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Depicting the Tendency of Vocational Pedagogy Practice in Technology and Vocational Education through Lesson Study

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One of the strengths of Lesson Study is having systematic steps in its implementation namely Plan-Do-See. Those typical steps of Lesson Study enable observers to do actual observation while the teaching and learning processes are running. In this study, the strength discussed in advance is utilized to observe the tendency of vocational pedagogy practice in technology and vocational education and appears to be the main purpose of the study. In addition, this study also aims to analyze the implementation of the three steps (Plan-Do-See) in the context of vocational pedagogy practice in technology and vocational education. This focus of the study is something of importance since the characteristics of the learning in technology and vocational education should implement comprehensive learning principals. The research procedure comprises observation forms which consist of ten observational items describing the tendency of vocational pedagogy practice. Every aspect of the tendency of the vocational pedagogy contains 'strong' 'medium' and 'low' In each subject, there are four observers involved. The data collected from twelve study programs in the Faculty of Technology and Vocational Education, Universitas Pendidikan Indonesia. The observation was conducted on practicum subjects for two cycles. The results of the study show that the tendency of the vocational pedagogy practices with highest scores that belong to 'strong' category are nature of activities, means of knowing, organization of time and space, visibility of processes, proximity to teacher, and role of learner. The learning tendency of the practices with highest scores that belong to 'medium' category are role of the teacher, attitude of knowledge, and approach of task. The first step of the lesson study, the 'plan' step, shows that the planning processes need more detailed observational instruments. The components on the observation sheet comprise some working tasks to be performed by the students based on the competence standards. The job distribution of learning practice should be done in this step. The second step, which is 'do' implies that the observation process of students' behaviors should have special strategies so that every step of the vocational pedagogy practice from planning, doing, and finishing, is observed thoroughly. In this step, the ratio of students and observers is 1:4. The final step, which is 'see' should reflect students' behaviors based on the existing competence standards. Like in the other steps, this reflective step focuses on students' behaviors in every step of the practice. The results also recommend that good facilities are an important aspect of the vocational pedagogy practice.

Keywords: The tendency of learning practice, vocational pedagogy practice, 'Plan, Do, and See' Steps

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The Adaptive Cycles of Teaching and the Mental Models of Expertise in Teaching Elementary Mathematics

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Some researchers have attempted to identify the core practices for teaching that can be used to educate prospective teachers (Grossman & McDonald, 2008; Kazemi, Lampert, & Ghouseini, 2007; Morris & Hiebert, 2009; Lampert & Graziani, 2009; Lampert et al, 2013). Grossman and McDonald (2008) argued that teaching at its core is clinical practice that requires specialized knowledge as well as craft and skills. Teacher Education Program should attend to ‘sustained inquiry about the clinical aspects of practice and how to best develop skilled practice’ (Grossman & McDonald, 2008, p. 189).

The Adaptive Cycles of Teaching (ACT) is an approach to preparing elementary prospective teachers at a university located in the Midwest of USA. ACT is a practiced-based teacher education curriculum designed to help prospective teachers learn a set of core teaching practices. A core practice in all the learning paths across different contents is repeatedly implemented and practiced with immediate feedback. Teacher candidates engage in repeated cycles of lesson planning, enacting the plan, analyzing the practice and synthesizing feedback and student learning data from a variety of sources to improve the core practice. Similar to the cycle of Lesson Study, it emphasizes collaborative lesson planning, implementing research lesson with knowledgeable others to observe and collect student learning data, reflecting upon the lesson with feedback, and consolidating the learning to design next round of teaching. This study attempts to explore how the ACT approach influenced the mental models of expertise for teaching mathematics through problem solving.

Recently, researchers drew on the theoretical lens of deliberate practice to investigate teacher learning and redesign teacher education programs (Deans for Impact, 2016; Han & Paine, 2010; Bronkhorst et al., 2011, 2014; Van Gog et al., 2005; Lampert & Graziani, 2009; Lampert et al, 2013). Ericsson and his collaborators in education (2016) synthesized five key principles of deliberate practice from the science of expertise that are highly relevant to developing teacher skill. The five principles are: pushing beyond one’s comfort zone; working toward well-defined, specific goals; focusing intently on practice activities; receiving and responding to high-quality feedback; and developing a mental model of expertise. Deliberate practice can produce and train practitioners to develop mental models and representations to guide decisions. That means teacher candidates are expected to know how students understand new ideas, retain information, solve problems, transfer their knowledge to new situations and find motivation to learn through conducting the repeated ACT as deliberate practice.

A cohort of eight teacher candidates in the undergraduate elementary education program were recruited for the study. The data were collected from the following sources, including videotaped four mathematics lessons, the related four lesson plans, the feedback from the field coaches and cooperating teachers, the students’ assessment work, and the teacher candidates’ reflections. The data were first analyzed through constant comparison of the videotaped lessons and the lesson plans across the year. The first round of analyses aimed at identifying the changes in the teacher candidates’ understanding of and responses to

their students' misconceptions, and examining how the teacher candidates elicited their students' mathematical thinking in instructional activities. Next, the data sources of the knowledgeable others' feedback, the teacher candidates' reflections, and the students' assessment work were used to triangulate the analyses. The study would bring an insight in understanding what kinds of mental models were developed through conducting the ACT as deliberate practice, how the teacher candidates relied on the mental models to respond to their students' mathematical learning and if they could use evidence of student learning to refine their ideas of how students learned mathematics.

Identifying Challenging Mathematics Topics through the Analysis of Learner Responses to Inform the Lesson Study Activities in South Africa

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Lesson Study is credited world-wide for its potential to strengthen teacher professional development. In South Africa the Lesson Study approach is gradually becoming a popular practice to strengthen the already institutionalized Professional Learning Communities (PLCs) especially to support the effective teaching and learning of mathematics in primary schools. Over the years South Africa has not been performing well in mathematics when compared to its international and continental counterparts. This is evident in the Trends in International Maths and Science Studies (TIMSS) as well as the regional Southern and Eastern African Consortium for Measuring Education Quality (SACMEQ). The inception of the Lesson Study, therefore, aims to capacitate primary school teachers to improve quality teaching and learning of mathematics. Although numerous countries have adapted the lesson study approach to suit their unique contexts, the common characteristic of utilising the lesson study to address the topic(s) or concept(s) that pose a challenge for teachers (and learners) is generally maintained. However, the 'reliable' method and process of identifying the challenging topic(s) or concept(s) to inform the Lesson Study activities is an area that has not been dealt with adequately. In other words there should be evidence that the topic(s) or concept(s) that are perceived to be problematic for teachers are indeed authentically challenging for them. The primary purpose of this paper is to share the approach that South Africa is pursuing to identify the problematic topic(s) or concept(s) in primary school mathematics to inform the Lesson Study activities. Essentially one critical step, which is a unique feature that characterises the Lesson Study in South Africa, has been added to identify the challenging topic(s) or concept(s) through diagnostic analysis based on learner responses after the writing of mathematics examination. This evidence-based diagnostic analysis of learner responses is two-pronged: firstly it focuses on item analysis and secondly error analysis. In this context, item analysis affords teachers an opportunity to know the concept(s) in which learners performed the lowest; and error analysis directs teachers to the learner deficiencies in relation to mathematics knowledge and skills. Naturally there is a possibility of identifying more than one concept that pose a challenge for learners, and by implication for teachers, in which case the topic(s) or concept(s) are prioritised based on the findings of the item analysis as well as teachers' needs. Through this paper it is envisaged that the debate on the evidence-based identification of the problematic topic(s) will be ignited and further contribute to the body of knowledge to improve the educational benefits of the lesson study in future.