TEACHER PROFESSIONAL DEVELOPMENT AS AN EFFORT TO IMPROVE TPACK SKILLS IN 21ST CENTURY LEARNING

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Abstract. This article aims to explain the conception and evaluation of information and communication technology (ICT) professional development processes for the development of teacher technology pedagogical content knowledge for 21st century learning. This study emphasizes the involvement of teachers using TPACK in learning. Research is concerned with the use of ICT in learning, setting design goals, redesigning, implementing, and evaluating, as well as reflecting on student learning outcomes. The research approach uses surveys and descriptive analysis. Data triangulation techniques based on observations and interviews with respondents. The results showed that the skills of using technology in learning related to TPACK had a positive effect on teacher confidence in the knowledge of technology pedagogic content for 21st century learning. Five of the seven design teams were able to make pedagogical changes towards 21st century learning, and six teams realized an increase in learning outcomes student. The conclusion of the study stated that TPACK had an impact on learning and teacher confidence in learning.

Keywords: TPACK, 21st Century

I. INTRODUCTION

Twenty-first century learning can be understood as a learning experience that helps students to develop sociocultural, cognitive, metacognitive, productive, and technological competencies in the 21st century world of work [1],[2]. (Koh, Chai, Wong, & Hong, 2015a). It seems that 21st century learning has always engaged students in collaborating and solving real-world problems through the effective exploitation of information and communication technology (ICT). One way to implement 21st century learning in schools is to consider how ICT-integrated learning can be designed to support these pedagogical goals. However, teachers may not be fully prepared to do so, empirical studies have found that teachers have not fully used ICT in learning [3], [4]. (Ertmer & Ottenbreit-Leftwich, 2013; Ward & Parr, 2010).

Teachers need a special form of professional knowledge as technological pedagogical content knowledge (TPACK) to support ICT integration [5] (Mishra & Koehler, 2016). The TPACK concept encourages teachers to develop their skills through various types of training [6], [7].(eg, Jang, 2010; Niess, 2015). Nonetheless, the experience of using ICT has not been optimal and one of the reasons is that innovation in ICT integration needs to be driven by clear pedagogical goals [8], [9]. (Ertmer & Ottenbreit-Leftwich, 2013). The lack of a pedagogical orientation has been highlighted as a weakness of the TPACK framework [11], [12]. (Brantley-Dias & Ertmer, 2013). In recent years, researchers have begun to formulate subject-specific forms of TPACK [13], [14]. (Jimoyiannis, 2010; Lim, Ang, & Koh, 2016) to better support teacher professional development. To foster 21st century learning, the professional development of ICT teachers may need to be more strongly oriented towards the 21st century learning pedagogical goals and focus on building the capabilities of teachers’ TPACK for 21st century learning (TPACK-21CL), a specific form of TPACK for giving birth to 21st century learning [15]. (Koh et al., 2015a). Based on existing studies on teacher professional development and TPACK, research is needed to develop 21st century learning TPACK. This research also evaluates teacher and student outcomes in learning.

21st century learning can be interpreted as a learning experience designed to support students’ 21st century skills. A review of 21st century skills frameworks [16]. (eg, Voogt & Roblin, 2012) reveals five general categories of 21st century skills: sociocultural, cognitive, metacognitive, productivity, and technology. These aspects show that 21st century learning is characterized by experiences that enable students to develop social skills for collaboration, conflict resolution, and multicultural communication; cognitive skills involving critical thinking for innovation and complex problem solving; metacognitive skills for engaging in self-reflection and independent learning; productivity skills to organize work effectively and efficiently; as well as technological skills to exploit ICT tools appropriately. Thus, technology-enabled learning is an important aspect of 21st century learning. To help students develop social, cognitive, metacognitive, and productivity skills through technology-enabled experiences, teachers need to understand and have skills in the use of ICT when implementing 21st century learning. Pedagogical models that focus on student-centred ICT-integrated learning can provide some insight into what 21st century learning might look like.

II. RESEARCH METHOD

This study used a survey method and analysis of the description of the use of ICT in learning. The research was conducted by interviewing 37 elementary school teachers in Bogor City. Interviews were conducted to obtain and analyze data relating to the use of technology in learning. 37 teachers participated in redesigning lessons using ICT.

Data were collected and analyzed to answer research questions consisting of self-confidence, teacher's belief in TPACK-21CL and lesson design. In this study, 22 out of 32 items related to teachers’ knowledge of technology (TK),
The results of the study show that the TPACK professional development process for 21st century skills is generally effective in increasing teacher confidence and their confidence in designing lessons. Research also shows pedagogical changes to various aspects of 21st century learning and impact on better student learning outcomes. The proposition that pedagogical vision drives pedagogical change [18] (Ertmer et al., 2012) is partially supported in research with the results achieved. Teachers were able to link 21st century skills objectives with the integration of ICT to address student learning problems, as evidenced by improved student learning outcomes. This professional development process appears to have boosted teachers' innovative abilities. Therefore, it is important for the professional development of teachers in the use of ICT to address learning that can have an impact on student learning outcomes. [19] Windschitl (2012) confirms that changes in teachers' learning ability levels have a positive impact, while [20] Somekh (2017) opines that a clear theoretical direction for pedagogical changes is an important factor for involving ICT pedagogy. Through the use of TPACK in 21st century learning the right design according to learning purposes will have impact on student learning outcomes. [21] affirms that pedagogical innovation is challenging and teachers need time to develop the knowledge required to influence change. Therefore, teacher professional development in ICT must give time for teachers to be biased in use of design.

ICT integration provides better added value to learning while supporting learning transformations that are not available without the use of technology [21]. (Angeli 2019) the result of this study suggest that pedagogical abilities of 21st century learning and ICT integration may vary among teachers and this may be the type of professional knowledge that needs to be emphasized more during the professional development of ICT teachers.

ICT lesson design in schools can be a complex activity for teachers because they need to balance skills with various contextual demands such as curriculum timing, school policies, and student readiness [22] (Koh et al., 2014). Teachers in this study took a long time to redesign their lessons and complete design-share-improvement-evaluation cycles for small lesson units. It appears that extended engagement in the design-implementation cycle is important for teachers to become confident designers of pedagogical change. According to [23] Koh et al. (2015b), findings also show that team-based design enables teachers to tap into the collective wisdom of a community of peers and researchers to develop TPACK in 21st century learning. The process of developing teachers with structured theoretical instruction as well as extended opportunities to engage with problem-based practice-based designs with peers were found to be important in this study [24], [25].

This study has several limitations which can also serve as areas for further research. First, the research was conducted with teachers in elementary schools. An area of future research is to validate processes in other primary schools as well as in middle schools, junior high schools, and colleges. In this study, the culture of school leadership and its influence on the implementation of the professional development process can be further investigated. Second, the design only completes one lesson redesign cycle. In future studies, the lasting effects of the development process on 21st century learning TPACK, design trustworthiness, and student performance can be investigated across various redesign cycles. Third, construct validation of the survey instrument was not possible because there were only 37 respondents. Thus, only reliability statistics can be reported. In future research, it is proposed that the survey instrument can be validated if a larger sample size is available.

Fourth, the researcher could not observe the lessons carried out by the teacher before redesigning because of constraints in the implementation schedule. Thus, the teacher's initial lesson plan cannot be strengthened by its application in the classroom. In future research, teacher lessons can be observed before redesigning and ratings of teacher lesson plans can be validated by independent reviewers who are unaware of the research objectives to increase their reliability. Finally,
student interviews could be conducted in future studies to determine their perceptions of the teacher's redesigned lesson and their motivation to learn. This is another measure that can be used to validate the relationship between observed student outcomes and teacher learning designs.

IV. CLOSING

Designing is very important to help teachers develop and implement TPACK in 21st century learning. Research has found an impact on teachers' trust and confidence in learning using technology, in this case TPACK. This study also found an increase in student learning outcomes through the use of TPACK in learning children 21

REFERENCE


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