lesson study was hence conducted to look at ways to improve the teaching and learning of this topic. The ICT platform (GeoGebra software) was used for this lesson as it allows students to be engaged in self-exploratory and collaborative tasks as well as providing opportunities for students to reflect on their learning. The presentation will include the design, planning stages, implementation and the statistics of the lesson study. It will also highlight the post-lesson discussions and the refinements made after each lesson.

F10-PP LT12 Leading Lesson Study: Issues and responses

*LIM Edmund (Room
Chairperson),*
Huamin Primary School,
SINGAPORE

Keywords:
Lesson Study; School
Leadership; Challenges;
Issues; Responses;
Approaches

This paper presentation examines the issues, challenges and considerations involved in the introduction and implementation of Lesson Study in the school context. In the process of nurturing a Professional Learning Community (PLC), various schools in Singapore have embarked on Lesson Study (LS) as an approach to building the PLC. This presentation will analyze specific issues and challenges linked to the use of LS in a primary school context. For instance, the issues of time, teachers' workload and buy-in will be examined. It will also present certain responses and approaches to addressing these concerns and considerations. The presentation will also feature approaches and solutions adopted in Japan and US to address similar issues. This paper presentation will be relevant to teachers, school leaders and researchers interested in the practical considerations linked to leading, implementing and sustaining LS in schools.

F11-PP LT12 Technology in Indonesian classrooms: Do teachers actually use technology in teaching?

PURNAWARMAN Pupung,
FADHLY Fahruz Zaman,
Universitas Pendidikan;
Universitas Kuningan;
INDONESIA

Keywords:
ICT; technology; computer;
feedback; word processor;
presentation; teaching and
learning

Technology, especially ICT (Information and Communications Technology), develops exponentially. The development of ICT is so rapid that it makes it difficult for teachers to keep up with new technologies, including technologies that teachers can use in teaching and learning activities in the classroom. Despite the fact that there are many new and different technologies available in the market today, not all teachers and schools can afford to buy or are willing to use them for classroom teaching and learning purposes. Moreover, there are still some teachers who are technology-resistant or worse, teachers who do not know well how to use technology such as computers or simple word processing programs. The discrepancy between teachers who are technology literate and those are technology-resistant or less technology literate, is still evident in Indonesia, especially between those who teach in the cities and those in remote areas or those who think they do not have any need for technology in their classrooms. On the other hand, most teachers are

actually so familiar with cell phones, other hand-held devices, or social networking sites out of their classroom. This paper will report findings of the study conducted among middle and high school teachers in several districts in West Java, Indonesia. The study involved 86 teachers who teach different courses in their schools. Subjects of this study were asked to complete a set of questionnaires about their use of different technology equipment in their classrooms and the use of simple and familiar technology tools such as word-processing and presentation programs in presenting lesson materials or providing feedback. Issues surrounding the use of technology in the classroom will be discussed; results and recommendations regarding the use of technology for classroom purposes will be shared.

F12-PP LT12 The uniqueness of Japanese and local Science teachers during Lesson Study practice in the opening session of their classroom instruction

*NUGRAHA Ikmanda,
SURATNO Tatang,
Universitas Pendidikan
INDONESIA*

Keywords:
opening session, open class,
characteristic of Japanese
and local science teacher

The study uses video analysis to analyse the the general characteristics during classroom instruction of three Japanese and three Indonesian science teachers in schools West Java, Indonesia. These teachers conducted an open class during lesson study practices in several schools. The focus of the study was to study the opening session of the classroom instruction. By studying the characteristics and uniqueness of these teachers helps the teachers to be reflective about their practices. By providing feedback to these teachers enables them to develop new strategies to engage students during science lessons.

F13-PP TR503 Using Predict-Observe-Explain Model and concept cartoon to construct, analyse, and promote arguments and address common misconceptions in the learning of refraction: A 21stC approach

*KOH Chee How (Room
Chairperson), SEAH Wan Yi
Wendy, KOH Tai Xiang,
Kranji Secondary School,
SINGAPORE*

Keywords:
predict; observe; explain;
concept cartoon; common
misconceptions; refraction,
21st century

The study is about the use of Predict-Observe-Explain (POE) model. The study incorporates the use of Concept Cartoon to construct, analyse and promote arguments and address common misconceptions in the learning of the topic "Refraction". The aspiration behind this study is to enable greater authentic learning in content knowledge when students apply what they have learned in theory to phenomenon they observe in daily life. This will lead to greater student engagement when students can link concepts and their prior experiences. The study also aims to teach 21st century competencies and skills such as using evidence for communication, logical reasoning and critical thinking in explaining the phenomenon. It also seeks to encourage Self-Directed Learning (SDL) when students do their own research and decide their learning goals, Collaborative Learning (CoL) when students work together in groups to discuss their findings. Presently, in line with the school being a 21st century curriculum/competencies (21CC) pilot school, there are various efforts by teachers to explore the effectiveness of teaching and learning pedagogies within the classroom. The study explores the use of POE and alternative assessment in concept cartoon in helping teachers to find out students' initial ideas and to provide teachers with information about students' thinking. Through the use of such pedagogies and tools, the study hopes to also generate discussion and motivate students to want to explore the concept. For our study, we would like all students to see the relevance of Physics in their daily life. Concept Cartoon will be a valuable stimulus for investigation, promote curiosity in the subject and encourage better student engagement during lessons. All students will be taught 21CC skills such as communication skills, logical reasoning and critical thinking when doing their research and discussions. At the same time, students will have the chance to develop their SDL and CoL competencies when they do independent research in groups and discuss their findings.

- F14-PP TR503 Reduction of Physics' misconceptions through Problem-Based Learning**
SARWANTO Sarwanto,
 UNS,
 INDONESIA
Keywords:
 problem-based learning,
 Reduction of physics'
 misconceptions, analytical
 skills, lesson study
- Physics education students of UNS were identified to have misconceptions in some physics materials. There were efforts to reduce student misconceptions through problem-based learning using problems found from their environment. Problem-based learning was done in four cycles, and involved three lecturers as observers. The results of this research: students had no textbooks, no lecture notes and lacked analytical skills; this affected the smooth progress of problem-based learning. Students were required to summarize the book, the lecture notes, analyze data from experiments or demonstrations, derive conclusions and provide a solution to the problem. This research found a significant reduction in student misconceptions. Another impact of this research is increasing the analytical skills of students.
- F15-PP TR503 A case study of Lesson Study in Japan: From the point of view of Action Research**
KURAMOTO Tetsuo,
CHIJIWA Mineko,
TOMINAGA Shun,
 Saga University,
 JAPAN
Keywords:
 Lesson Study, Curriculum
 Management, Action
 Research
- “Lesson Study” focuses on teachers working together to build learning communities through sharing their experiences and knowledge, preparing lesson plans, pre-researching for lessons, and teaching lessons in which all of the relevant team teachers observe. Internal Collaboration within the school organization related to “Lesson Study” can be understood through School Culture Theory. According to School Culture Theory, if we look at the whole structure of “Lesson Study” as factors of School Culture, such as personal values of teachers, principal leadership, and protocol for in-service teacher training systems, the effectiveness of teacher’s instruction would increase and would affect teacher’s professional development positively. Secondly, it is directly related to the concept of “School Improvement”. “School Improvement” means to promote the ability of the school as a whole, which not only focuses on individual teacher’s efforts, but also on collaborative teacher-team learning communities within the school organization. In general, the concepts of “School Improvement” means to build a positive “School Culture”, to minimize outside control, to learn problem solving skills for the school organization, and, lastly, to be accountable for the communities. However, to define excellent model schools, one has to consider not only school organizational management issues, but also how to foster student’s intellectual and personal development. This is why “School Improvement” should prioritize academic and character growth of students, not focus only on school managerial issues. In addition, evaluation of the management and design of the school curriculum also needs to account for both personal development and academic achievement of students. These factors also show a direct or indirect relationship to school management considerations. Therefore, from a research perspective on “Lesson Study”, the educational effectiveness of “input and output theory” of “School Improvement” indicates the importance of both professional development of teachers and student achievement.
- F16-PP TR504 The effects Lesson Study had on teachers and students in the teaching and learning of Mathematics**
LONG Alice (Room
Chairperson), BEH Mui Leng,
SONG Rosemary, CHAN
Sock Har, LIM Soh Cheng,
GAN Justina, LIM Siew Joo,
FOO Kum Fong, TAN Lay
Hoon,
 SINGAPORE Chinese Girls'
 School
 SINGAPORE
- This paper aims to show the effects lesson study (LS) had on the Mathematics teachers and students in a case study of a girls’ school in Singapore. The research questions were: (1) Does participation in LS as a form of professional development serve as a catalyst for building a culture of open sharing amongst Mathematics teachers? (2) What are the effects of teachers’ participation in LS on students’ learning? The participants for this study comprised eight experienced Mathematics teachers who formed a LS group with a Master Teacher as our consultant. The LS was designed in a case study format. The overarching goal for this study was for students to develop deep conceptual understanding of the selected Mathematical concept, Quadratic Inequalities.

Keywords:
Lesson Study; Professional
Development; Mathematics;
Sharing Culture; Quadratic
Inequalities

To achieve the goal, the LS team adopted a graphical approach to help students visualise the solution and scaffold activities to facilitate class and group discussions. In the first lesson, the team's attempt to focus the observation on students' thinking and learning difficulties were not successful as the students were hesitant in responding to questions that draw on their conceptual understanding. Based on perspectives offered by observers and feedback on the first lesson, the LS team reviewed and revised the lesson plan as well as pedagogical approach for a similar lesson in another class. With the revised lesson plan, students in the second lesson were observed to be more engaged in peer discussions. There were also more interactions between the teacher and the students. Subsequently, it was observed that students in the second class were able to demonstrate conceptual understanding of the concept as they were able to transfer their newly acquired knowledge to more complex situations involving cubic inequalities. The professional sharing and learning through LS has also equipped the team with skills to give objective feedback. Consequently, the teachers were more appreciative of the feedback and there was more open sharing amongst them. For instance, the team realised that to employ effective questioning techniques in the research lesson that draws on students' conceptual understanding, teachers need to be cognisant of the differing learning needs through constant monitoring of students' understanding. These skills were put to use in the second research lesson to actively engage the learners and help them acquire deeper understanding of the mathematical concepts taught. This presentation will share more details on the case study, the related issues encountered and how the LS team overcame challenges.

F17-PP

TR504

Qualitative research of Learning Study for Year 10 combined Science students: A comparison

PG OSMAN Ak.Eddyroyanto,
Menglait Secondary School,
BRUNEI

Keywords:
Learning Study; Wave
Properties; speed; frequency;
wavelength; Object of
Learning; Variation Theory

The Learning Study research was designed to help selected secondary level students of Menglait Secondary School to improve on their learning experience in the classroom environment. A group of science teachers investigated their Year 10 students' understanding in the Applications of General Wave Properties, mainly through graphical interpretations. The research focused on the understanding of the relationship between the speed, frequency and wavelength of a wave. Earlier diagnostic tests showed that students failed to grasp how any one of the three factors influences other factors in the equation. This research examines the effectiveness of Learning Study. Learning Study is one of the teaching strategies used to tackle difficult topic(s) from the students' point of view. It ran for about four months during the school's third and fourth terms of 2011. The teachers met at least once a week to discuss and collaborate, and to make analysis on what had been and would be carried out. Cycle 1 and 2 were carried out in July and September respectively. The research required the process of designing and identifying the Object of Learning, Critical Aspects, the possible inputs of Variation Theory and the Pre-requisite knowledge that needed to be covered prior the actual Learning Study lesson. By comparing students' results obtained from the two cycles, there were significant improvements. These could be observed from the analysis of students' pre-tests and post-tests for both cycles. Additionally, there were a number of data collection techniques used for this research; surveys, questionnaire, interviews, observations, video-recording and journal writing. It is interesting to note that the two cycles' methods of teaching were very different in nature and hence contributed to the students' progress. This research encourages teachers to put more effort in terms of teamwork and collaboration and also that teachers require time to develop and adapt this Learning Study strategy or method. The school hopes it will become a culture whereby all the departments can practice Learning Study teaching strategy.

F18-PP TR504 Factors influencing teachers' collaboration in Lesson Study for teaching Physics through inquiry

MARAMAG Cerilina,
University of the
PHILIPPINES

Keywords:
Factors influencing lesson
study

In 2010, the University of the Philippines National Institute for Science and Mathematics Education Development (UP NISMED) initiated a professional development project called Collaborative Lesson Research and Development (CLRD). This project aims to promote Lesson Study in the Philippines and to improve learning of students by enhancing the competence of teachers through collaborative lesson research and development. During its first year of implementation, a team of researchers from NISMED collaborated with a group of high school Physics teachers from the National Capital Region, and also with another group from a province in Central Luzon. Both groups were engaged in collaborative development of inquiry-based Physics lessons. The first implementation was initially evaluated using the results of the interviews with teachers and students, the output of the teachers, the result of their lesson implementation, and the observations of the NISMED group. One group turned out to be more successful than the other in various aspects. In this presentation, I will describe the factors identified to have influenced the outcomes of the project for both groups of teachers.

F19-PP TR505 Levels of reflection during Lesson Study discussion sessions

*ONO Yumiko (Room
Chairperson), ROGAN John,*
CHIKAMORI Kensuke,
Naruto University of
Education,
JAPAN

Keywords:
Lesson study; Reflective
practice; Measurement of
reflection

Lesson study is attracting increasing attention throughout the world. It is a cyclical process in which the three main components are: 1. Teachers collaborate to prepare a lesson or unit; 2. which is subsequently taught by one of them while the others observe, and finally; 3. the participants engage in collaborative reflection aimed at improving the lesson or unit. The question of interest in our research program is whether the nature and level of reflection changes over time when lesson study is introduced into a new setting. As teachers become more familiar with the practice of lesson study, does the reflection session show increasing levels of depth and sophistication? The first step in the program was to develop an instrument capable of measuring the levels of reflection during the post lesson reflection session. The proposed paper will trace the process followed in the development of this instrument. We adopted a two-pronged approach in developing the levels and types of reflection in our rubric. First we took cognizance of those proposed in the related literature on reflection. However these served only as initial guideposts. We then took a grounded approach by identifying types and levels of reflection in transcripts of a number of post lesson analysis sessions conducted in four different cultural settings. Eventually a rubric consisting of five categories was developed, with either three or four levels in each of the categories. The five categories are: • Teaching and learning strategies; Instructional techniques and practices; • Teacher behavior; teacher characteristics; communication skills; • Lesson as experienced by students; student behavior; interaction between students • Achievement of lesson and curriculum objectives (e.g. thinking skills, creativity, conceptual understanding); inconsistency with objectives; and • Logistics; management; planning; use of materials and teaching aids. As part of the proposed presentation, the rubric will be shared with the audience, who will also be given access to an online manual on how to use the instrument. While the instrument was designed with lesson study in mind, it can likely be adapted for use in any situation where discussion on classroom performance occurs, as in, say, student teaching.

F20-PP TR505 Using Lesson Study to promote greater collaborative learning among teachers teaching Upper Secondary Biology

TAY Siew Peng,
KRISHNASAMY Maha
Letchimi, TOH Ghim Yeow
Kenny, LUEI Sin Yen Joselyn,

Lesson Study has been known to promote greater collaborative professional learning among teachers. Our study delves into how that collaboration actually takes place and what sort of learning individual teachers in a team derived

PANG Ronnie,
Ang Mo Kio Secondary
School,
SINGAPORE

Keywords:
lesson study; collaborative
learning

from working collaboratively during the lesson study process. The study involves a team of six Science teachers working on a Secondary Three Express Biology lesson about the topic of enzymes. Guided by the Professional Learning Community (PLC) framework, the team began our collaborative learning journey in mid-January 2011. Our focus was aligned to our school's values of developing knowledgeable, resourceful and warm-hearted pupils. We planned to inculcate these values in our pupils by deepening teachers' existing pedagogical practices and improving teaching resources and processes. The 5 main aspects of our collaborative learning are namely: (1) exploring trigger ideas and strategies for lessons to engage and enthuse our pupils (e.g. use of traffic light coloured cards, name selector software), (2) use of new pedagogies to introduce our pupils to inquiry based learning (e.g. POE), (3) learning to solve problems as a learning team, (4) use of peer support, observing each other and learning from each other and (5) refining our reflective processes, particularly through debriefing with a Biology Master Teacher from the Academy of Singapore Teachers (AST). The result of this study will show the extent of collaborative learning among teachers through lesson study.

F21-PP

TR505

Teachers' discourse supporting professional development: A case study of Lesson Studies in Japan

SUZUKI Yuta,
The University of Tokyo,
JAPAN

Keywords:
Teachers discourse;
professional development;
children learning; lesson study
in Japan

The purpose of this research is to examine the nature of teachers' discourse that supports professional development. To fulfil the purpose, this research employed intensive case study of lesson studies at an elementary school in Japan. Supporting professional development by teachers' discourse includes the following sequential phases: exploring the teacher's tasks for developing as a teaching professional, identifying the developmental tasks, and acknowledgement of achievement of the tasks. This research focused on the phase of the acknowledgement of achievement of the tasks. In terms of teachers' professional learning community, this phase means the process of teachers becoming members of the professional learning community and the teachers' participation in the professional learning community. This phase is important for teachers' professional development. This research employed an intensive case study that primarily focused on teachers' discourse in post-lesson conferences held at an elementary school in Japan. We selected a Japanese elementary school that has engaged in school reform for more than 10 years as the location for our case study. Additionally it relied on a variety of ethnographic data obtained over a two-year period. These data include observational data of the research lessons, the lesson study itself, ordinary activities, interviews with individual teachers and relevant school and classroom documents. To scrutinize teachers' discourse supporting professional development, we selected one case of lesson study. This research analyzed those data in the following original viewpoint: to what extent the children's learning in the lesson were centred in teachers' discursive mode? This viewpoint could classify the teachers' discourse. The classification not only could be conducted by the analyst but also the teachers' discourse itself classified it and made connection to the same category of discursive mode. Moreover, the classification was reflected on the teachers' professional culture in the school. This research considered the relationship between supporting the professional development of teachers, inquiry into the children's learning, and enhancing the teachers' professional culture.

F22-PP

TR506

Lesson Study in developing Tamil language pedagogy

LASKHMI Seetha (Room
Chairperson),
National Institute of
Education,

Lesson study is a professional development process that involves identifying challenges, planning, teaching, observing, critiquing lessons, and refining and evaluating the effectiveness of research lessons (Lieberman, 2009). In lesson

SINGAPORE
SARAVANAN, *Vanithamani*,
University of BAHRAIN

Keywords:
professional development
process; critiquing lessons;
Tamil Language Pedagogy;
Second Language Teaching

study processes, teachers are engaged in two cycles to improve and implement effective teaching and thereby improved learning (Lewis C., 2000, 2001 & 2007, Watanabe, 2002). Hence this paper will analyse a total of 2 research cycles at 2 Primary Schools' Tamil language classrooms on the effective use of Lesson study features. Further, this paper will explore how Lesson Study attributes can be used to develop best practices. Lesson Study approach was used in Tamil Language classrooms in two schools for the professional development of Tamil teachers. Both schools used the approach to develop students' skills in reading comprehension. In high stake examinations in Tamil Language, the comprehension and composition are the major components of assessment. The Lesson Study included observers' coding, profiling, and use of cooperative learning techniques in the context of real life situations. The findings of this project will be shared. Despite a challenging time and constraints Tamil teaching showed gradual progress. The following are the research questions investigated: • How Lesson Study approach will enhance the effective teaching of Tamil? • What are the best Lesson Study features that will provide further inputs to best practices? • In what ways did Lesson Study enable the professional development of teachers? Lesson Plans, classroom transcriptions, teaching materials, worksheets, and artifacts will be analyzed for this paper. This Lesson Study project is a way of understanding challenges in the Tamil teaching profession, and how teachers responded to students' needs, learning styles and worked on effective learning strategies. Lesson Study is a well planned process to explore and develop communities of practice where teachers work with each other to help develop their professional pedagogical skills and best practices (Lieberman, 2009).

F23-PP

TR506

Investigating the shifted on the lesson: How interaction of technology knowledge with content and pedagogy is changed

MAULANA Reza Taufik,
NURAENI Fitri, HIDAYAT Arif,
Universitas Pendidikan
INDONESIA

Keywords:
Lesson Study, Technological
Pedagogical Content
Knowledge

Understanding how particular topics are organized, presented, and adapted to diverse learners and presented for instruction is a complex task. Here, technological pedagogical content knowledge is becoming an aspect that has an important role to support the instruction itself so that it can be understood by the students. This paper investigates the shift in daily lessons indicated by the changing interactions among three teaching knowledge domains: content, pedagogical and technological domain that occurs in the sequence of more than 50 recorded lessons for one-academic year. The data include videos of Science and English lessons conducted by teachers in Junior High School. These teachers have experience with lesson study for more than 7 years. The videos were transcribed, reflected on and analyzed qualitatively. The aspect that can be used to see significant shifts are the appropriateness of technology integration with the content being taught and the way teachers teach the content with the use of technology.

F24-PP

TR506

Lessons from students: A case of teacher professional development programme in West Java

YUSUF Fazri Nur,
Universitas Pendidikan
INDONESIA

Keywords:
learning problems, teacher
education, teacher
competence, teaching
strategy

Regarding the implementation of the 2006 School-Based English Curriculum, the issue of learning problems faced by students has been a cause for concern among teachers for a long time. This study investigated the learning problems encountered by students and the strategies employed by teachers to overcome these problems. Employing a descriptive approach, this study involved two schools in two districts of West Java, Indonesia. Four teachers and 120 students were involved in this study, data was collected through classroom observations and interviews, and was subsequently analyzed using the learning theory proposed by Spratt et al. (2005). The findings show that both students and teachers encountered problems with the implementation of

this curriculum. The problematic areas, among others, include the learning of vocabulary, which teachers found particularly challenging, for example, 'looking up the dictionary' although a recommended learning strategy, was not considered effective by many teachers. In sum, proactively identifying students' learning problems through a research study can help teachers to modify and adapt their teaching while also developing their professional competencies. Ultimately, such professional development will help students to better attain their learning objectives and improve their learning achievements.

F25-PP

TR507

Effective teaching of Chinese interaction skills

*TAN Ning Si (Room
Chairperson),
Ang Mo Kio Primary School,
SINGAPORE*

Students face difficulties in communicating effectively in Chinese with peers and family members as they usually speak English at home and in school. It is important for them to be able to speak proper Chinese sentences so that they can communicate their opinion and ideas effectively. The aim of this lesson study was to teach students how to speak proper Chinese sentences in authentic situations. The target group for this lesson is Primary 2 students. The selected topic "A day in the book shop" is relevant to their daily lives as they can put what they have learnt to good use after the lesson. The classroom was transformed into a mini-bookshop for students to carry out the activities. They were provided with a set of relevant Chinese vocabulary based on the topic. The students also used a variety of proper sentences to communicate with the 'seller'. Before the start of the activities, each student was given a card which stated the specific stationery item they are required to purchase. Our finding indicates that students developed an interest in learning proper Chinese sentences and vocabulary through this interactive activity. However, the weaker students found it difficult to remember certain sentence structures and vocabulary as they do not usually use these phrases or terms in school or at home.

Keywords:
proper Chinese sentences
and vocabulary, interactive
activity

F26-PP

TR507

Teacher-led Professional Development Model: Lesson Study in Singapore Chinese language teaching and learning

*LIM Kwee Hua, CHIA Swee
Hong, LIM Chin Nam,
Ministry of Education,
SINGAPORE*

Lesson Study is a tool to enable teachers to observe how students learn, and to know what the students are thinking during learning process. Based on the evidence collected during lesson observations, teachers are able to improve their professional practice after analysis is done. The framework of Lesson Study is to plan instruction design collaboratively and to carry out research lessons. After observation, the evidence collected were analysed for further improvement. This paper is a case presentation in exploring how CL teachers construct knowledge and promote professional growth through Teacher-led professional development model. Master Teachers in Chinese Language (CL) actively promote Lesson Study in the teaching and learning of CL in Singapore schools. The "Teacher-led Professional Development Model" facilitated by Master Teachers in CL consists of three stages: 1) Master Teachers designed and developed course materials for training; 2) Master Teachers served as Knowledgeable Others, worked with the teachers in charge (Lead Teachers, Senior Teachers or experienced teachers) who led the lesson study in schools. The purpose is to raise the awareness of making reflections by teachers for improving the effect of teaching and learning CL in class. 3) Master Teachers facilitated the forming of professional learning community (PLC). Through the PLC, teachers are able to meet and share their research outcomes and experiences in classroom teaching. The outcomes of classroom teaching were then collated and published for sharing under the guide of Master Teachers / Knowledgeable Others. A publication entitled "Lesson Study – Searching for Answers in the Classroom" was published. As Master Teachers, we hope to work collaboratively with more research teams in schools through the professional development model.

Keywords:
Teacher-Led ; Professional
Learning Community; Master
Teacher

Together with the knowledgeable others, continue the professional learning led by Senior Teachers and Lead Teachers, to promote professional growth in both knowledge and skills for more CL teachers.

F27-PP TR507

DU Pin, Beijing No.4 High School, CHINA

Keywords:

Speeches; analysis; changing

The study of speeches for High School students

This lesson study involved freshmen participants and seven teachers, three of whom are from Beijing No.4 High School (BHSF) focusing on teaching while the other four are responsible for the syllabus discussion. Analysis of student learning focused on "Speech" together with "Letter" in "Applied Articles", the standard feature in the textbook for Senior One students. The reasons for our focus on "Speech" are: (1) the crucial importance of verbal expression abilities, (2) current trends of native language teaching, and (3) the strong interest from students in BHSF in making speeches to express their thoughts. Based on the analysis of student learning, during the whole process of the study, we used two reading materials and three video clips of some famous speeches worldwide. In order to make the learning experience more practical and authentic, we helped students to recognize the close relationship between "purpose" and "listeners" or "audience". Therefore, the first step involved the analysis of the materials, followed by the techniques of speech presentation. This lesson study lasted for two months with two cycles, the first experimental cycle followed by the improved cycle. The debut cycle was performed by Ms. Xu and Ms. Du, who taught their own 180 students separately in four classes. After the "post-evaluation", the pleasant progress of the students helped us improve the design of the "pre-evaluation" lessons. The "post-evaluation" also supplemented the composition process. In the second cycle, when Miss Wei taught her 90 students in two classes, the improved teaching method benefitted the students enormously, which presents our success in "changing" how we teach to help students develop better verbal expression abilities.

F28-PP TR508

ISHII Hiroshi (Room Chairperson), Hiroshima University, JAPAN

Keywords:

Teachers learning motivation; Continuous professional development; Lesson Study

The present status and possibility of Lesson Study in Zambia: Focusing on teachers' learning motivation

In the Republic of Zambia which is the target country of this research, there was an increase in the net enrolment rate because of the implementation of free primary education in 2001. Therefore, the next issue in this country as similar to other developing countries was to improve quality of education. Zambian Ministry of Education requested JICA's technical cooperation for the improvement of the quality of education, and Lesson Study Support Project was started in 2005 by JICA. The main purpose of this project was to promote implementation of Lesson Study through existing In-service training program. In order to consider the possibility of Lesson Study as an In-service training, this research focused on teachers learning motivation in the Lesson Study. The research was conducted at five schools with a focus on groups of Mathematics teachers. The main purpose of this research was to investigate what kind of learning motivation teachers have in the Lesson Study. The sources of data were questionnaire, interview and participation observation. The analysis of the results showed that the discussion after 1st demo lesson made an impact on improvement of 2nd demo lesson, which implies that the Lesson Study can bring about changes in their routine teaching among Zambian teachers. It was found that the teachers were able to reflect on their colleagues' criticisms, however they found it challenging to reflect on pupils learning condition. Learning from colleagues is a critical factor in the Lesson Study. Since the Lesson Study was implemented only few times in a year, it was difficult to assess teachers' change over a long-term.

F29-PP TR508 Quality professional development, motivated teachers, and improving classroom practices: Has lesson Study added value?

TAN Chew Shie,
Catholic High School,
SINGAPORE

Keywords:
teacher professional
development; teaching and
learning; classroom
experience; value-adding

Singapore's education system has been besieged with reform the last two decades, be it the policies, initiatives or curriculum. Accompanying effective changes is the need to grow, which then points to the central character in classrooms, i.e. teachers, and the importance of their professional development. Today, we have moved from a centralised mode of conducting training to decentralised school-based professional learning communities. Over the years, Lesson Study (LS) has also gained much interest and popularity after its introduction into Singapore schools in 2005. Many schools have implemented or are implementing Lesson Study adapted to their own structure, needs and culture. In light of providing a quality learning journey for teachers, equipping them with the necessary expertise, motivating them and creating meaningful classroom experiences, has Lesson Study value-added to the professional development of teachers? This paper attempts to share the findings of a survey and interviews of key drivers of LS and teachers from a local primary school, which has participated in one full cycle of LS in 2011, to find out how they perceive LS as a platform for their professional development. How has participation in LS impacted teachers in their emotional aspects? How has the involvement transformed their learning and teaching? Much of the current LS literature focuses on specific case studies of LS bringing about change in classrooms or schools. Though Lewis et al, (2006), proposed for research that could present a descriptive knowledge base to provide a more complete insight of LS, few quantitative studies have looked at trends of implementation of LS and uncover constant or varying features in different settings which LS is conducted; and even fewer have examined how LS has contributed to teacher professional development and learning. The quantitative results and qualitative data collected from this paper could help to clarify the significant influence that Lesson Study has exerted on developing a culture of shared professionalism. However, the need for more research evidence to inform policy remains.

F30-PP TR508 Junior Secondary Science teachers' self-efficiency belief in Science teaching in piloting and non-piloting Lesson Study sites

GHAFUR Abdul,
Hiroshima University,
JAPAN

Keywords:
lesson study; self-efficacy;
science teaching

This study focuses on a professional development program known as lesson study among science teachers in two designated sites: the first site involved teachers who have been implementing lesson study (piloting site) while the second site involved those who have not been implementing it (non-piloting site). This research, therefore, aims to examine the effect of lesson study on the level of self-efficacy beliefs among junior secondary science teachers. Data were obtained from 60 teachers in public schools of Sumedang Regency, West Java Province, Indonesia as a piloting site and 50 teachers of Tangerang Selatan City, Banten Province, as a non-piloting site. In the case of Sumedang Regency, the science teachers were asked to respond to questions using a Likert Scale related to their self-efficacy beliefs twice: when they have had lesson study program and when they haven't had it; while in Tangerang Selatan City, the teachers were asked to answer only once. "Science Teaching Efficacy Belief Instrument" was used in this study. The result showed that the level of science teachers' self-efficacy belief in the piloting site was higher than those in the non-piloting site at the level of confidence 0.95. In addition, it was found out that the level of science teachers' self-efficacy belief in the piloting site increased during the program of lesson study implementation. In conclusion, the teachers who were collaboratively joining the professional development program of lesson study showed high level of self-efficacy belief compared to those who did not have this kind of program. As lesson study was found to be able to increase teachers' self-efficacy belief, the professional

development program of lesson study is a recommended approach to enhance the level of self-efficacy belief among teachers as it is important for improving their teaching practice.

F31-PP TR703

*KAN Amanda (Room
Chairperson), TEO Jonah,
TOH Peggy,
Pei Tong Primary School,
SINGAPORE*

Keywords:

STAR Strategy; Problem Solving; PSS; What's Wrong; Find the Mistake

The Star Strategy in What's Wrong Approach to Problem Solving

The school had adopted the STAR Strategy (a problem solving framework, renamed from STAR Tactic (Ganon & Maccini, 2011; Maccini & Hughes, 2000) to teach problem solving since 2011. STAR is a mnemonic used to guide students' thinking process as they do problem solving. The acronym stands for See, Think, Act and Review (revised). In 2012, the team decided to embark on a lesson study using the STAR Strategy. This strategy was taught to the students explicitly in class and the team was interested to find out the effects of the use of STAR strategy on students' success in problem solving tasks. The team was also interested to use the lesson study platform to develop a pedagogical approach using the STAR Strategy to maximise learning in our pupils; assisting them to acquire the skills and dispositions as required by 21C where our pupils become lifelong learners, one who is a Confident Person; Self-Directed Learner, an Active Contributor and a Concerned Citizen. The team went through three cycles of lesson design, implementation, and refinement of lessons before formalising an approach that makes learning more engaging for the students. The pedagogical approach, What's Wrong (Kaur & Yeap, 2009), was used to kick start the lesson. Pupils also verbalised their thoughts through Thinking Aloud (Olshavsky, 1977; Wilhelm, 2001; Conner, 2004). The lessons followed a structure – Problem posing- Group work-Self-assessment-Feedback-Presentation. The STAR checklist given encouraged self-directed learning to guide pupils step-by-step. They worked in groups, collaborating to complete the tasks given. Pupils were active contributors when they were required to point out the mistakes in the group work questions given to them. This paper seeks to share the process taken and the learning acquired as the team engaged in the lesson study. It also shares how the pedagogical approach can be researched upon in future to study the effects of it on pupil's learning. An experimental study can be conducted between two groups to measure the effect of different teaching methods and the pupil outcomes.

F32-PP TR703

*RAML I Harlinah, FANG Chua,
LOH Tze Mui, FONG Yoon
Yee,
Shuqun Primary School,
SINGAPORE*

Keywords:

Circling ; Underlining ;
Bracketing ; annotation;
visualisation; popplets

Cubing your way through comprehension with annotation and visualization

The team focused on the use of learnt strategies to tackle comprehension questions. As the teachers were taught visualization, annotation and CUBing methods during training sessions, the team decided to use the methods to teach the pupils to tackle comprehension questions. For the ICT component of the lesson, popplets was selected as a tool as it was easy to use and readily available online. Popplets was also found to be user-friendly and could be shared among members and thus made it possible for pupils to work in groups to come up with their popplets. The features of adding photographs and videos made this tool more interesting for the pupils. "Annotating is a writing-to-learn strategy for use while reading or rereading. Annotating helps readers reach a deeper level of engagement and promotes active reading. It makes the reader's 'dialogue with the text' a visible record of the thoughts that emerge while making sense of the reading" (O'Donnell, 2004). The visualizing strategy refers to the act of a reader creating pictures in their mind based on information they read or hear. A reader's inability to visualize is in fact a common obstruction of comprehension (Parsons, 2006). The Professional Learning Community (PLC) team carried out 5 lessons using various comprehension texts, focusing on strategies including visualization and annotation and CUB (C-circle the question words, U-underline the tense words

and B-bracket the answers in the passage) methods. Popplets, the online software used allowed pupils to work on the mind map collaboratively both during and after the lesson. This will allow pupils to work together without having to meet during curriculum time. The original lessons created for High Ability pupils were later modified to suit the needs of Middle Ability and Low Ability pupils.

F33-PP TR703

*LING Yi Chin, LAU Kai Yen,
WONG King Sing, LU
Baozhu,
St Anthony's Primary School,
SINGAPORE*

Keywords:

integrating; conversation

Integrating conversation into P4 Compo Writing

Lesson Study is a professional development process that Japanese teachers engage in to systematically examine their practice. The goal of lesson study is to improve the effectiveness of the experiences that the teachers provide their pupils and in so doing improve pupils' learning. As most of our pupils' writing skills are not on par with the required standard as observed from the results of previous year examinations, our teachers introduced concepts to guide pupils in building their writing skills. One of the concepts integrated is to weave conversational skills into their composition. Through role play, the primary aim is to create opportunities for the pupils to have active use of Mandarin first followed by transferring what they have articulated and practiced in scenario play into writing. Pupils are required to work in groups in order to write out the conversation, and they have to role play accordingly to what they have written. Multiple rounds of conversational practice come into place before they eventually put the ideas together to complete the required composition. Composition writing comes alive in class and through it, pupils indirectly brushed up their speaking and writing skills. We hope our pupils can learn to put themselves in another person's situation and design dialogue in their composition so as to bring about an interesting flow of ideas and that with practise, they will be able to present with depth in their written expression in time to come.

F34-PP TR704

*JORDAN Gill (Room
Chairperson),
Gill Jordan Consulting Ltd,
UNITED KINGDOM*

Keywords:

improving teaching and
learning, cross-school
collaboration, leadership

Improving pupils' writing, teachers' pedagogical knowledge and leaders' knowledge of cross-school collaboration through a Lesson Study approach

A growing literature on the theory and practice of improving teaching and learning and leading teacher knowledge growth, suggests that cross-school collaboration and school to school support provide important dimensions of context. This paper explores how a group of primary schools in Suffolk, UK engaged in a development project used Lesson Study as a means of collaborating on planning, observation, teaching and reflection in order to improve the progress that their pupils were making in writing. It details approaches taken in developing both subject and pedagogical knowledge in the teaching of writing; a subject which had been identified as a priority by the network of schools involved. The paper also sets out how Lesson Study was introduced to this group of eighteen schools by the author, as well as details of the nature of the training that they received and an analysis of the initial responses of the teachers. Importantly in this project, teachers worked across schools from the outset and this paper examines the impact that these cross-school lesson studies had on the teachers and schools, together with the features of leadership which were identified as promoting or inhibiting practice transfer between schools. The outcomes of this project reveal how effective the Lesson Study approach can be in simultaneously increasing pupils' progress while enhancing teacher learning in the context of the English primary school system. The paper concludes by considering these outcomes, and proposes ways of transforming short-term teacher learning gains into long-term development for local and wider school systems.

F35-PP TR704 Lesson Study development in Indonesia from MGMP to school: Case study in Pasuruan District and East Java-Indonesia

IBROHIM Ibrohim,
State University of Malang,
INDONESIA

Keywords:
lesson study dissemination,
ESLS, MGMP

One of the efforts to enhance education in Indonesia was through collaboration between Ministry of National Education and JICA through IMSTEP Program, which started in 1988. In this collaboration, three teacher colleges (UPI, UM, UNY) were involved. IMSTEP program was developed with the aim of improving the quality of mathematics and science education through Piloting activity together with MGMP (subject teacher cluster) in three districts (Bandung, Malang, Yogyakarta) in 2001. Three steps involved in the piloting activity are conducting workshop for developing lesson plan, implementation of lesson plans, and post class discussion. Based on JICA expert recommendations, in early 2005 piloting activity was replaced by Lesson Study (LS). The three steps involved in Indonesian's LS are: Plan, Do, and See. It was the first time that LS was implemented through MGMP of math and science in these three districts of project target area. After one and half years of implementation, the results of the study show that the LS has helped to bring about change in the math and science teachers paradigms, their lesson plan preparation, and learning process. Through SISTTEMS program, LS was extended to 3 more districts, Pasuruan (East Java), Bantul (DIY), and Sumedang (West Java) since September 2006. At Pasuruan, there are 8 Mathematics MGMP and 8 science MGMPs, each of them with 10 to 20 teachers as members. So there are more than 400 teachers involved in lesson study activities which are conducted every two weeks. Every mathematics and science MGMP conducted 10 cycle of 'plan, do, see'. In the middle of 2007, LS was implemented in 2 schools as a school-wide program (entire school lesson study -ESLS) with assistance from Japanese experts. By the end of SISTTEMS program (October, 2008), more than 10 Junior High Schools with 450 teachers at Pasuruan had implemented ESLS. SISTTEMS activities were continued by PELITA Program. In PELITA program (2009 until now) LS activity in MGMP decreased (based on number of MGMP, member, and cycle), while the number of the schools that implemented ESLS increased with more than 32 Junior High Schools (SMP/MTs) in 2011. LS dissemination (ESLS) was also conducted by Educational Office of East Java Province in each district in phases. Since 2010, it has been successful in reaching up to 21 districts. The results are: improvement in the quality of lesson plan; increasing the teacher confidence to conduct open class; teachers' increased the use of media; increasing the collegiality among teachers. The key factor in developing lesson study in Pasuruan and East Java are: 1) Educational office leader, 2) Principals, 3) MGMP Facilitators, and 4) lecturers from the university.

F36-PP TR704 A study on Project Management Theory in integrated curriculum development from a case study of schools integration in Tosu City

NGUYEN Huyen Trang,
Saga University,
VIETNAM

Keywords:
project " curriculum"
management, lesson study,
school integration, curriculum
development

Curriculum development has been considered as one of the most important purposes of lesson study and is being studied by many educators and researchers worldwide. Considering curriculum as an object to manage, this study aims to describe Project management theory in educational field, particularly in developing curriculum, through investigating the case study of Tosu city's schools integration. Developing curriculum is always said to illustrate how individual schools are managing aspects of the curriculum, but in the trend of no border among family-school- community, developing integrated curriculum between schools is needed to be researched on. The case study in this research is the project of schools integration in T city, Saga Prefecture, Japan. A survey was done with nearly 300 teachers, 3000 parents and 6000 students in order to investigate the effectiveness of school integration. A special method of "Inter-Subjective Cognition" lesson study was used by T city Board of education. Using qualitative research method

(interview and discourse analysis) and quantitative research method (factors analysis, AMOS), we hope the analyzed results can indicate how educational administrators can operate curriculum development between schools from the point of view of Project management theory. The significance of this study is to look at how curriculum management can be studied as a project and also to give suggestion on how it can be done through case studies on schools integration.

F37-PP TR705 Transforming traditional schools in The Netherlands into learning communities: Connecting information from videos and theory

BULTERMAN Jacquelin
(Room Chairperson).
 Ede University Of Applied
 Sciences,
 THE NETHERLANDS

Keywords:
 dealing with differences,
 diversity, learning
 communities, tacit
 knowledge, communities of
 practice

An important part of a teacher's knowledge is personal and tacit. Tacit knowledge, however, cannot easily be articulated or transferred. Is it nevertheless possible for teachers to share knowledge across different context and learn from each other in after school settings? In a consortium of six traditional elementary schools in The Netherlands, a learning community was formed in order to improve teacher's skills in dealing with different students' mathematical needs. To make sure that participating teachers shared a similar practice (Wenger, 2000) they were grouped in homogeneous subgroups of the same or adjacent grades. The four quadrants of Nonaka & Takeuchi's (1995) knowledge spiral were followed. Teachers read theory about identifying different needs in mathematics and a teacher educator gave examples. In this way, teachers' existing knowledge was combined with explicit knowledge from outside their setting (combination). Next, teachers got assignments to try out aspects of the new approach in their own class (internalization) and shared their experience in the subgroups (externalization). The schools issued a video-policy to help teachers share their practice (socialization). Gradually, teachers became used to making short videos of interactions with students during which they tried to discover mathematical needs. These videos were discussed in the subgroups in the light of the theory. After one and a half years, each teacher (N=41) filled in a survey asking which aspects of this learning community they found useful. The videos as well as the reading of the theory scored high, while the presentations of teacher educators, the assignments, and telling about experiences scored less high. The reports of the mediators of the subgroups confirmed that the use of video, combined with theory, had been particularly inspiring. What can we learn from this? Although it can be useful for teachers to tell about their experiences, words do not capture enough. Videos show "more than one can tell." The connection between information from videos and using a theoretical framework to discuss the videos with fellows seems to be an important aspect of a learning community that is helpful for teachers.

F38-PP TR705 Open classroom: An inter-disciplinary approach

NOORDIN Salama, WONG
Shumin Aileen, NG Wei Ling,
LIM Wen Chiang Ivan, GOH
Wee Suan,
 Temasek Junior College,
 SINGAPORE

Keywords:
 open classroom, lesson
 study, student learning,
 learning needs, learning
 community

Temasek Junior College (TJC) has embarked on using Lesson Study as a way to improve pedagogy for several years. However, this is the first time that the concept of 'Open Classroom' is tested out in TJC. The teachers of the class 09/12 took turns to observe the students during their 50-minute General Paper, Economics, Mathematics and Chemistry lessons so that they can better understand the learning needs of individual students which differ according to their particular learning style, attitudes and aptitudes. This presented an opportunity for teachers to build better relationships with students by developing a holistic understanding of students as individuals. Our study focuses on how to build a learning community in a Singapore public school which involves teachers from various disciplines with a group of students at the centre of the learning community. These features are atypical of the usual research carried out in Singapore schools and we look at the benefits and challenges that come with conducting 'Open Classroom' lessons in the local

context. We propose that the 'Open Classroom' approach is a good way to build a true learning and collaborative culture among teachers and their students, which is well-suited to contemporary society where changes in culture, attitudes and roles requires us to re-imagine our school and classrooms of the future.

F39-PP TR705 Report 2: Using Lesson Study as a unifying platform for building school culture

*K S MOORTHY Md Shahrin,
SAYED MOBARAK Salahu
Deen,
Broadrick Secondary School,
SINGAPORE*

Keywords:
School Culture, Whole school
approach, Professional
Learning Teams

In WALs 2011, Broadrick Secondary School reported how Lesson Study was tapped for building a unifying school culture. A key finding suggests that teachers who came from two schools may be adopting different practices or do not share similar understandings on matters pertaining to school-wide practices. This notion stems from the understanding that the way teachers think, feel and act is influenced by the school culture, which is defined by the norms of the organisation (Paterson, 2002) and in turn shaped by its people, history and unique context (Stoll, 1998). Broadrick has embarked on the Lesson Study approach to teachers' professional development in order to help teachers in the "re-culturing" process (Fullan, 1998) and this follows from providing a framework for cultural changes to take place (Rutledge and Benedicto, 2007). This evaluative research measures the progress of modifying cultural norms suggested by Saphier and King (1985). In WALs 2011, the research team reported developments in the first six cultural norms modification, in the way Lesson Study teams were created and empowered. This presentation will revisit this aspect, however, the main thrust of our observations and analysis are focused on the remaining six cultural norms namely. The main research data was collected from questionnaires. Findings from questionnaires were supported qualitatively by semi-structured interviews with randomly-selected individuals. As previously reported in the earlier phase of our research, Lesson Study has positive influence in all six of the twelve cultural norms being investigated but more for some than others. This presentation will also discuss challenges and future directions for sustained professional development through Lesson Study.

F40-PP TR706 Teaching of distance and speed time graphs through authentic experiential learning

*ONG Jack (Room
Chairperson), NG-GOH Shwu
Jun,
Chong Boon Secondary
School,
SINGAPORE*

Keywords:
Self-discovery; Authentic;
experiential-learning

This paper presents a lesson study carried out by the Mathematics Department in collaboration with the Physical Education (PE) Department in a Singapore Secondary School. The study aims to help students: (i) develop their understanding of mathematical concepts through experiential learning and self-discovery, in alignment with the Ministry of Education's Curriculum 2015 outcomes; and (ii) appreciate the relevance of Mathematics in different real-life contexts and subject areas. The teachers in the school believe that every child can learn. Learning happens when students make meaning of their new experiences and build on their prior knowledge. The study, therefore, aimed to help teachers gain deeper understanding and insight into students' thinking and learning to enhance their professional development. The lesson study was conducted in 4 stages. First, a pre-test was administered on the topics 'Distance, Speed and Time' to assess students' prior knowledge on the critical concepts and skills in these topics. The misconceptions were surfaced and addressed during the actual research lesson. Second, the students did a 600-metres run in the PE lesson. Their timings were recorded at 100-metre intervals. The key takeaway is to understand and plot the distance-and speed-time graphs using authentic timings. They also experienced, during this lesson, the concept of speed endurance, i.e. maintenance of speed during a run. Third, in their Mathematics lessons, they analyzed a set of data of a selected group of students and plotted the distance-and speed-time graphs.

Thereafter, the students discussed and answered higher-order thinking questions related to the set of data. Lastly, a post-test was administered and the results were analyzed. Qualitative feedback from both teachers and students were gathered. At the same time, a control group from another class of students with the same abilities were taught the same topic on distance and speed time graphs and they took the same pre-test and post-test. The results from the 2 groups of students are compared and analyzed in this study.

F41-PP

TR706

Oops, are children learning what was intended by the teacher? Understanding students' responses to tasks in Physical Education using the Lesson Study 'model' of classroom inquiry

*YEO Connie, TAN Kwang
San Steven,
National Institute of
Education,
SINGAPORE*

Keywords:
physical education; learning
tasks; observation

Physical Education (PE) is education about movement, through movement and in movement (Arnold, 1979). When children develop the skills, knowledge and attitudes that help them to participate confidently in different physical activities, we as educators are working towards the goals of PE. Since learning in PE can be inferred primarily from observing appropriate behaviours during lessons, children's performances and responses to practice tasks can help teachers better understand the extent and nature of their learning. As such, the Lesson Study protocol (i.e. select and design, practice and teach, observe and discuss, improve and teach and reflect and retain) is most appropriate for facilitating keen observation of children's learning. This study aimed to understand how children interpret and make sense of the learning tasks presented by the teacher and what affects their performance outcomes. Four different fundamental movement skills lessons were selected by 4 primary schools, and were taught by specialist PE teachers to primary one children. Each lesson was presented on 3 occasions by different teachers to different primary one cohorts. A total of 12 lessons were observed and video recorded. The two authors were on-site for all lessons, together with other PE teachers who helped to observe pre-assigned student groups and document field notes. Data analysis included open-coding of children's responses to the tasks into descriptors (Glaser and Strauss, 1967), with all responses revisited for similar and discrepant ideas and patterns, and eventual classifying of descriptors into coherent themes (Goetz and LeCompte, 1994). Four themes describing children's unintended responses to ensure task completion were identified in this study. The first theme, 'presupposing task specificity and explicitness', was built from indicators that inferred that some children generally might not see or comprehend the movement content-specific purpose of the tasks, and therefore may be unable to question its appropriateness or correctness in order to seek further clarity of the task, if one is in doubt. The second theme of analysis, 'adapting task constraints and standards to meet expectations', was based on children's responses regarding their misunderstanding of the intended learning as defined by the task, and therefore structured their success based on the performance outcome, or what was accomplished, rather than the stipulated performance standards and movement process, or how they should accomplish the task. The third theme, 'adapting task congruence to meet expectations', was constructed from children's responses that they generally knew the limits of their abilities and the impact of increasing task conditions that influence ultimate success, and therefore these children would seek to modify their precise movement answer and reduce task demands, but still within the task boundaries, in order to achieve the necessary performance outcome. Finally, observations that inferred 'translating of expected performance from teaching cues', helped build a notion that children would generally attempt anticipated actions based on their personal translation and understanding of the cue meaning, rather than performing the movement pattern related to the cues as demonstrated by the teacher.

F42-PP TR706 Game Concept Approach (GCA) in the teaching of Physical Education
 VAITHILINGAM David,
 LEONG Jason, QUEK Benjamin, TAN Eddie,
 Coral Secondary School,
 SINGAPORE

Keywords:
 Game Concept Approach;
 Physical Education

It has been four years since our department embarked on the journey of sharpening teaching and learning practices in Physical Education (PE) lessons using lesson study. Lesson study (LS) had provided a valuable platform for us as practitioners to jointly plan, observe, analyze, and refine actual classroom lessons. In a traditional teaching approach, much emphasis would have been placed on learning skills and not learning how to use those skills in game situations. The Game Concept Approach (GCA) emphasizes first learning what to do and then how to do it. GCA helps create the specific game situations and empower students to self-discover and experience the importance of learning a skill in a game context and being able to apply it to play the sport well vis-à-vis learning a skill in isolation. Our research lesson leverages on GCA to help students learn a sport (badminton) specific fundamental skill such as the overhead forehand clear and to apply the skill in a game situation to play the sport successfully. Our team has decided to adopt the GCA as the key pedagogical approach as we want to increase the intrinsic motivation of the students while helping them to make sense of the skills they are learning in the game of badminton. Using GCA in PE lessons had led to better student engagement, greater intrinsic motivation and deeper learning as students were able to make meaning of their learning and were able to apply the skills to play the sport more successfully. The LS process has also given us the opportunity to learn in a collaborative environment and sharpen our teaching pedagogies whilst examining learning from our students' perspective. It is only by understanding how the students learn and what will help them learn better can teachers teach less and for the students to learn more.

F43-PP TR708 Explicit teaching of inferential questions
 YAAKOP Fazilah (Room
 Chairperson),
 Ang Mo Kio Primary,
 SINGAPORE

Keywords:
 Comprehension; Inferential
 Questions

At the end of each Semestral Examination, our school conducts a detailed error analysis. Based on the data collected, we could see that the pupils were very weak in Comprehension, specifically in answering inferential questions. According to Nell K Duke's research paper "Building Comprehension through Explicit Teaching of Comprehension Strategies", the teaching of Comprehension should be made explicit. To address the concern, the Malay teachers came together to try out three approaches; Think Aloud, Summarizing and Drawing Inferences, based on Nell's research. A lesson was specially tailored by a team of teachers to guide pupils in answering inferential questions. The pupils went through the stages of thinking aloud, summarizing and answering the inferential questions with the guidance from the teacher. Observations by the teachers showed that the pupils were more confident and aware of the steps in answering the inferential questions.

F44-PP TR708 Teaching points of view using Making Thinking Visible (Mtv)
 TEO Weilun,
 St. Andrew's Junior School,
 SINGAPORE

Keywords:
 Comprehension, Making
 thinking Visible

As one reads, deeper understanding is developed by reading "between the lines" and the evaluation of ideas and information presented in the text (Korabiak, Mete, Moursund, 2004). Our belief is that understanding the author's point of view allows readers to understand the author's purpose, the choice of words used, multiple perspectives, and develop readers to be active users of information obtained (Molden, 2007). In order to teach point of view, the thinking routine "Step Inside: Perceive, Know About or Believe, Care About" was used as a comprehension strategy to help pupils better understand what they read. Comprehension has always been an area of concern of our pupils. Our motivation for this study stems from the reason that most of the pupils are not able to comprehend the text, leading to inability to answer the questions. We started with the research question: how can the use of thinking routines enhance the learning of Comprehension? Our target group is forty High Ability Primary 3 students who are independent readers, approximately

17% of the cohort, but have not been exposed to any effective strategies in identifying the points of view in a Comprehension text. Lesson study (LS) 1 was carried out in a more teacher-centred manner with the teacher teaching the approach. After reflecting on the first LS, LS 2 focused more on students' participation in their learning through more collaboration using an online platform. Our team conducted a total of 3 tests (Pre-test, LS 1, LS 2). Students fared worse for LS 1 as compared to pre-test. The second lesson study showed an improvement. Our team has found that the use of the MTV (Making Thinking Visible) strategy has helped the students' grades to improve even with the use of more open ended questions. However, it is too soon to conclude any success. More time and practice is needed to see the real success in answering point of view questions. There is also a need to test and use the same strategy for other types of genres to extend its usage.

F45-PP TR708 Increasing pupils' confidence and improving pupils' performance in open-ended comprehension questions

PRAKASH Shanti, ALJARU Afifah, MOKHTAR Suhaidah, MUSTAFFA Azlin, SUNG Kelvin,
Tao Nan School,
SINGAPORE

Keywords:
Confidence
comprehension

This lesson study explores English Comprehension teaching strategies used to help Primary Four pupils overcome their current reluctance towards, and lack of confidence in, dealing with open-ended comprehension questions. The quantitative data for this lesson study consists of a comparison of the quality of answers given by three classes of Primary Four pupils to open-ended comprehension questions before and after these teaching strategies were employed. The qualitative data comprises observations of pupil behaviour made by the teachers in this lesson study team during the comprehension lessons carried out using the above-mentioned teaching strategies. An analysis of the data collected revealed an improvement in both the attitudes as well as comprehension scores of the pupils who were exposed to these comprehension teaching strategies. This lesson study demonstrates the underpinnings of a model approach for teaching comprehension. The improved scores in the classroom-based comprehension exercises, as well as the increased positive attitude towards approaching open-ended comprehension questions, could translate into higher formal examination scores in the open-ended comprehension segment of the examination paper.

F46-PP TR709 Using rubrics to evaluate ideas and voice in students' compositions

TAN Boon Seng Steven, SNG Yee Yee Josephine, PHUA Victoria, KOAY Say Shin Victoria, WONG Lynette (Room Chairperson),
St Andrew's Junior School,
SINGAPORE

Keywords:
writing; composition; rubric;
thinking routines; visible
thinking

Writing is both a science and an art. As such, in designing a writing curriculum, one should consider what writing research has shown us to be effective. Towards this end, our PLC Team embarked on our journey to experiment with how the use of rubric, Making Thinking Visible tools and the 6+1 Traits of Writing could influence the way teachers teach and students learn writing. Through a thorough search for writing models, the team has found The 6+1 Traits of Writing Model (Culham, 2003) to be an effective framework on which the writing curriculum could be based. Furthermore, it provided a tool to provide students with a deeper understanding of features of good writing. The emphasis on the use of exact language throughout the various stages in the writing process such as revision and editing requires that teachers align assessment with instruction in order to provide meaningful feedback to students and to enhance their teaching of writing – made possible with the use of a clear criterion that defines quality performance. The lesson study aimed to achieve the following: 1) Students to understand and review the 6 +1 traits of writing comprising ideas, organization, sentence fluency, word choice, voice, conventions, and presentation. 2) Students to understand the writing rubric pertaining to “Content” (comprising “ideas” and “voice”) of a composition. 3) Students to use MTV tool “Claim-Support-Challenge” in conjunction with the writing rubric to evaluate the “ideas” and “voice” in a composition.

F47-PP

TR709 Effects of 5W1H writing strategy on narrative writing

*LEONG Cheng Im,
Open University
MALAYSIA*

Keywords:
Heuristic, collaboration

An experiment into the effects of the 5W1H writing strategy on student performance in narrative writing was conducted to test if any difference to writing outcome would prove significantly positive with a class of Primary 5s (36 students), of average to low writing ability. A treatment of 16 sessions consisted of a pretest (50 minutes), post test (40 minutes), two sessions of pilot study and 12 teaching & writing classes (each completed within 1 hour 30 minutes, including data collection of observation, narrative inquiry, reflection journal and interview). The study focused on the development of narratives with the processes of 5W1H writing strategy in 4 main writing criteria: content, creativity, coherence & elaboration. By using a simple frame or word-window in the initial group collaboration for generating multiple ideas, the 5W1H guided participants in writing through a topic by expanding heuristic (normative solutions to quality argument in narrating) ideas in the verticalness (lucid and descriptive detailing) and horizontalness (sequential actions and events) of storying, for them to emerge as independent writers eventually. In keeping with the validity and reliability of data, besides control measures like selection bias, maturation, instrumentation and testing period, the following were implemented to ensure that results obtained were due to the treatment of the 5W1H writing strategy: 1) pilot study: to adapt 5W1H instruction for participants; 2) self checklist: to guide along the pathways of the processes & strategies of 5W1H; 3) assessment rubric: to assess effects of 5W1H (content, creativity, coherence & elaboration); 4) focus group meetings: feedback on participants' development with 5W1H for better instruction & data collection. Positive feedback from teachers showed that 5W1H writing strategy had enabled students to write better stories, with students writing to greater lengths and putting conscious effort in the use of dialogue, simile and sense of sound, while linking up to 6 paragraphs. The 5W1H writing strategy is also to be qualitatively analysed before recommendation as the new approach for students to gain confidence in developing narratives and teachers to increase their effectiveness in guiding students with more creative, coherent and elaborate narrative content.

F48-PP

TR709 Generating ideas through the use of ICT tools

*LEE Chin Han, PALANIANDY
Mallika, MOHAMAD TAHAR
Juliana, LIM Jing Han,
Woodlands Ring Primary
School,
SINGAPORE*

Keywords:
ICT tools; writing; cooperative
learning strategies;
generating ideas

Riding on the skills learnt in the Information and Communication Technology (ICT) Enrichment programme in the school, a team of English Language teachers embarked on the teaching of composition using ICT tools. Past research has indicated that there is greater student engagement when ICT tools are used in lessons (Coll, Rochera & Colomina, 2010). With this belief in mind, a lesson study was carried out with a group of Primary 4 students by the team. The objective of the research lesson was to use ICT tools to help students generate ideas to complete a story. The ICT tools used were Microsoft PowerPoint, video clips from YouTube and interactive platforms from the world-wide web such as Kidblog and Wall Wisher. The Cooperative Learning Strategy of Think-Pair-Share was incorporated into the lesson to encourage collaboration and the production of ideas. In the lesson, students viewed four animations and video clips from YouTube on the topic of accidents involving pedestrians and motorists. The students then worked in pairs to discuss what they had viewed and recorded their responses in a PowerPoint presentation where guiding questions were provided. After introducing a situation, the teacher guided students with questions to elicit phrases that could be used in their writing. The students then recorded three words, phrases and sentences they would use in their writing using the Wall Wisher. There was a significant difference in students' level of engagement. Students were highly engaged and eager to demonstrate the knowledge acquired during the research lesson. Students were able to visualize the sequence of events to

complete a story. During the post-lesson discussion, the team felt that the use of the ICT tools definitely enabled the smooth transition of generating ideas from pictures to continuous writing. Learning was greatly enhanced as students had the opportunity to view and make use of the responses posted and generated by their peers. The lesson study has also increased the competency of teachers in their use of technology.

F49-PP TR710 Teaching problem solving in Primary School Mathematics: From a teacher's lens

WEE Jee Chen Charlotte
(Room Chairperson), *WANG*
Jinyan,
Haig Girls' School,
SINGAPORE

Keywords:

problem solving; Polya's model; heuristics; problem solving instruction; metacognitive skill

Problem solving and pupil-centred learning have received a great deal of attention in mathematics curricula for schools. Most problem solving sequences employ Polya's four stages of problem solving (1957) which are characterized by having clearly defined steps to approach a problem. However, despite the attention it has received, problem solving remains a difficult skill, both to teach and to learn. It is widely acknowledged that the processes of solving mathematical word problems proceed through complex phases of translation and interpretation of problem, generation, implementation and evaluation of a solution strategy. Hence one may argue that successful problem solving requires more than just the application of Polya's model but other factors to consider as well. This lesson study sets out to examine closely the problem solving process and the obstacles faced by two classes of Primary 5 students during the process. Findings from the study suggest that besides the use of Polya's model and the range of heuristics, we need to guide pupils to manage their own cognitive resources (facts, procedures), select potential heuristics to try, evaluate and monitor the efficiency of their problem solving process and progress. In addition, lessons learned from the study are discussed in regard to the importance of problem solving instruction, teaching of metacognitive skills and the role of teachers in the light of current research findings. Directions for further work and ways to enhance the problem solving process are also suggested to help students develop their ability to solve mathematics problems.

F50-PP TR710 Identifying 1 Step/2 Steps Mathematics word problems

MOHAMED AM Nurul Asyikin,
Tampines Primary School,
SINGAPORE

Keywords:

Mathematics, Word Problems, Lesson Study, Teaching Strategies

This lesson study looks into how Primary Two Mathematics teachers helped mixed ability pupils make the transition from solving 1 step problems to solving 2 step problems. With the transition from solving 1-step word problems in Primary 1 to 2-steps word problems in Primary 2, teachers found that pupils faced difficulty in identifying whether a word problem involves one or two steps. The P2 level teachers believe that it is important to address this area of concern because it is the first step in the school's '4 Steps of Problem-Solving' process. In addition to that, with the high weightage of problem sums in the 2nd Semestral Examination (SA2), the teachers found it crucial that pupils be equipped with a skill or strategy to help them in identifying 1-step or 2-steps word problems. A pre-test was conducted throughout the seven Primary 2 classes. Through the pre-test, it was concluded that a substantial percentage of the pupils were only able to produce the first step when it came to 2-steps word problems. With this result in hand, a lesson was designed with the use of a 'race track chart' with guiding questions to aid pupils' thinking process as they solve the word problems. The lesson was then piloted in two classes before the final modified lesson was eventually conducted for the rest of the Primary 2 classes. Finally, a post-test was conducted. The outcome of the lesson study showed a significant increase in the percentage of pupils being able to identify and produce two steps when it came to solving 2-steps word problems. The use of the 'race track chart' supplemented by the guiding questions offered pupils the scaffolding and transition from concrete to abstract that they needed. These enabled the pupils to be more aware and conscious

of their thinking process.

F51-PP TR710 Using Concrete-Pictorial-Abstract approach to teach one-step multiplication word problems

*ABDULLAH Siti Noorbiyah,
TAN Amy, MURALI Krishnan,
LEE Rena, SHANMUGAM
Vincent, SOH Eric,
Ang Mo Kio Primary School,
SINGAPORE*

Keywords:
Using Concrete-Pictorial-
Abstract Approach to Teach
One-Step Multiplication Word
Problems

One of the main challenges that a primary school teacher faces when teaching Mathematics is getting pupils to understand abstract mathematical concepts and internalize them. Moreover, as reflected in Singapore's Ministry of Education syllabus for Primary Mathematics, a teacher must also cultivate in pupils a positive attitude towards the learning of Mathematics, and develop their ability to apply Mathematical knowledge in their daily lives and other subject areas of their undertaking. After much deliberation, a team of Primary Three teachers concluded that solving word problems is one of the topics pupils traditionally struggle with, and hence requires special attention. The team collaboratively planned a lesson using the Concrete-Pictorial-Abstract (CPA) approach to introduce the mathematical concept of solving word problems. Twenty low-ability pupils were given a scenario and some pre-prepared manipulative to solve a problem. The pupils, drawing on their knowledge of the concept of multiplication, were able to solve the given problem under the guidance of the teacher. Observations were recorded and shared during the post-observation discussion. Overall, the pupils were thoroughly engaged in the experiential nature of the activity. Changes were made to the lesson plan for the second cycle of the lesson study. On the whole, it was an enriching process which benefited all our teachers.

F52-PP TR711 Effective teaching of Chinese through 10C!

*TAN Toon Lim (Room
Chairperson), CHENG Siew
Kim, HONG Yuning, LEW Yee
Loo Michelle,
West View Primary School,
SINGAPORE*

Keywords:
10C!

Since 2010, West View Primary school has been collaborating with the Educational Technology Division (ETD) to pilot the 10C' ICT-based Teaching and Learning of Chinese Language project. The integration of technology into the learning of Chinese Language is pertinent in helping pupils acquire proficiency in the language. The interactive environment strengthens pupils' interest to learn the language and helps them to improve their reading and writing skills. Through the use of 10C portal, students actively contribute to their learning process by collaborating and building upon each other's knowledge, thus taking ownership of their own learning. Using of the online extended reading materials has enabled the higher-ability students to affirm their understanding, learn more content knowledge and create new understanding on the subject topic. Lower-ability students are exposed to learning beyond the textbooks. The purpose of the lesson study is to develop lessons that engage our 21st century learners in the learning of Chinese through the use of 10C online portal. We also want to raise our teachers' competencies as using 10C to teach is new to the teachers. Teachers involved in the lesson study come together to discuss, share lesson ideas and come up with a lesson plan that is targeted at a specific ability of the pupils. After the initial lesson planning, teachers make refinement and reflect on the lessons conducted. Invaluable lessons were learnt during the course of the lesson study in terms of how one can best deliver for understanding and cater to the different abilities and learning needs of the students. At the same time, we want to build teachers' confidence level when using the model. Pupils find the learning of Chinese Language more engaging with the use of technology. In this paper, we hope to share valuable insights about the teaching of Chinese Language and the implementation of LS. Most importantly, it looks at how teachers have grown in their own pedagogical knowledge and understanding of their students' learning, to become effective classroom teachers.

F53-PP

TR711

Enhanced writing using 'Personification'

SOH Hoon Suu, CHIN Yoke Lan, CAO Liu, LEE Ai Lian, WONG Hui Lynn, HUANG Wanqi, LEE Ai Lian, REN Si Xuan,
Woodlands Ring Primary School,
SINGAPORE

Keywords:

Enhanced Writing;
Personification; Photostory3;
Cooperative Learning strategies; Collaboration

As we move towards the 21st century, students should grasp basic ICT skills as one of the communication tools. Collaborative group work can also foster better social integration among students and enhance retention of knowledge (Summers et al, 2005). Brain researchers say human beings are hardwired to tell stories; to organize experience into a meaningful whole that can be shared with others. Giving students opportunities to use and direct this natural drive gives them a sense of confidence while it develops fundamental intellectual skills. Encouraging students to create digital stories has proven educational benefits that help prepare students for success in the 21st century. Telling digital stories nurtures deep and lifelong learning, connects students with the real world, builds their critical-thinking and communication skills, and empowers them to find a voice. Holding to the above belief, a lesson study was carried out with a group of Primary 4 students by a team of Chinese Language teachers. The objective of the research lesson was for students to use 'personification' in their writing. This was facilitated through the use of Cooperative Learning strategies and digital storytelling. The digital storytelling was done through Microsoft Photostory 3. In the lesson, students worked in pairs, looked for pictures, music and did a voice recording to complete their digistory. Students had to contribute their ideas on personification and collaborated with their partner to work on a worksheet designed by the teacher. There was a noticeable difference in the level of engagement in the students. The students were eager to learn new skills during the research lesson. The lesson gave them the opportunity to create their stories and also practise speaking the language with confidence. After the post-lesson discussion, the team felt that digital storytelling is a powerful learning tool which captures the hearts and imagination of students as it combines traditional storytelling with modern-day pop culture and technology. Students' interests increased and performance improved. This study can be replicated for other levels and modified to get students to deliver other interesting end-products like e-diaries and e-journals.

F54-PP

TR711

Using bilingual approach to learn Chinese sentence structure

LENG Kok Keong, HAN Ying, CHIEN Chia Yuh, TAN Yi Ru, YANG Yiqun, CHEW Si Min,
St Stephen's School,
SINGAPORE

Keywords:

Bilingual Approach; Chinese Sentence Structure

About 90% of students learning Chinese Language in St. Stephen's school speak English at home, as such their writing and speaking of Chinese is influenced by English grammatical structures. Over the years, our school has adopted a bilingual approach to conduct Chinese lessons i.e. we use English to explain Chinese vocabulary and to explain instructions. Recently, a team of Chinese Language teachers in our school analysed and compared Chinese and English grammatical structures. Understanding similarities and differences in grammatical structures will help our students to speak and write in Chinese more independently. For example, in English, the destination for an activity is usually mentioned at the end of a sentence while in Chinese, the destination is usually mentioned before an action or activity, recognising such patterns and principles through comparing the differences between the grammatical structures of English and Chinese can help students to make sense of common mistakes. Such comparison taps on students' prior knowledge and strengths in speaking and writing in English. Helping students to develop a more systematic understanding of the differences between Chinese and English grammatical structures enables students to independently identify, pre-empt and correct common mistakes made when thinking in English while speaking and writing in Chinese.

- F55-PP TR712 Lesson Study: Two case studies**
GAN Pearlyn (Room Chairperson),
 National Institute of Education,
 SINGAPORE
- Keywords:**
 Case Studies; Constraints
- To improve its teaching and learning practices, a local primary school carried out a number of lesson studies in 2011. Lesson study has been known to be time-consuming albeit its benefits. Some teachers also feared having their lessons observed by their peers. As such, the teachers involved in the lesson studies were given autonomy on when and how they would conduct the studies, while maintaining the essence of lesson study. This paper will focus on two Mathematics lesson studies that were carried out. The two teams took into consideration the constraints and worked around them in creative ways.
- F56-PP TR712 Making thinking visible through Journal Writing**
YONG Wei Min Stephanie, NG Xin Yi,
 East View Primary School,
 SINGAPORE
- Keywords:**
 Problem Solving, Journal writing, Visible thinking
- Primary Four pupils doing Mathematics are introduced to an increased number of complex word problems involving heuristics and connections between concepts. Can doing Math journaling help them to better solve word problems? The difficulty faced is mainly due to a lack of processes such as reasoning, communication and thinking skills. Guided by George Polya's 4 steps of Problem Solving, and using Math journaling, the lesson study team sought to find out if pupils' thought processes would be more systematic and guided when solving word problems. Journal writing is a technique used to develop and enhance pupils' mathematical thinking and communication skills in mathematics. Journal entries can provide opportunities for individuals to self-assess. Integrating writing helps pupils to communicate their mathematical thinking which also helps to strengthen their learning and build deep understanding. By making the thinking process concrete vis-à-vis having the pupils articulate their thinking in journals, writing gives teachers valuable information about how their pupils are learning math, hence it not only allows the teacher to reflect on their teaching practices, it also makes thinking visible which allows them to more accurately assess pupils' understanding (Ritchhart & Perkins, 2008). Borasi and Rose (1989) highlighted that writing helps pupils by consciously getting them to think about what they are doing. It forces them to articulate the connections that they may not realize they are making and it helps them reflect on what they are learning. The team used a Lesson Study approach in the design of tasks for journaling as well as setting the criteria for evaluation. Rubrics were crafted and used in the assessment of pupils' communication and reasoning processes. This approach allowed teachers to focus and pool their resources to develop pupils' understanding of solving problems in a systematic way.
- F57-PP TR712 Performance and motivation in Mathematics learning**
AKBAR Zuraida, HELMI Eymani, BASHIR MAMMADKUNH Mohamed,
 Yu Neng Primary School,
 SINGAPORE
- Keywords:**
 Lower Primary Mathematics; Performance Task, Holistic Assessment
- Under the PERI recommendations, all primary schools in Singapore have embarked on Holistic Assessment. A key recommendation for Holistic Assessment is to shift the focus of assessment towards building pupils' confidence and desire to learn in both the academic and non-academic areas. The schools have also gone beyond pen-and paper testing and have adopted multiple assessment modes. One of the alternative assessment modes adopted is the use of performance tasks in the teaching and learning of Mathematics. Performance tasks are used in performance assessment and performance assessment is useful in gathering data on the pupils' learning. This study aimed to examine how performance tasks accompanied with structured questioning affect pupils' motivation in the learning of Mathematics. Through qualitative research methodology, the Primary 1 Mathematics teachers sought to understand their pupils' thinking processes, interests and appreciation of Mathematics. From the study, the teachers learnt how to harness the potential of performance tasks to improve pupils' motivation in the learning of Mathematics and how they can be effectively used in the Mathematics classrooms.

F58-PP

TR713

A case study of Proportional Reasoning

OLTEANU Lucian (Room

Chairperson),

Linnaeus University,

SWEDEN

Keywords:

proportional reasoning; the golden rule; learning study; variation theory; teaching; learning

This study tries to explore the question: do teachers who develop theoretical knowledge of the object of learning change the way(s) they offer this object to their students. The aim of the study is to find if and how teachers developed theoretical knowledge when planning instruction to develop students' problem solving ability in mathematics using "the golden rule". This rule is strongly connected to proportional reasoning. Problem solving is a recent term, as discussed extensively in Sweden and internationally. It is an area with more space and added weight. Good knowledge and systematic understanding of mathematical tools facilitate thinking and create opportunities to solve problems. Problem solving is one of the main goals of mathematics teaching. Many times, students learn to solve partial problems in school, but that knowledge is short-term as they seem to be forget after the next test or the national test or by the time they graduate. So the biggest question is how teachers can help students learn to solve problems and retain this knowledge for a longer period of time. The teachers (38) have planned lessons with the aim of solving two problems in which proportional reasoning should be used. The result showed how the teachers gradually used the golden rule when planning instruction and solving several problems. The developed knowledge of the object of learning seems to affect the teachers' ways of planning the lessons, such as subtle changes of how to identify the critical features of the learning object.

F59-PP

TR713

Problem solving or solving problems?

VAN BOMMEL Jorryt,

Karlstad University,

SWEDEN

Keywords:

Problem Solving, Learning Study, teaching method

Problem solving, which is the focus of the learning study reported here, plays an important role in mathematics. The learning study was conducted in a Swedish grade 5 (Age 11) during spring 2012. The teachers' definition on problem solving came from both Polya's (1957) four principles (understand the problem, devise a plan, carry out the plan, looking back) and Mason's (1984) three phases (entry, attack, review). From these, critical features were defined related to the object of learning. A learning study often develops teachers' knowledge regarding the object of learning, and this learning study challenged the teachers to a great extent on their view on the focus of the teaching of the object of learning. The focus changed from training problem solving via solving problems into a focus on the process of problem solving, preparing pupils to solve problems. In the first developed pre-test the teachers tested the pupils on solving problems and the only insight they gained was whether or not the pupils' mathematical skills were sufficient to solve the problems. In what way the problems were solved, what strategies the pupils choose from, if the pupils understood the problem and reflected on the answer afterwards, was not possible to depict in that test. The pre-test was revised where the focus was on the problem solving process rather than on solving the problems. For instance; the pupils were asked to choose between given strategies and to distinguish between important and unimportant information within the problem. The phases described through the critical features were possible to discern by keeping the context of the problem invariant and by varying the question to the problem. Issues regarding the phases were discussed and asked for, and as the focus was on the process of problem solving, the problems did not necessarily need to be solved. For teachers and teacher educators this study illustrates a way of teaching problem solving, where the focus is on the process of problem solving. In the presentation the insights the teachers gained regarding the focus in lessons on problem solving will be illustrated through the two pre-tests developed and through the changes made in the lesson plan. Clear examples of the use of patterns of variation will be given and related to the discernment of the object of learning.

- F60-PP TR713 The impact of Lesson Study approach on improving teaching competency**
- TAN Bee Bee, MAK Amanda, NG Brandon,*
Nanyang Primary School,
SINGAPORE
- Keywords:**
mathematical reasoning;
teaching competency;
teacher professional
development
- Nanyang Primary School has decided to embrace in the beginning of this year the approach of Lesson Study. The philosophy and framework of Lesson Study has become one of the cornerstones for the foundation of the school's strategic thrusts of curriculum innovation and staff professional development. The school has crafted "Engaged Learning through Curriculum Innovation" as its overarching research theme. The focus of the presentation is on how a group of Math teachers has deepened their understanding of both the teaching strategies used for designing and delivering a Math lesson and, the expertise required to work towards curriculum innovation. The teachers were guided by the well-structured Lesson Study cycle and effective questioning techniques during the facilitation process. This has a powerful and positive impact on the level of teaching competency of the teachers involved as they enter the next cycle of Lesson Study. The professional learning goal of the lesson conducted is to find engaging ways to encourage pupils to engage in mathematical reasoning. Therefore, the Math teachers involved in the Lesson Study group had decided to investigate effective teaching strategies to help pupils to build confidence in their ability to articulate clearly their thought process behind the solution of a set of non-routine word problems. A class of primary three high and middle-ability pupils was selected for a research lesson based on the Lesson Study model. A set of non-routine Math questions was designed based on a well-known children's story, Hansel and Gretel. Cooperative learning and questioning strategies based on Polya's problem-solving model were adopted for the lesson. The last part of the presentation will revolve around the sharing of the initial professional learning based on the research lesson by studying the data collected during the lesson through the lens of the K.I.S.S. model and good questioning techniques by the Lesson Study facilitator.
- F61-PP TR714 Using 5E model, engagement, and exploration to apply to a real-life situation**
- SWARNA V Swarna Leela*
(Room Chairperson), LEE Ai
Ling, LOW Heng Chong,
CHEW Xuan Hui, CHEONG
Gui Ying,
Jurong Primary School,
SINGAPORE
- Keywords:**
Lesson Study; Primary
Science; Strategies
- Students in primary schools need to apply Science concepts to real-life scenarios. By getting them to explore hands-on Science instructions, they get to collaborate and be self-directed learners. Hands-on activities allow engagement in learning, especially in the topic of electricity, and allow a child's success beyond the classroom. The review of literature indicates that using part of the 5E Model allows students to comprehend information better and has more impact in their learning. Findings indicate that teachers felt that Science taught using the 5E Model had positive effects on a child's engagement in learning. Using a mixed methods approach, teacher's observational notes and a survey done by students were used to understand the child's learning. Their written work was also used to support our understanding of their learning in the classroom. The instrument used for our research allowed us to further discuss and provide directions for future revisions and research.
- F62-PP TR714 Taking Lesson Study outdoors**
- MOHAMED YUNOS*
Mohamed Faisal, LONG
Rachel, ABDUL RASHID
Eliza,
Guangyang Primary School,
SINGAPORE
- Keywords:**
Outdoor Experiential Learning
- In 2007, Guangyang Primary School adopted Lesson Study (LS) as a whole-school approach towards building a collaborative culture amongst teachers and as a means towards building teacher competency in pedagogy. LS teams have typically embarked on designing engaging and effective classroom lessons. In 2012, aligned to the school's focus on creating engaging lessons, and the Science department's focus on outdoor experiential learning, a team of Science teachers designed and implemented a lesson conducted at the Singapore Zoo. In placing the learner as the central entity around which the lesson was designed, the team incorporated flexibility in terms of difficulty level

and content-focus through a learning station-based lesson design. Needless to say, the research lesson (RL) was conducted at the Singapore Zoo. Due to the unique nature of the lesson, the team innovated by conducting 2 concurrent RL at the Singapore Zoo, the feedback from which was gathered during the post-RL discussion, to be incorporated into another RL, which will be held in 2013. Apart from feedback gathered from the RL observers, and lesson artefacts, the team gathered feedback from the pupils on their perception of the lesson and from parents who were present during the outdoor lesson. Several innovative practices arose on this LS journey. Foremost was the lesson planning and RL stages of the LS cycle, which were held in an outdoor setting. Secondly, the learning station-based design of the lesson allowed for flexibility in content and difficulty level to cater to learners' differing readiness and even learning styles. Thirdly, feedback for the next RL came not only from RL teacher-observers and RL teachers but also from pupils and non-formal observers, so as to paint a more balanced view of the effectiveness of the lesson. One impactful point of learning for the LS team was in designing effective and engaging outdoor experiential learning lessons and in ensuring that the intended learning at each learning station is clearly communicated (by the team to the RL teacher, who were not members of the LS team) so that the intended outcomes were achieved.

F63-PP TR714

LIM Petrina, NG Kevin, NGIN Chor Hong, NG Wee Liam, ONG Ivan,
St Andrew's Junior School,
SINGAPORE

Keywords:

thinking dispositions; Science exploration; self-directed learning; visible thinking

Developing thinking dispositions in Science exploration using OPA

The Science Inquiry Approach (5E model – Engagement, Exploration, Explanation, Elaboration and Evaluation) is a complex process that is made up of many intertwined steps. An internal scan of the upper primary Science results led to the following conclusions that our pupils were unable to answer open-ended questions due to: an inability to process data that is given, the use of appropriate terminology in Science, unfamiliarity with the steps to conduct an exploration activity. This led to the research of the lesson study project to develop intellectual behaviours of a Scientist in the Exploration stage of the 5E Inquiry approach. The team developed a set of thinking dispositions that a Scientist needs to demonstrate – ‘Open-minded’, ‘Planner’ and ‘Adventurous’ (OPA). In each disposition, a set of thinking routines were customised to guide pupils to develop themselves as thoughtful learners. These guiding routines serve as scaffolding questions to direct pupils on the steps that need to be taken in order to cultivate the thinking dispositions of a Scientist. Method: The lesson study was conducted on a class of mixed ability pupils from a Primary 5 class and involved four phases comprising pre-intervention data collection, lesson study cycle 1, lesson study cycle 2 and focus group discussion on student learning outcomes. The lesson study aimed to achieve the following outcomes: pupils to be able to conduct a Science Exploration activity independently and to engage in intellectual discourse during the Science Exploration activity.

F64-PP TR715

TRINH Lap (Room Chairperson), NGUYEN Thi Hong Nam, HO Thi Thu Ho,
Can Tho University,
VIETNAM

Keywords:

Lesson study; In-service Teacher Professional Development; Pre-Service Teacher Education, Viet Nam

Effects of Lesson Study on teaching professional development and teacher education in Vietnam

During the past decade, lesson study (LS) has been implemented and has widely spread in Vietnam. Different projects on using LS in teacher professional development and teacher education have been realized in the north, central and south of Vietnam such as the Bac Giang lesson study project, a collaborative project between Japan and Vietnam, the Hue University lesson study project, the CTU-MSU lesson study project on integrating school reform with community development in Hau Giang Province in the Mekong Delta, a joint project between Michigan State University (US) and Can Tho University (Vietnam). LS in these projects have brought about positive changes in teachers' expertise and students' learning (Saito, 2008;

Tran, 2006; Ho, et.al, 2008; Wheeler, et.al, 2011). This paper presents the results of our investigation into the effects of lesson study on teacher professional development and teacher education in mentioned projects, namely (1) how LS has affected in-service teacher professional development after each project ended; whether the use of LS had any sustained effects on how teachers taught and what students learned will be reported; (2) how LS was used in pre-service teacher education programs at universities in the north and central part of Vietnam. Under this investigation, the authors of this paper explore how LS was used in pre-service teacher education programs in universities of teacher education, specifically which advantages/disadvantages of using LS brought into these teacher education programs and how disadvantages could be overcome and advantages be strengthened; (3) how LS should be applied in pre-service teacher education programs at School of Education (SoE), Cantho University (CTU). Gaining insights into how LS has been used in different parts of Vietnam, the paper then comes with proposed model for how LS could be used in micro teaching and school teaching practices for pre-service teacher education programs at the SoE, CTU. This proposed model was trialled in our experimental study applying LS in micro teaching and school teaching practices in pre-service teacher education programs at SoE, CTU. The results of this experimental study are reported in another paper of these authors.

- F65-PP TR715 Implementing Lesson Study: A case study of micro teaching class**
MURSADI Maryam,
 Sampoerna School of
 Education,
 INDONESIA
Keywords:
 Lesson Study; Micro
 Teaching; Teaching and
 Learning; Teacher
 Candidates
 This case study is an examination of 12 teacher candidates' perceptions of the implementation of lesson study into their micro teaching course. Data analysis revealed that they held differing views of the implementation of lesson study. The four themes emerged were: a) concerns regarding the designing of lesson plan that supports students' learning, b) the role of reflection, c) the importance of planning, d) the dilemma of assessing students learning vs. Teacher competencies to deliver the materials. Suggestion for future implementation are lesson study model should be introduced earlier so that teacher candidates are aware of the importance of student learning in teaching and learning process; and also more opportunities should be provided to practice lesson study in other courses.
- F66-PP TR715 The development of student's awareness who take course with "Trial Lessons" – Through the lectures of "Studies of Practical Instruction"**
TSUKAMOTO Hiroo,
 Kagoshima University,
 JAPAN
Keywords:
 Trial lesson; Lesson plan;
 Teaching ability
 In 2008, with a focus on 2nd year students, we established the course, "Studies in Practical Instruction I" (free elective), in order to contribute to the students lesson building competence through executing trial lessons and the lesson plan creation assignments. Through these experiences, the students would improve their understanding of topics such as, "The Understanding of the Curricula of Various Subjects", "Lesson Analysis", "Designing Lessons", "Self-improvement" and "Cooperation". Through 15 lectures of 2nd year students of the Faculty of Education we taught them what an ideal lesson should be, how to create lesson plans and guided them through trial lessons. We analyzed the outcomes of this course through asking the students before, during and after what teaching abilities they felt they have gained as well as any improvements to their abilities that they were conscious of.
- F67-PP TR716 Using Describe Analyse and Interpret (DAI) approach to teach visual literacy: A 21stC approach**
*WU, Renee (Room
 Chairperson), SUPARI
 Norhayati, RAWI Ratnawati,*
 Kranji Secondary School,
 SINGAPORE
 This study is on the use of the Describe Analyse and Interpret (D.A.I.) approach to teach visual literacy. With the D.A.I. approach, teachers teaching the new English Syllabus 2010 would be better able to guide their students to interpret the stimuli and express their opinions. We also aim to create

Keywords:
Describe; Analyse; Interpret;
visual literacy; 21st century,
English Language

resources for teachers teaching the new syllabus as we acknowledge the absence of standardised teaching materials. The aspiration behind this study is to facilitate students to have an inquiring mind in the learning of English Language. They should see language learning as alive and that it comes in different forms. They should be familiar and comfortable with assessing and using the different modes of stimuli. They should be able to interpret and distil relevant information. They should be able to see the relationship between different stimuli and draw appropriate conclusions. The English Syllabus 2010 places an emphasis on students' ability to read, view and listen closely and critically to a variety of spoken and written texts including visual texts. Students must understand how speakers and writers use language to achieve intended purpose and impact. Presently, students lack the ability to pick out visual cues – pictures, graphics, font sizes in a structured manner in order to interpret the stimuli. They need help and some form of structure in expressing their opinions and interpretation. They lack the ability to analyse literary devices such as irony, hyperbole, emphasis and compare and contrast. For our study, we focused on students' difficulties with picking out visual cues in a structured manner in order to interpret the stimuli. To help them overcome such difficulties, we looked into creating a structure to help them express their opinions and interpretations.

F68-PP TR716 The effects of vocabulary and Semantic map strategies in narrative text comprehension

*MOHD YUSSOF Yusfarina,
JAMIAN Abdul Rasid,
ZAINON HAMZAH Zaitul
Azma, ROSLAN Samsilah,
Putra University of
MALAYSIA*

Keywords:
Reading Comprehension;
Narrative Text; Vocabulary
Strategy; Semantic Map
Strategy

This quasi-experimental study aims to investigate the Vocabulary and Semantic Map Strategy effects in increasing reading comprehension mastery among secondary school students. The research sample involved 90 Form 2 students from two intact classes, randomly chosen from a secondary school in Selangor, Malaysia. The sample was selected through Cluster Random Sampling method. A group of 45 students formed the experimental group and the remaining 45 formed the control group. A Reading Comprehension Pre-test was administered to both groups before Vocabulary Strategy and Semantic Mapping intervention was given to the experimental group whilst the control group received conventional classroom teaching for reading comprehension. These strategies were applied to increase students' narrative text comprehension mastery from literal level to a higher cognitive level (inference & evaluation) and the ultimate goal is the affective level. The thinking levels involved in this Reading Comprehension process are based on Barret's Taxonomy. The proposed Vocabulary Strategy follows Tabá's Model (1967) which encourages students' active and constructive thinking, ability to organize their thinking and finally increase their thinking level; this approach parallels Barret's thinking level hierarchy. After the intervention, Reading Comprehension Post-test was administered to both groups. Results of Pre-and Post-tests were analysed through descriptive statistics, namely Mean and Standard Deviation score. Findings show both mean and standard deviation score increment for experimental group compared to those for control group. Besides quantitative data, this study gathered qualitative data concurrently. Observation of the students undergoing this intervention and document analyses (Semantic Mapping students' exercise) were conducted by researchers to prove this strategy's efficacy. The observation method documented students' success in following these strategies towards comprehension improvement. The strategy effects were also examined via the analysis of students' answers on Semantic Mapping exercises. From the quantitative and qualitative data obtained, it is evident that these strategies successfully increased reading comprehension mastery among students studied.

F69-PP TR716 A Continuum model of Critical Thinking: Theory and practice
ONG Bernard,
 Shepherding Children Hearts
 Lp,
 SINGAPORE

Keywords:
 critical thinking, thinking
 models, thinking tools,
 effectiveness of programme,
 writing

Critical Thinking is a highly contested construct which has its origins in Greco-Roman logic and reasoning, with influences from various fields in communication studies, educational and cognitive psychology, and is manifested in outcomes such as debating and students' argumentative writing. There are researchers who have pioneered the field of critical thinking by detailing analytical, discrete skills and operations (Paul, 1992 and Beyer, 1993) which are readily applicable to problem solving and decision making. There is also research and pedagogy that focus on a more holistic description of the attitudes and values of good thinking, such as Costa's Habits of Mind. This paper suggests that instead of a dichotomy, there could be a synthesis of higher-order thinking, as part of a continuum that stretches from a discrete/cognitive aspect to a holistic/affective aspect. With this model in mind, the author has conceptualised a pedagogical approach known as "thinking tool kit", integrating both the 'thinking' and 'feeling' dimensions when students approach current affairs and social issues. A group of Singaporean students ranging from 10 to 14 year-old participated in a 12-week programme known as "Socrates & Sophias", which aims to use a "thinking" tool kit to discuss and debate on current and social issues, in the hope that they will be more aware and active in championing social causes. A study was conducted to measure the effectiveness of the programme based on Donald Kirkpatrick's model, in terms of the students' response to the course, students' outcomes such as their reflection journal and writings and the impact of the course on their academic grade.

F70-PP TR717 Sketch graphs, polynom functions
*HERTZ Emma, GRANATH
 Hans, RYDFALK Mikael,*
 Berzeliuskolan,
 SWEDEN

Keywords:
 Upper secondary school;
 Mathematics; Functions

Learning Study: Sketch graphs Upper secondary school (age 17-18) For about a year now, Berzelius School has received funding to implement and distribute the skills of upper secondary school teachers in learning studies. The tutors of this specific study have been Johan Häggström and Tuula Maunula at the University of Gothenburg. All participating teachers teach Mathematics and Physics. The students attend either a science or a technology program preparing them for university studies. The students take all available courses in Mathematics in the Swedish educational system. The first study was conducted in Mathematics C (which includes algebra, functions and derivatives). The purpose of this study was to sketch polynomial functions of various degrees by the dominant term. An critical aspect was the understanding of which term is the dominant term for various values of x in a function such as $y = 2x^3 + 4x^2 - 5x - 1$. Another critical aspect was to demonstrate the difference between sketching and plotting graphs. The usefulness of the study was shown in the higher courses taken by the students who participated in the study. The discussions and cooperation among the participating teachers have been commendable. This effect has significantly influenced other colleagues, and doubled the number of participants in learning studies at Berzelius School. HansGranath, Emma Hertz, Mikael Rydfalk Berzelius School, Linkoping, Sweden

F71-PP TR717 Designing the Geometer's sketchpad activities for teaching Mathematics through Lesson Study
*CHEW Cheng Meng, LIM
 Chap Sam,*
 Universiti Sains
 MALAYSIA

Keywords:
 Pre-service secondary
 teachers; The Geometer's
 Sketchpad (GSP); Lesson

The purpose of this study was to develop pre-service secondary teachers' ability to design The Geometer's Sketchpad (GSP) activities for teaching mathematics through Lesson Study (LS). GSP is a dynamic geometry software program for constructing and investigating mathematical objects that adds a powerful dimension to the teaching and learning of geometry and many other areas of mathematics. Lesson Study is a Japanese model of teacher professional development in which small groups of teachers collaboratively

Study; Secondary
mathematics

plan, teach and revise a lesson to improve the quality of their teaching as well as to enrich students' learning experiences. Twenty-three LS groups each comprising 2 pre-service secondary teachers who attended a mathematics teaching methods course in a local Malaysian public university were set up in four tutorial groups. There were six LS groups in the first three tutorial groups and five LS groups in the last tutorial group. For each LS group, qualitative data were collected through video recorded lessons, observations, written lesson plans, reflections and GSP activities. This paper discusses how LS has helped to develop pre-service secondary teachers' ability to design GSP activities for teaching the sum of the interior angles of a polygon in one of the selected LS groups. Analysis of their GSP activities in the first, second and third lessons indicate that the participants of this LS group showed positive changes in their ability to design GSP activities for teaching the topic after engaging in LS. This in turn has enhanced their confidence in using GSP to teach mathematics in general and the topic in particular at the secondary school level.

F72-PP TR717 Promoting authentic instructions in Lower Secondary Computer Applications: Lessons learned through Lesson Study

*LIM Shi Hao, NAZIR AHMAD
Nurieza, YAP Wee Yong
Simon,
Broadrick Secondary School,
SINGAPORE*

Keywords:
Computer Applications,
Authentic Instructions

The Computer Education Unit (CEU) in the Ministry of Education's Curriculum Planning and Development Division has revised the Computer Applications (CPA) syllabus for Normal (Technical) students to include new modules in the Lower Secondary CPA curriculum. Our Professional Learning Team (known as Team Normal Technical or TnT) has chosen to focus our lesson study on the challenges faced by students in the revised curriculum as we observed that students experienced difficulties in creating 2D digital animations and making sense of computing instructions. Through collaboration and research, TnT hypothesised that such performance tasks require students to go beyond skills to higher order thinking and application of deep content knowledge. TnT believed that the lesson study process would enable meaningful teacher inquiry about how to adapt teaching for better student learning, ultimately to help students transfer deep learning and be able to create their own animations. With further research, the team decided to adopt Newmann's Authentic Intellectual Work (AIW) Framework to analyse the lesson activities and assessments conducted in this new module. Such a move departs from the traditional drill and practice method of teaching. In our refined lessons, the observers also rated classroom instructions based on the standards proposed in the AIW Framework. This process benefited observers as they gained a better understanding of students' knowledge and skills which enabled them to target specific gaps in student understanding to inform instructional planning. The team also studied video footage of the observed lessons to generate insights for refining instructional processes. Overall, TnT found that the implementation of the project has met our main goal of improving student learning as well as the secondary goal of making lessons fun and engaging, thus enhancing Normal (Technical) students' interest in the subject matter. We would like to share our observations and learning from the research process as well as the steps taken to implement the AIW Framework. We are also keen to show the benefits of our research process and the templates we created for using the AIW Framework to guide teachers in strengthening their instructions and assessments.

F73-PP TR718 Lesson study on shapes of molecules

*LIM Aileen (Room
Chairperson), LOW Kian Seh,
CHENG Boon Wah, TAN
Kuang Shing, YEOW Chern
Ee, LI Xuanjun,*

Chemical bonding is an important topic in Chemistry as it is the foundation for the teaching of other topics in the subject. It is a major component in Physical Chemistry and this topic is widely tested at the General Certificate of Education Advanced level (GCE A level) examination. However, the concepts

Temasek Junior College,
SINGAPORE

Keywords:
Lesson Study; THINK Cycle;
VSEPR Theory

in this topic, especially the shapes of molecules, are not easily imparted to students as they are abstract and involve good visualization skills. Students are required to visualize shapes of molecules in three dimensions, and this is generally difficult for students to grasp. In this paper, we will discuss a chemical bonding lesson involving shapes of molecules where students derive key concepts of the Valence Shell Electron Pair Repulsion (VSEPR) theory through the construction of balloon models. The THINK Cycle pedagogy, an in-house adaptation of Problem-Based Learning, was utilized for this lesson. Lesson study was carried out to investigate students' learning using this approach and students' learning attitude was assessed using a survey and a teacher's observation checklist.

F74-PP TR718 Using IBL approach to teach the concept of acidity and the chemical reactions of acids

*MOHD SHARIFF Shuryati,
KHOO Elaine Ying Ling, TAN
Siong Leong,
Woodgrove Secondary
School,
SINGAPORE*

Keywords:
Lesson Study; Using IBL
approach; to teach the
concept of acidity and the
chemical reactions of acid

The topic on acids was chosen for the lesson study as it is one of the major topics that many students find difficulty in understanding the concept of acidity and memorising the facts on chemical reactions of acids. This topic is crucial as it is the foundation topic for other topics such as preparation of salts and qualitative Analysis. Inquiry Based Learning (IBL) approach was used to help students to understand the concept acidity and chemical reactions of acids. The lesson study was carried out to a group of about 170 students from four secondary three express classes. During pre-lesson conference sessions, the team members discussed and prepared the lesson plan, worksheet, pre-test and post-test, observation checklist, schedule of teacher-observers, teaching materials and logistic requirement for videotaping the lessons. Four cycles of the lesson study were conducted. For each lesson study cycle, pre-lesson conference was conducted to discuss the lesson plan and post-lesson conference to review the lesson plan and the observation checklist. After each cycle, based on the feedback given by teacher-observers and the classroom teacher, the observation checklist, lesson plan and worksheet were reviewed to tailor to the profile of the students of the subsequent class. In addition, pre- and post-tests comprising of two-tier questions were also conducted. From the analysis of the pre-test and post-test, it is seen that there is an improvement in the percentage of correct answers as well as the correct explanation given. Using IBL through effective questioning and visual stimulation helps students in understanding the big idea. Observations also showed that students were more forthcoming in asking and answering questions during lessons. The video clips used during the lessons helped to trigger constructive conversation. Through the IBL approach, many misconceptions were verbalised by students during lessons. This provided an opportunity for the teachers to explain and clarify the facts and concepts. Students were also able to grasp the big ideas on the topic with the aid of video animation. Hence, using IBL for this topic generated constructive conversation in class and made understanding of the concepts easier.

F75-PP TR718 Improving quality of Experimental General Chemistry lecturing using process standard learning design; Formal lesson design for Indonesian school

*MUNTHOLIB Muntholib,
SANTOSA Santosa,
University of Malang,
INDONESIA*

Keywords:
learning process; students'
achievements; 'process
standard' of instructional
design

The first year is a transition period for students, from school life (high school) to campus life (university). In the first year learning achievements of students for their study field is often unsatisfactory. The purpose of this study is to improve quality of learning process and students' achievements of Experimental General Chemistry subject for Chemistry Students, Faculty of Mathematics and Natural Science, State University of Malang, year 2011/2012 using 'process standard' instructional design. 'Process standard' is a formal lesson design for Indonesian schools consisting minimum steps of

learning process. This study used a classroom action research (CAR) design consisting of two cycles. The data were collected through pre-tests, worksheets, observation sheets of student activities, and post-tests. The results showed that the 'process standard' of instructional design could improve the quality of learning process and achievement of students for Experimental General Chemistry subject; average test scores for Rate of Reaction (cycle I) increased from 62.1 (pre-test) to 85.2 (post-test) and Chemical Equilibrium (cycle II) increased from 63.6 (pre-test) to 88.3 (post-test). The normalized gain scores of the research were 60,95% (cycle I) and 67,86 (cycle II).

F76-PP TR719 Infusing Polya's Four-Step Problem Solving process into the Secondary One Express Mathematics curriculum

LIN Huiyuan (Room Chairperson), YEW Daniel, ABDUL RAHMAN Syahrulnizam, LOH Serene, HUI Win Sun, LIM Alex, Sengkang Secondary School, SINGAPORE

Keywords:
Problem solving; Polya's four-step process

The core of the Singapore Mathematics Framework is problem-solving (MOE, 2007). Besides imparting mathematical knowledge, teachers equip students with mathematical skills and processes, as well as encourage positive attitudes essential for problem-solving. Despite the above, we observed that our students have difficulties solving complex mathematics problems. They give up easily whenever they perceive a question to be difficult, and rely on their teachers to break the question down into simpler subtasks before they will attempt it. This prompted us to examine how we can help students approach problem solving in a more structured way. Several studies advocate the explicit teaching of a problem solving model, which helps to guide students in their problem solving attempts and encourages them to monitor their learning and problem solving attempts (Polya, 1954; Schoenfeld, 1992; Toh et al., 2011). Therefore, we conducted a lesson study to investigate how explicit teaching of the four-step process could help Secondary One Express students in problem solving. We used a survey to find out about students' confidence level in and their attitudes towards problem-solving prior to the research lesson. We then designed a lesson that incorporated the use of Polya's four step process and various problem-solving heuristics to support students' efforts in problem solving. In this paper, we will share our findings and suggest how these learning points could be used to develop students' problem solving abilities in the mathematics curriculum.

F77-PP TR719 The Order of Operations - A Learning Study in Mathematics

BERGKVIST Kent, OLSSON Anna, Fenestra Centrum, SWEDEN

Keywords:
Learning study, Order of operations, priority rules, critical features, mathematics

At Fenestra Centrum, we have been working with Learning Study for three years. During the past year, studies have been made in almost every subject and the majority of the teachers at the school have been involved. This Learning Study was performed with students in the seventh grade, in secondary school (age 13). When we were to choose an object of learning we had many different suggestions up for discussion. During these discussions we noticed that most of those objects of learning required that our students already knew how to handle "the order of operations". We asked ourselves; "can most topics of mathematics be hard for students to handle if they do not know the priority rules?" Therefore, "the order of operations" came to be our object of learning. We wanted the students to learn how to handle the priority rules, and also understand when and why parentheses are needed in mathematics. During the work with this Learning Study, we have discovered many critical aspects, e.g. that our students did not find it an issue that the same mathematical problem had more than one answer. They said; "it is like that because it depends on how one calculates". The analysis of the lessons has raised further questions and we have understood that we took a couple of things for granted, when planning this topic, which made learning more difficult for our students. This study has been a journey for us. We have not only gained a lot of experience that will help us in our teaching profession, but we

have also discovered critical aspects that we now can consider when teaching “the order of operations”.

F78-PP TR719 Secret strategy in sustaining Lesson Study as a form of teacher professional development in the district of Sumedang

*SUPRIATNA Asep,
KUSDIJANTONO Timbul,
Universitas Pendidikan
INDONESIA*

Keywords:
Lesson Study Teacher
Professional Development
Sumedang

Lesson study has been implemented in districts of Sumedang as a form of teacher professional development for junior secondary math and science teachers since 2006 under support of JICA and Indonesia University of Education. District of Sumedang could maintain it sustainability even though the external supports have been decreased gradually. Interestingly, district of Sumedang is able to disseminate best practice of lesson study to primary and senior secondary levels. The secret strategy of district of Sumedang in maintaining the lesson study practice will be shared.

F79-PP TR720 The use of case studies in teaching Primary 5 Science

*LOW Jo-Fan (Room
Chairperson), TAN Roger
Whye Kwang, LIM Catherine
Chiek Kuan, RAMAN
Karthiyayini N,
Xinghua Primary School
LOKE Wai Ling,
Choa Chu Kang Primary
School,
SINGAPORE*

Keywords:
case-based learning; science

An exploratory quasi-experimental study was conducted by the school to find out whether the use of the Case Studies Approach in teaching Science had any effects in helping Primary Five middle-ability pupils in answering open-ended application questions accurately, as well as in increasing the level of engagement in the learning of Science. The study involved two Primary Five classes. A project group of 29 pupils went through a six-week programme lasting 30 periods to study two Science units and 29 pupils served as a comparison group. The project class showed an improvement with a moderate effect size. The level of engagement had also increased. The limitations of the study were discussed for the possibility of further research.

F80-PP TR720 Infusing thinking routines into the teaching of Primary 3 Science

*LIM Kok Soon, SEW Pearllyn,
St. Andrew's Junior School,
SINGAPORE*

Keywords:
Science Inquiry; MTV

In recent years, there has been greater focus and emphasis on developing our pupils to become 21st century learners. In Saint Andrew's Junior School, Singapore, when teachers teach a Science lesson, we want to ensure that inquiry-based and holistic education strategies (such as ACE pedagogy 'Authentic experiences - Customised learning - Embedding values', the 3Cs comprising 'Confidence, Curiosity and Collaboration' as well as the BSCS 5E instructional model of 'Engagement, Exploration, Explanation, Elaboration and Evaluation') and thinking routines (e.g. "Claim-Support-Question", "See-Think-Wonder", "What makes you say that?") are embedded into our lessons based in the strong belief that "when there's no thinking, there's no learning".

F81-PP TR720 Does the ability to represent equivalent fractions help in the addition of related fractions?

*CHEW Anthony, TAY Annie,
MAJID Kamarudin, KAUR
Kiranjeet, WEE Wei Min,
CHUAH Shelley,
Jurong Primary School,
SINGAPORE*

Keywords:
Lesson Study; Primary
Mathematics; Fractions

The use of manipulatives in teaching Mathematics has become as commonplace as the use of textbooks. And with good reason, as both Sowell (1989) and Ruzic & O'Connell (2001) found that the long-term use of manipulatives (allowing students to use concrete objects to observe, model and internalize abstract concepts) has a positive effect on student achievement. Manipulatives not only allow students to construct their own cognitive models for abstract mathematical ideas and processes, it also provides a common language with which to communicate these models to the teacher and other students. In addition to the ability of manipulatives to aid directly in the cognitive process, manipulatives have the additional advantage of engaging students and increasing both interest in and enjoyment of Mathematics. Students who are presented with the opportunity to use manipulatives report that they are more interested in Mathematics. And long-term interest in Mathematics translates to increased Mathematical ability (Sutton & Krueger, 2002). Fractions have always been a difficult topic for students to learn. A good understanding of fraction concepts will form the

foundation for learning of related concepts such as decimals, percentage, ratio and proportion. Hence, it is critical for students to develop sound understanding of fractions. Our lesson study seeks to identify the nature of difficulties experienced by Primary 4 students in our school in the learning of fraction concepts and how the use of manipulatives can assist in deepening students' conceptual understanding of fractions. Ultimately, our lesson study aims to shed light on how we can minimise common misconceptions about fractions which often arise when students progress to the manual invert-and-multiply procedure for solving fraction problems at later stages.

F01-WO TR 701

*LIM Selina, TAN Clement,
PAIK Robin, CHEANG
Geoffrey, SHEE Soo Mei,
CHEN Zhang Jin, KOH Amos,
Coral Secondary School,
SINGAPORE*

Keywords:

Lesson Study; Concrete
Pictorial Approach;
Mensuration

Students learning in mensuration

This lesson study focuses on how a group of Mathematics teachers in Coral Secondary School make use the Lesson Study (LS) cycle as a professional development tool to study the teaching and learning of Mensuration through the CPA approach. Research has shown that students with difficulties in learning Mathematics have benefitted significantly from CPA approach, which sequenced concepts at different cognitive levels. The Concrete Pictorial Abstract (CPA) approach is widely used in the teaching of Primary School Mathematics; however it is not implemented as consistently in the teaching of Secondary School Mathematics. The reasons for not using CPA approach as widely in Secondary Schools are that 1) most students and teachers perceived using concrete objects as being too basic and 2) the tight time-frame to complete the syllabus often causes teachers to teach directly at the abstract level. In the study, teachers first make use of concrete materials which students can handle during the lessons to show how mathematical concepts can be used to solve authentic problems in the real world. Students then advance to pictorial representations to generalise the formulae for total surface area of geometric solids. Finally, students move on to the abstract component, where the task is in symbolic representation that students need to interpret and solve in order to demonstrate understanding. Differentiated worksheets are designed by the teachers to help students to transit from the different stages of the CPA approach. Through LS, we aim to highlight impact of the CPA approach on students' learning of Mensuration. The CPA approach allows students to grasp abstract concepts as it allows the mathematical ideas to be represented in a concrete manner using external representations. This is particularly beneficial to students who have difficulties in learning mathematics and often see Mathematics as rote repetitions of meaningless memorised formulas. In addition, we also seek to present the impact of LS on teachers' professional learning and development. The presentation will include photographs of students' learning, videos of the research lesson, teachers' reflections as well as lesson plans and worksheets to help the audience better understand the LS project.

F02-WO TR 501

*YIP Jee Cheng Jessie,
MOHD RASHID Sitihajar,
Mayflower Primary School,
SINGAPORE*

Keywords:

Introducing; challenges;
issues; practice; making
thinking visible

From introducing Lesson Study to deepening the practice

Lesson study is a process in which Japanese teachers have been engaged in for many centuries to continually improve the quality of the experiences they provide for their students. The tremendous amount of learning has benefited not only the research teacher but also colleagues in the learning community. This consistent practice has brought about waves of educational reforms that has produced effective change in teacher practice and student learning. If you have not been implementing this or thinking about introducing this in your school, you may be wondering: How is this possible? What place does this

professional development protocol have in the context of a Singapore school? What challenges do School Leaders, staff developers and teacher leaders face in bringing this seemingly time consuming protocol into our schools? How will having so many eyes looking over the shoulders of our pupils have an impact on my learning as a teacher? This is such an artificial lesson. Do you expect me to plan my daily lessons this way? Many educational scholars believe that a critical component of any educational reform effort should be to provide teachers with opportunities and appropriate support structures that encourage the critical work of on-going improvement of pedagogical practice (Darling-Hammond & McLaughlin, 1995; Garet, Porter, Desimone, Birman, & Yoon, 2001; Sparks & Hirsh, 1997). In this workshop, you will: (1) learn how this educational reform was introduced from the formation of a Coalition Team to its planning and implementation of the cycles lesson study and different learning teams to the deepening of its practice to bring about a shift in the mindsets of teachers even in their daily practices in Mayflower Primary School, (2) be facilitated to explore ways to overcome the challenges in implementation, (3) discover how learning teams collaborate to collect meaningful data through lesson study to inform them of their teaching practices and in turn leveling up the professional language of 21st century educators, (4) acquire ways to facilitate learning teams to align their learning to the research theme such as to make thinking visible in the various subject classes.

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*WONG Elaine,
ZAINALIBIDIN Norhaiza, TEO
Ching Ling,
Fuhua Secondary School,
SINGAPORE*

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The hard truths of recalling from texts.

In recent years, much research has been carried out to study the effects of expository texts on L2 learners' reading comprehension ability. Some linguists categorised the expository texts into 5 types; collection, description, causation, problem/solution and comparison. The different types affect the reading comprehension ability of L2 learners. Research carried out by Pretorius (2006) concluded that L2 learners have difficulty constructing meaning when reading expository texts (p. 447) as the L2 learners may not be aware of the logical relations within the text. This finding is supported by Carrell's research conducted in 1984. Carrell concluded that a L2 learner is able to comprehend an expository text well if the learner possesses the formal schemata. In Long, Prat, Jones, Morris & Jonathon's research conducted in 2008, it is postulated that a L2 learner's background knowledge is a 'reliable' predictor of recollection for old items which may offer an explanation why narratives are easily recalled by L2 learners. Narratives usually contain stories which may be familiar to the L2 learners. The team would like to share with fellow educators the result of the Lesson Study Project it embarked on.

- G01-PL LKC/LT Deepening Student Learning through Lesson Study**
LEWIS Catherine,
 Mills College,
 UNITED STATES
 RUNESSON Ulla,
 Jonkoping University,
 SWEDEN
 Discussant: *LO Mun Ling*,
 The Hong Kong Institute of
 Education,
 HONG KONG
 Chairperson: *WOOD Keith*,
 Universiti Brunei Darussalam,
 BRUNEI
 In this plenary session, we will consider views of what it means to deepen student learning. Lesson study improves instruction by helping teachers change their understanding of the object of learning and their teaching of it which in turn leads to improvement in student learning. The object of learning is defined by research in the discipline. Learning study engages teachers in conjecture about the nature of the object of learning itself. Through their research, teachers find the most worthwhile object of learning and identify the critical features required through systematic testing and verification in classroom practice. The roles of learners, teachers and researchers, the research approach and the outcomes are similar yet different in these views. Following an elaboration by each of the speakers, discussion will be opened to participants in the plenary
- G02-PL LT22 Partnership to sustain Lesson Study**
INPRASITHA Maitree,
 Khon Kaen University,
 THAILAND
 DUDLEY Pete,
 Leicester University,
 UNITED KINGDOM
 Discussant: *KO Po Yuk*,
 The Hong Kong Institute of
 Education,
 HONG KONG
 Chairperson: *SALLEH Hairon*,
 National Institute of
 Education,
 SINGAPORE
 The growth of Lesson Study across the globe has also witnessed the development of the notion of partnership within communities of Lesson Study. The development and growth of partnerships in communities of Lesson Study is in fact a mark of sustainability. The contexts of partnership could take place within organizations such as schools or higher education institutions, or across organizations such as between schools, or between schools and higher education institutions, other external agencies, or educational local authorities. Partnerships bring along with it shared knowledge and resources. Besides providing illustrations and examples on the benefits of partnerships in Lesson Study, the plenary session seeks to provide the platform to discuss the demands, issues, challenges and limitations faced in ensuring that partnerships contribute to the sustainability of Lesson Study practices.
- G03-PL LT23 Developing tools and artifacts for supporting Lesson Study and instructional improvement**
TAKAHASHI Akihiko,
 YOSHIDA Makoto,
 Gakugei University,
 JAPAN
 Discussant: *ROVIO-JOHANSSON Airi*,
 University of Gothenberg,
 SWEDEN
 Chairperson: *YEAP Ban Har*,
 Marshall Cavendish Institute,
 SINGAPORE
 There are several challenges to the effective implementation of Lesson Study outside of Japan, and efforts to improve teaching often ignore the cultural assumptions that underpin teaching and learning (Stigler & Hiebert, 1999). Despite Lesson Study's great promise, questions about the extent to which it can be replicated elsewhere remain (Perry & Lewis, 2008; Lewis, Perry & Hurd, 2009). As a result, teachers often focus only on superficial aspects of Lesson Study (Yoshida, 2012). In this symposium, the presenters will discuss the kinds of resources and tools that are necessary to overcome these challenges to successful implementation of Lesson Study.
 First, Akihiko Takahashi will share several useful tools and resources that have been developed by Project IMPULS (International Math-teacher Professionalization Using Lesson Study). These tools and resources include LessonNote, an iPad App to support teachers to observe research lessons, and research lesson videos from Japanese mathematics classrooms. Makoto Yoshida will share the English translated version of a Japanese mathematics textbook series called Mathematics International (Grades 1 to 6 and 7 to 9). These textbooks were developed based on the accumulated wisdom and experiences of Lesson Study practitioners, mathematics educators, and mathematicians in Japan. The topics in the textbooks are coherently organized in order to develop students' conceptual understanding of topics and support their learning by the Teaching through Problem Solving instructional approach.