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Using Scientific Argumentation to Develop Sound Evidence-Based Reasoning and Social-Emotional Learning Competencies

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Students often find it a challenge to make evidence-based claims or justify their claims with sound reasoning. This may stem from a lack of content mastery as well as poor reasoning and communication skills. To help students develop enduring understandings of biological concepts and develop sound evidence-based reasoning skills, we aim to develop a sustainable lesson model based on scientific argumentation and assess its effectiveness in the classrooms through the use of lesson study.

In planning for the lesson study, three areas of focus were identified. First, we aim to identify and design a simple criteria-based rubric to aid teachers in crafting sound scientific debate questions. Second, we aim to equip students with skills in making evidence-based claims and sound justification of their claims. Third, we aim to increase students' awareness of their social-emotional learning (SEL) competencies through post-lesson reflection.

Two lesson studies were conducted. In the first lesson study, a debate question was crafted to elicit knowledge on several learning outcomes within the same topic. An argumentation template was designed to guide student in their synthesis of arguments using claims, evidence and justification. The students then carried out a debate and made rebuttals to their peers' arguments. Teacher observers were deployed to each group to observe students' behaviour and to evaluate the strength of their arguments. At the end of the lesson, a peer assessment of the SEL competencies was carried out, followed by a class sharing to consolidate content.

The first lesson study was well-received by students. However, post lesson review revealed a need for more time to develop arguments, more explicit guidance on argument synthesis and debate questions with broader scopes.

Firstly, three criteria were identified to evaluate the suitability of debate questions, namely Broad, Balanced and Multi-Layered. This ensured sufficient breadth and depth for the students to make inter-topical connection as well as deep analysis. Second, a recommendation was made to re-schedule the session on argumentation and conduct as an end of term revision. An online discussion prior to the lesson was also recommended to prime students mind in preparing for the lesson. This would increase the familiarity of the students to the concepts debated on and consequently the rigour of debate. Third, the argumentation template was also improved for clarity. In addition, a student jury was convened to evaluate the arguments instead of the teacher, further enhancing the sustainability of the lesson. A second lesson study was carried out with the proposed improvements.

Results showed that the students benefited from the lesson cognitively. Lesson observers documented students exhibiting positive traits in the respective categories, making and justifying evidence-based statements, as well as posing effective responses to others. This also corresponded to the post-lesson student survey.

Affectively, some students felt that the lesson was out of their comfort zones and were thus mildly uncomfortable. Despite this, results from the student survey revealed that they enjoyed the group work and acknowledged the effectiveness of the lesson in teaching specific skills, demonstrating the social appeal of learning. Classes with better dynamics tended to enjoy the lesson better.

The lesson also provided an opportunity for the students to reflect on their SEL competencies using the SEL competencies template. Some students expressed that although the group work required some compromise when crafting arguments, it allowed them to be exposed to various viewpoints.

In conclusion, the lesson study scored higher in cognitive compared to affective and behavioural indicators. The lesson allowed for a deeper understanding of content, enhancement of critical thinking skills while maintaining an emphasis on self-reflection.

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Lesson Study as a Tool for Rebuilding Teachers' Practical Thinking: A Bridge Between Espoused Theories and Theories-In-use

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This Lesson Study forms part of the research work carried out by the Spanish team, in order to analyse the potential of this professional teacher development methodology for the reconstruction of teachers' practical thinking. It is a qualitative research process which involves the monitoring of seven infant school teachers during two school cycles. The teachers developed a Lesson Study over this period, with a practical thinking case study being carried out both before and after. This paper focuses on the Lesson Study case study.

The Lesson Study was developed independently by the group of teachers, who were advised throughout by the undersigned researchers. At the same time, the researchers carried out a case study focusing on the Lesson Study being developed by the teachers.

Findings/Conclusions:

- From the start of the Lesson Study, we can find evidence of changes in the practical thinking of the teachers involved, which led to immediate changes in their classroom practice.
- The development of the Lesson Study brought about significant reflection with regards to the Infant Education curriculum, in some cases resulting in substantial modification to the way it is implemented in their different classrooms.
- The teachers pointed out the value of cooperative work on several different occasions.
- They also emphasised the high level of learning they achieved by observing how their colleagues developed the lesson designed by the group using different strategies and data collection instruments, such as documentation inspired by the Reggio Emilia approach, when reflecting on their own practice.

On the whole, we can state that the cooperative design work of this lesson showed the contrast between the espoused theories of the participants and their theories-in-use, conditioned fundamentally by their work contexts and previous experience. Lesson Study is a way to bring these two poles closer together, enriching teachers with strategies to help detect contradictions in their practice and to resolve them and feel more comfortable with what they do.

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Developing Students' 21st Century Skills in a Secondary School Classroom

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Consciously or subconsciously, teachers will find themselves the one speaking in the classroom 90% of the time. While we dominate the air-time in class, we also wish that our students can be more effective and confident in speaking up. Communication skills is an important 21st Century skill which we want our students to acquire. Like all other skills, communication and presentation skills require practice. However, without returning the air-time in class to our students, this is almost impossible. Therefore, our team embarked on this project to focus on student-centric learning while helping students develop life-long skills which they can bring with them as they enter the society.

The aim of this project was to engage our students in class and develop them into critical thinkers and confident speakers who are passionate about learning.

Using the process of learn, think and express, students were expected to do self-directed learning with the lesson notes created by the teachers, hold discussions with their group mates and eventually share their answers with their classmates. The teacher, as the facilitator, helped students gain confidence to speak up in class by providing support in the following ways:

- Provide ample preparation: trainings on presentation skills, give students ample time and resources to prepare for their presentations.
- Create a safe environment in the classroom: everyone is heard and respected.
- Motivate students by using tiered point system.

Using the lesson study approach, the department collaboratively planned lessons and created lesson notes. Lesson observations were then carried out and the lesson plans were reviewed, improved and executed again. This project also aimed to develop our teachers professionally ‘ focusing on lesson preparation and lesson execution.

This presentation will focus on the following key areas:

- The process of learn, think and express
- Student-centric learning
- Teacher’s role as a facilitator in the class
- Preparing students for presentations
- Tiered point system
- Assessment for Learning in class
- Results and reflections