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Investigating the Development of Teachers' TPACK and the Adoption of Digital Storytelling: A Case Study of Teaching English in Elementary School

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Introduction

Previous studies have reported that numerous elementary schools around the world in the last ten years have fully incorporated information and technology (Ciampa & Gallagher, 2013; Domingo & Garganté, 2016; O'Neal et al., 2017; Tay et al., 2017; Ricoy & Sanchez Martinez, 2019; Taghizadeh & Yourdshahi, 2019; Taylor et al., 2020). This fundamental shift in education has required teachers to be more adaptive and responsive in assessing technological tools. However, the rapid development of technologies such as modern gadgets, the internet, and multimedia learning tools poses challenges for teachers in terms of choosing appropriate technologies for the educational context. Philip and Garcia (2015) argued that technology only works when it is used in the hands of skilled teachers. A lack of pedagogical practices for teachers to blend specific approaches into particular technology in an elementary classroom results in a loss of direction (Nguyen, 2018). Additionally, based on observation, although schools possess a wide range of technological facilities such as laptops, smartphones, online learning management systems, and ease of access to the internet, this does not imply that teachers are willing and able to effectively incorporate these technologies into their lessons. This is due to the difference between learning about the use of technology and learning about integrating technology for educational purposes (Mishra & Koehler, 2006).

Context and EFL Teaching in Indonesian Elementary School

This research investigated how two English teachers integrated information and communication technology (ICT) into English lessons by adopting a digital storytelling approach to further the progress of digital literacy of young students aged 9–11 years through peer online collaboration, research, problem-solving, and creation of a digital text. The context of this study is an elementary school located in an urban area in Semarang, Central Java, Indonesia. To begin with, we would like to introduce context details of English education in Indonesian elementary schools. English has been taught in Indonesian elementary schools since 2006. However, most English teaching at the elementary school level is not related to the students' daily lives (Widodo, 2016). Rather than involving students in meaningful (Lestariyana & Widodo, 2018) and challenging (Sulistyo et al., 2019) games or projects, more focus is paid to teaching grammar and vocabulary.

Literature Review

Digital Storytelling for 21st Century Learning

In this study, a digital story is described as a multi-modal text created using technological instruments that interlink pictures and scripts/subtitles as well as music and personal voice, if available. Smeda et al. (2014) described synthesised digital storytelling as a fruitful approach that involves students in meaningful learning. Lestariyana & Widodo (2018) reported that digital stories could be applied in English language classrooms, which, when implemented properly, could positively contribute to language acquisition (Jones & Chapman, 2017) and digital literacy for English language learners in 21st-century learning (Churcill, 2020). Since digital stories are considered to contribute to the development of students' language and digital literacy, Koszalka and Ntloedibe - Kuswani (2010) suggested further studies on teacher development about integrating certain learning strategies to improve digital literacy; elementary school English teachers must expand technological, pedagogical, and content knowledge (TPACK) in the context of teaching English to young learners (TEYL) (Sulistyo et al., 2019). Informed by this empirical evidence, we conducted this study on the growth of English teachers' TPACK in designing lessons with storytelling to encourage digital literacy for learning in the 21st century.

Concept of TPACK and Digital Literacy in Elementary School

TPACK is a conceptual framework introduced by Mishra and Koehler (2006) that expands the idea of Shullman's (1986) pedagogical content knowledge (PCK). Shullman (1986) describes PCK as the knowledge integration of content and pedagogy to highlight specific subjects, problems, or issues, which addresses the need to accommodate the varied interests and abilities of learners. TPACK is defined as a body of knowledge that teachers need to develop with the support of technology in specific subjects and levels. The framework of TPACK consists of technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK), pedagogical and content knowledge (PCK), technological and content knowledge (TCK), technological and pedagogical knowledge (TPK), TPACK, and XK (contextual knowledge) (Mishra, 2019).
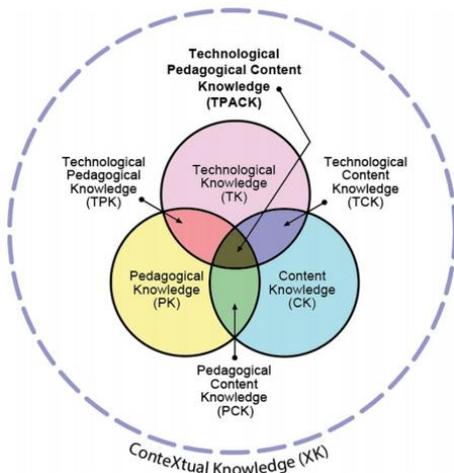
Figure 1. Schematic view of TPACK in the revised version (Mishra, 2019).

As technology integration is introduced to more elementary school students, special attention should be paid to digital literacy as another skill on which the success of technology integration depends. It is hoped that English teachers could provide lessons to young learners of English that encompass the ability to use media and develop a critical understanding of using ICT, as described by Hobb (2017). This knowledge includes the ability to access, evaluate, organise, and communicate messages in a variety of forms.
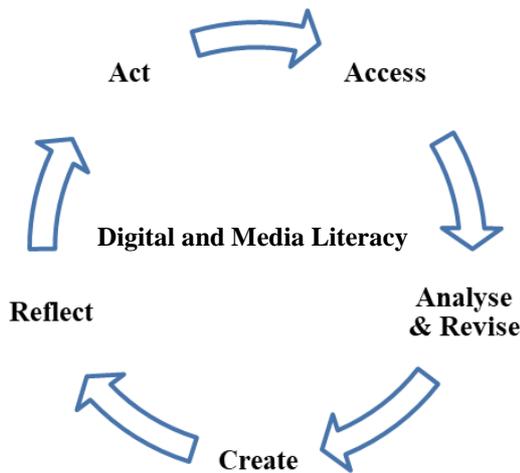

Figure 2. Competencies of digital media and literacy (Hobb, 2017).

Method

The project of digital storytelling in this study was part of a more extensive case study in which TPACK was incorporated. This work is part of an extensive research study conducted from September 2019 to August 2020. This study was implemented in a primary school in Semarang, East Java, Indonesia because of two considerations. First, this school obligates teachers to use mobile devices and implement several learning applications as learning tools for the students (*Razkids, Seesaw*, and *Google docs*). As part of the school programme, the teachers need to learn how to develop lessons effectively using ICT. The students are allowed to bring laptops, mobile devices, or iPads to school and have been taught how to use the digital tools effectively and safely (e.g., learning how to access information safely, create a strong

password, upload and share files safely, and use privacy settings). Second, the authors were granted entry access to this school because this was a case study (Stake, 1995). During data collection, the authors acted as participant–observers and were positioned as outsiders.

The participants in this study were Jane and Audrey, who worked as a team to teach English to fourth graders. To begin with, the participants provided informed consent after reading a detailed form written in Bahasa Indonesia. The participants were asked to read and sign off on all items on the consent form to ensure all data were kept confidential. Concerning data collection, the data were derived from classroom interviews, video recordings, and artefacts obtained from the teachers' lesson plan designs. Interviews aimed to determine how teachers integrate ICT into fourth grade English teaching using a digital storytelling project. Video recordings were used to observe the teachers' technological, pedagogical, and content knowledge in actual teaching practice. The data analysis drew from a general inductive approach, particularly thematic analysis, to analyse the result of classroom observation and interview transcripts carefully. The data were derived from the teachers' lesson plan designs and the teachers' actual teaching, which can be characterised into four themes: reasons for adoption of digital storytelling and digital storytelling into lessons, technology selection, lesson preparation, and assessment.

Results and Discussion

Developing a Digital Storytelling Project

Digital storytelling is a suitable strategy to encourage students' digital literacy in creating stories through digital media platforms that combine digital technologies and narratives into media text (Gladwin, 2020). It could be used to represent both fiction and non-fiction in digital media texts to influence readers through experiences (Gladwin, 2020). In this study, this principle was implemented in the project of 'digital narrative storytelling', where the English teachers created lessons for the fourth-grade students through the project of digital storytelling by using to TPACK as the framework.

To investigate the implementation of a digital storytelling project, semi-structured interviews, observation, and document analysis (artefacts) were used to portray each layer of the teachers' teaching episodes. Based on a pre-teaching interview with the two participants, the teachers framed the instructional design and their teaching practice by referring to the aspects of technological, pedagogical, and content knowledge (Mishra, 2019). The aspect of digital media/literacy was also considered, in which it generally aimed to support learning for English language classrooms in the 21st century. Thus, the findings on how the teachers developed their knowledge during the creation of a digital storytelling project were examined under the themes of reasons for using technology and digital storytelling, technology selection, lesson preparation, and assessment.

Reasons for using technology and the adoption of digital storytelling as a way to promote digital literacy. The teachers reported that digital storytelling supports the technology integration programme in their school, where the school has obliged teachers to strengthen students' digital literacy.

For example, Jane reported:

> *Our school's vision consists of building an evolving **digital learning community** that strengthens knowledge and skills that empowers students to be creative **digital citizens** throughout their lives. We then have to understand how **technology** can be structured and incorporated into real classroom materials. In this topic, we use **digital storytelling project** as it improves the students' **digital literacy**, makes students more **fluent** in using the apps, and helps them **develop typing skills** and **other ICT skills**.*

Technology selection. Accessibility was a key factor that influenced teachers in selecting a technology. For example, Audrey reported:

> *We use RazKids as it provides a number of digital texts that **can be accessed** by the students during the lesson. Therefore, we mostly prefer to use RazKids in our lessons to build the students' knowledge before creating digital storytelling.*

Lesson preparation. The findings showed that lesson planning was one of the core elements that teachers have to prepare before implementing the lesson. The TPACK framework helps the teachers frame the lessons effectively.

For example, Jane reported:

> *In teaching English, the methods and strategies **should fit** the **content, pedagogy, and technology**. Therefore we **planned** appropriate technological, pedagogical practice and the content of materials and we **learned** how to integrate it before the implementation of the lessons.*

Reasons for using technology to assess learning. Teachers indicated that they used a range of technology-enhanced evaluation methods.

For example, Audrey reported:

> *The reason we use online assessment by using Seesaw application is to make learning **visible** to everyone (e. q. students and parents). We could give **immediate feedback** for the students' assignment, and their parents can **track the record** for their children learning progress by login using parents account. This kind of online assessment **helps me** learn to what degree the learning outcomes are accomplished. It **helps** me to make a reflection on learning.*

This finding revealed that technology had enabled teachers to monitor the students' learning, making it more visible and accessible. Table 1 shows the teaching scenario constructed in the teachers' lesson plan design.

TABLE 1
Activity Scenario of the Digital Storytelling Project

No.	Scenarios of teaching	Details of the scenarios
1.	Access	Access iPads and connect to the internet Login into *RazKids* and search for the narrative text
2.	Analyse and evaluate	Derive meaning the narrative text Retell the text that has been read in *Seesaw*
3.	Create a Digital Story	Create novel stories by following the model writing and guided writing that has been given using *Google docs* Conduct online research using a search engine on *Google* to develop the idea of writing (e.g., theme, pictures, etc.)
4.	Collaborate	Collaborate and share the story with peers using *Google docs* and the online rubric for the assessment
5.	Revise	Revise the story based on feedback provided from peers and teachers
6.	Presentation	Present a digital storytelling project and post it to *Seesaw*

Table 1 shows the teaching scenarios during the creation of a digital story project. The teachers developed six main activities in the lesson (scenarios 1–6), including the scenarios to access information, analyse, evaluate, create, collaborate, and reflect. These activities aimed to create opportunities for students to build knowledge as well as solve authentic, real-world problems. Based on pre-teaching interviews, the students should have a strong knowledge foundation before they are exposed to the project. To begin with, the process of learning started with the activity of accessing digital text (scenario 1), where the students access the narrative text through their iPads or laptops using the *RazKids* application.

This activity was followed by analysis and evaluation of the text in which teachers asked students to read and analyse the text chosen in the *RazKids* (e.g., logical flows, idea and the features of the text). In this scenario, the fundamental features of narrative text were also introduced, such as generic structure and language components (e.g., vocabulary, grammar, and pronunciation) before starting the project. As the output in this activity, the teachers asked the students to retell the given story and upload it onto the *Seesaw* application. In scenario 3, the teachers initiated the project of digital storytelling as pedagogical innovation with several learning activities (e.g., group formation, topic brainstorming, field observation, outlining and drafting, creating a digital story and sharing). The students were guided to start their own writing using *Google docs* by shadowing the model of writing provided by the teachers (scenario 4). During the process of writing the digital story, the students brainstormed using online guided writing to enrich their ideas. After that, the students revised their writing based on feedback from their peers and teachers. As the last part of the scenario, the teachers asked the students to present their project and submit their work on *Seesaw* (Scenario 6).

In this study, the teachers provided learning activities to young learners of English in the creation and presentation of digital storytelling that presents in spiral empowerment (Hobb, 2017), which in turn activates students' digital literacy to support learning in the 21st century. When it is used in appropriate ways, digital storytelling can afford primary students' skills in the 21st century comprising critical thinking, problem-solving and research skills, technological tools and traditional literacies (Churchill, 2020). Digital storytelling promotes the creation of digital literacy by students in the context of an upper primary classroom (Churchill, 2020). In line with this study, it was found that a digital storytelling project could improve digital literacy in the English language classroom as the students become more fluent in using the apps.

In designing the lessons, the teachers confirmed that the framework of TPACK was used to sequence the lesson effectively. The data from video recordings showed that the teachers had drawn the development of their technological, pedagogical and content knowledge in their real teaching practice during the digital storytelling project, as seen in Table 2.

TABLE 2
Analysis of English Teachers' TPACK from Video Recordings

Coding Scheme	Definition	Example
TK	Knowledge about and ability to use various technological tools.	Can use a smartboard, laptop or iPads to develop and implement a digital storytelling project.
PK	Knowledge about and ability to create successful teaching and learning.	Uses a variety of teaching and evaluation methods such as small group discussion and individualised instruction effectively.
CK-the structure and types of narrative the text	Knowledge about the body and structure of the narrative text.	A clear explanation of the setting, characters, plot and the implicit messages.
CK-the language features of the narrative	This represents the knowledge about the language features of the narrative text.	A clear explanation of language features required in the narrative text, such as past tense, figurative language and metaphors.
TPK	Knowledge about and the ability to integrate particular technological tools and the intended learning strategy.	Able to integrate ICT to present the lesson effectively (e.g. using *RazKids* for levelled reading, *Seesaw* for assessment and portfolios, *Google docs* for writing).
PCK	Knowledge about and the ability to deliver a particular learning strategy to the specific subject matter.	The teacher presents a lesson on the theme of the narrative text using guided questions to build the students' initial concept of the narrative text.
TPACK	This represents unique knowledge of the integration of technological, pedagogical and content knowledge and its intersection.	The teachers use *RazKids* to offer the students a number of narrative texts and build students' communication and collaboration skills through online collaboration using note functions in *Seesaw* and *Google docs*.
XK	This represents the awareness and knowledge of a wide range of technologies available, policies, etc.	Clear explanations of the policy of technology integration in their school *"Bring Your Own Device" (BYOD)*.
TPK-digital literacy	Knowledge about and ability to integrate digital literacy into teaching instruction.	Teachers can incorporate digital literacy skills into learning activities. Teachers help students to identify appropriate technology tools for learning.

The creativity of teachers as designers is the success of technological integration with respect to technology, pedagogy, and content combination (Tseng et al., 2011). Therefore, the main components of TPACK, new technologies and related pedagogies need to emerge to improve student learning and success. Concerning the use of technology with fourth-grade students, technology could be incorporated to engage them in content reproduction to construct both verbal and visual expression in multiple texts. Thus, pedagogical knowledge to transmit the content (PCK), supported by a number of useful technological devices (TCK, TPK), affects the failure or the success of the teaching process. In other words, teachers cannot count on technology without sufficient pedagogical competence. Moreover, fourth grade is a momentous and essential year for English teaching. Thus, considering the uniqueness of students' developmental characteristics at an age when they are very active and curious, teachers should be able to provide them with demanding texts, appropriate content materials, and technology to meet the multi-literacy expectations, particularly in English teaching. Literacy expectations in English were not in line with the students' ability to read and write. The development of teachers' TPACK further addressed students' multi-literacy capability, which covered the fundamental skills to comprehend ideas and information as well as symbols and multimedia in a range of contexts. This skill should be accompanied by the fundamental skills to access a wide range of digital information safely and effectively.

The role of teachers as creators and mentors during lessons makes a vital contribution in EFL teaching. Thus, teachers should be able to design particular learning activities that allow students to work collaboratively and solve the given problems authentically. The framework of TPACK can be used to capture some of the essential qualities required for technology integration, pedagogical practices and specific content material. Therefore, teachers cannot only rely on technologies without considering multiple layers of technology integration, such as teaching preparation, pedagogy practice, the subject

matter, and multi-literacy for learning in the 21st century learning. It is expected that the utilisation of technology through digital storytelling with the help of the TPACK framework enhances English teachers' capability to create meaningful learning experiences, which enables students to activate both cognitive skills in reading and writing, as well as technical skills such as product composition, images and design using technology. This study suggests that rather than assuming that students are intuitively capable of using technology and creating digital text, the framework of the lessons should consider the aspect of technological, pedagogical, and content knowledge that guide students to demonstrate those skills can be more useful.

Conclusion

The role of teachers as creators and mentors during lessons makes a vital contribution in EFL teaching. Thus, teachers should be able to design particular learning activities that allow students to work collaboratively and solve the given problems authentically. The framework of TPACK can be used to capture some of the essential qualities required for technology integration, pedagogical practices and specific content material. Therefore, teachers cannot only rely on technologies without considering multiple layers of technology integration, such as teaching preparation, pedagogy practice, the subject matter, and multi-literacy for learning in the 21st century learning. It is expected that the utilisation of technology through digital storytelling with the help of the TPACK framework enhances English teachers' capability to create meaningful learning experiences, which enables students to activate both cognitive skills in reading and writing, as well as technical skills such as product composition, images and design using technology. This study suggests that rather than assuming that students are intuitively capable of using technology and creating digital text, the framework of the lessons should consider the aspect of technological, pedagogical, and content knowledge that guide students to demonstrate those skills can be more useful.

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