Appropriating TPACK in Preparation for Hybrid Learning: Innovations in Teaching Practices[1]

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Abstract

The sudden school suspension during the Covid-19 pandemic forced 218,234 primary and secondary schools in Indonesia to shift into emergency remote teaching (ERT) when internet was not easily accessible in some regions, and many teachers were not ready for the disruption. Almost two years after the sudden shift to remote learning, teachers in our previous study (Lie et al., 2020) were re-contacted and invited to participate in this reported study. This longitudinal case study aimed to explore teachers' progression during the ERT. Specifically, this study set two questions: 1) How have teachers progressed in their online learning engagement in reference to the degrees of appropriation during the ERT?; and 2) How is teachers' readiness to sustain their Technological-Pedagogical-Content Knowledge (TPACK) skills in the context of planned hybrid learning? The study collected data through a survey, interviews of teachers and their students, and observations of their online classes. An online questionnaire was first sent to 18 secondary school teachers of English and Indonesian from four regions in Indonesia. Based on the questionnaire results, seven teachers were selected for a more in-depth study, which involved interviews with the teachers and online classes observations. A group interview with five students for each teacher was used as triangulation. This study found that, regardless of their prior exposure to technology, some teachers had, within a twenty-month period of ERT, appropriated their TPACK while some were still striving to transform their role. In addition, teachers demonstrated different levels of readiness for hybrid learning and of sustaining their TPACK skills.

Resumen

La suspensión repentina de las escuelas durante la pandemia de Covid-19 obligó a 218 234 escuelas primarias y secundarias en Indonesia a cambiar a la enseñanza remota de emergencia (ERT) cuando Internet no era fácilmente accesible en algunas regiones y muchos maestros no estaban preparados para la interrupción. Casi dos años después del cambio repentino al aprendizaje remoto, se volvió a contactar a los maestros de nuestro estudio anterior (Lie et al., 2020) y se les invitó a participar en este estudio informado. Este estudio de caso longitudinal tuvo como objetivo explorar la progresión de los docentes durante la ERT. Específicamente, este estudio planteó dos preguntas: 1) ¿Cómo han progresado los docentes en su compromiso de aprendizaje en línea en referencia a los grados de apropiación durante la ERT?; y 2) ¿Cómo es la preparación de los docentes para mantener sus habilidades de Conocimiento Tecnológico-Pedagógico-Contenido (TPACK) en el contexto del aprendizaje híbrido planificado? El estudio recolectó datos a través de una encuesta, entrevistas a maestros y sus alumnos, y observaciones de sus clases en línea. Primero se envió un cuestionario en línea a 18 profesores de secundaria de inglés e indonesio de cuatro regiones de Indonesia. Con base en los resultados del cuestionario, se seleccionaron siete maestros para un estudio más profundo, que involucró entrevistas con los maestros y observaciones de clases en línea. Se utilizó como triangulación una entrevista grupal con cinco estudiantes por cada docente. Este estudio encontró que, independientemente de su exposición previa a la tecnología, algunos maestros, dentro de un período de veinte meses de ERT, se apropiaron de su TPACK mientras que algunos todavía se esforzaban por transformar su rol. Además, los maestros demostraron diferentes niveles de preparación para el aprendizaje híbrido y para mantener sus habilidades TPACK.

Introduction

The sudden school suspension enacted in Indonesia on March 24, 2020, due to the Covid-19 pandemic forced all teachers to shift into remote learning. A study by Ginting et al. (2021) found that teachers demonstrated their readiness to host emergency remote teaching during the pandemic. Fachriansyah (2020) reported that teachers were left with little support for optimal online learning. During the suspension, emergency remote teaching was conducted with varying levels of engagement. "At best, a few teachers managed to execute online learning by engaging students in video conferences and different learning management systems (LMS). At worst, however, learning simply did not take place for many students" (Lie et al., 2020, p. 805). These teachers lacked resources to engage in emergency remote teaching and did not develop their technological pedagogical and content knowledge (TPACK), as many of their students did not have access to internet connections and other necessary gadgets (Allo, 2020; Lie et al., 2020). In between those two points, students were still grappling with their readiness and motivation (Prijambodo & Lie, 2021) to participate in video-conferencing sessions in their classes.

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The decline of Covid-19 cases in Indonesia in August 2021 coincided with reports that prolonged school closure had caused learning loss (Azevedo et al., 2021; Covid-19 is widening Indonesia's education gap, 2020; Loasana, 2021; Purwaningsih & Lie, in press;). This situation prompted the Indonesian Ministry of Education and Culture (MoEC) to instruct schools to reopen on condition that stringent health protocols during the implementation of limited face-to-face learning be fulfilled and that parents give their consent. In the wake of the school reopening, issues of hybrid and blended learning have emerged in the discourses of education stakeholders. In January 2022, schools started to open in varying degrees of hybridity (percentage of students in attendance), depending on the outbreak severity level in each region.

The pandemic disruption magnified the widening digital divide due to pre-existing socio-economic factors across the country. Our previous study (Lie et al., 2020) examined 18 teachers from four provinces in Indonesia and found four out of five levels of engagement ranging from little or no online learning at all through intermediate level involving an interplay of related factors with online learning processes, as summed up in Figure 1.

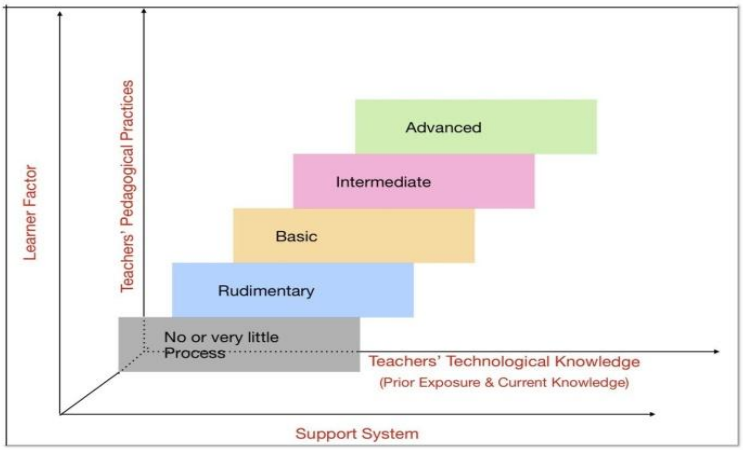

Figure 1: Levels of online learning engagement and the factors (Lie et al., 2020)

None of the teachers in our previous study reached an advanced level of online learning engagement in the first semester of remote learning from March to June of 2020. The range from little or no online learning at all through intermediate level was related to five factors, namely "the learners, teachers' prior exposure to distance learning, technological knowledge, pedagogical knowledge and support system" (p. 816).

Numerous studies on distance learning during the pandemic have been published (Akram et al., 2021; Alshammari, 2021; Bozkurt & Sharma, 2020; Hadriana et al., 2021; Hodges et al., 2020; Lie et al., 2020; Mahdum et al., 2019; Prijambodo & Lie, 2021; Spoel et al., 2020). These studies focused on the occurrences of online learning, including students' and teachers' motivations, behaviors, and performances. In countries where Covid-19 cases began to decline and where governments reopened schools, the transition from remote learning to face-to-face schooling became a blank space for researchers to fill in and help education policymakers with insights on stakeholders' readiness. The unpredictability of the pandemic situation set a precarious stage for the implementation of limited face-to-face learning. The Indonesian Ministry of Education and Culture prescribed that no more than 50% of the students could be present on-site with strict health protocols and parents' consent. This mandate entailed teachers' readiness to design and manage blended or hybrid learning. Questions about teachers' TPACK competence including their progression during the remote learning period and the sustainability of the newly acquired skills emerged, as the research gap this study intended to fill in.

In this study, 18 teachers who were involved in our previous study were recontacted and invited to participate in this current study. This study aimed to find out their progression within a period of twenty months and explored two issues:

1. *How had teachers progressed in their online learning engagement in reference to the Degrees of Appropriation during emergency remote teaching (ERT)?*
2. *How was teachers' readiness to sustain their TPACK skills in the context of hybrid learning?*

Literature Review

Two main theoretical frameworks used as references in this study are the five degrees of appropriation (Grossman et al., 1999) and TPACK (Mishra & Koehler, 2006). Based on the activity theory evolving from the work of Vygotsky (1978, 1987), Grossman et al. (1999) list five degrees of appropriation to reflect degrees of in-depth understanding: lack of appropriation, appropriating a label, appropriating surface structures, appropriating cultural underpinnings, and achieving mastery. They explain that these levels are not consecutive stages to be reached as appropriation is a construct that does not accommodate stages of development; rather, it consists of a cluster of various relations to an artifact, as active and dynamic social and communicative processes. "Appropriation refers to the process through which a person adopts the pedagogical tools available for use in particular social environments (e.g., classrooms) and through this process internalizes ways of thinking endemic to specific cultural practices" (p. 15).

Furthermore, Grossman et al. extend the concept of appropriation in conjunction with activity settings and pedagogical tools. "Activity settings encourage particular social practices that presumably participants will come to see as worthwhile means to a better future. Activity settings provide constraints and affordances that channel, limit, and support learners' efforts to adopt the prevailing social practices" (pp. 6-7). Pedagogical tools include conceptual and practical tools.

The second theoretical framework is TPACK, a model that was first introduced by Mishra and Koehler (2006) by adding technology knowledge to complement pedagogical content knowledge (PCK) model by Shulman (1986). In the TPACK framework, three domains for teachers to master are:

1. pedagogical knowledge (PK): understanding of teaching-learning approaches, methods, and techniques, and evaluation.
2. content knowledge (CK): understanding of the subject matter taught.
3. technological knowledge (TK): the knowledge of the technology used to enhance educational practices.

Those three domains then form an interplay of PCK, TPK, and TCK described as follows:

PCK (Pedagogical Content Knowledge) is teachers' knowledge of maintaining optimal teaching strategies required for presenting the intended teaching content.

TPK (Technological Pedagogical Knowledge) is teachers' knowledge of utilizing technology in instructional practices

TCK (Technological Content Knowledge) is teachers' knowledge of presenting the teaching content by the use of technology.

Finally, as an amalgam of three overlapped domains of teachers' knowledge, TPACK is teachers' knowledge of fostering students' learning of a specific teaching content by the use of optimal technology and pedagogy. In conclusion, the TPACK model demonstrates how to combine technology with pedagogy and subject-matter expertise to provide more relevant teaching approaches that may fulfill 21st-century expectations.

There have been numerous studies referring to Grossman et al. (1999), as well as Mishra and Koehler (2006). Lund (2003) adopted Grossman et al.'s (1999) appropriation theory to study beliefs, practices, and appropriation of English as a Foreign Language (EFL) teachers in information communication technology (ICT) rich environments and offered a similar leveling of teachers' in-depth understanding of their pedagogical practices. In their study of new teachers' reflections and learning, Sanchez et al. (2022) refer to both conceptions and practices, as iterated by Grossman et al. (1999), and conclude that teachers need not only conceptual tools like principles, frameworks, and heuristics to consolidate understanding, but also practical tools like strategies, methods, and practices. In her study of onsite coaching for prospective teachers, Hinojosa (2022) focused on stage three of the framework (Grossman et al., 1999) to illustrate the systematic developmental process, in which teachers deliberately enacted instructional strategies from university course work.

The other reference in this study, the TPACK model has gained popularity as teachers have had to resort to technology integration in their remote teaching. By the same token, this model was widely used by researchers particularly during the pandemic remote teaching. Lee et al. (2022) conducted a bibliometric analysis of TPACK from 2011 to 2020 retrieved from the Scopus databases and found 700 articles, representing 63 countries and 159 journals. They also found that the number of articles on TPACK is on the rise every year. The reference to TPACK has gradually turned to practical strategies to facilitate teachers to implement technology-assisted teaching.

This present study pairs both Degrees of Appropriation (Grossman et al., 1999) and TPACK (Mishra & Koehler, 2003) to explore teachers' progression in their TPACK skills during the ERT and their readiness to sustain those skills beyond the pandemic. Grossman et al's article (1999) does not address the use of technology in the teaching of English but the discussion on appropriating "pedagogical tools" in particular

activity settings is a useful reference to highlight the findings of our previous study (Lie et al., 2020) and to elucidate the appropriation and maintenance of TPACK in the present study. This article suggests benchmarking the findings from our previous research (Lie et al., 2020) against the five degrees of appropriation (Grossman et al., 1999) as seen in the following table.

Levels of Online Learning Engagement (Lie et al., 2020)	Five Degrees of Appropriation (Grossman et al., 1999)
No or little learning	Lack of appropriation
Rudimentary	Appropriating a label
Basic	Appropriating surface structures
Intermediate	Appropriating conceptual underpinnings
Advanced	Achieving mastery

Table 1: Levels of online learning engagement and five degrees of appropriation

Furthermore, this current study uses the appropriation framework (Grossman et al., 1999) to explain teachers' progression in their online learning performances twenty months after the sudden shift. In the context of our current study, we took into account the pedagogical tools, including conceptual and practical tools. The conceptual tools are principles, frameworks, and ideas about teaching and learning a language while practical tools are their technological skills ingrained into the TPACK framework (Mishra & Koehler, 2006).

Research Method

This longitudinal case study spanned through a period of twenty months and looked into teachers' progression during the remote learning period. Our previous study (Lie et al. 2020) examined 18 teachers from four provinces in Indonesia and found four levels of engagement ranging from little or no online learning at all through intermediate level involving an interplay of five related factors of online learning processes. Learners, teachers' prior experience in remote learning, knowledge of technology, pedagogy, and a support system are the five factors. Data collection in that study occurred from March through mid-June 2020. When data collection was completed, contact with these teachers was maintained in a *WhatsApp* group.

Contexts and participants

The school closure accelerated many teachers to grasp the technological knowledge to sustain remote learning, as well as prevented many others from delivering learning at all. Almost two years after the sudden shift to remote learning, teachers in our previous study (Lie et al., 2020) were re-contacted in September 2021 and invited to participate in this reported study. The study collected data through a questionnaire, interviews of teachers and their students, and observations of their online class. An online questionnaire was first sent to the eighteen teachers from four regions in Indonesia. One item in the questionnaire asked about their willingness to participate in a further study, which involved in-depth interviews with the teachers, online class observations, and a group interview with five students for each teacher. Seven consented, but along the way, one of them quit the project.

The seven teachers (five female and two male) had varying years of teaching experience. One was a novice teacher with less than five years of teaching experience, three were senior teachers with more than fifteen years and the other three had taught between 10 to 15 years. Six of them taught English covering all the four language skills and one taught Bahasa Indonesia. See Table 3 for teacher participants' initial online learning engagement level a few months after the school suspension started and their contexts almost two years afterwards.

Data collection and analysis

This study used a mixed method approach (Creswell, 2014), employing three instruments of data collection: questionnaire, in-depth teacher interviews, and observation of online class recordings. As triangulation, online focus group discussions (FGD) with a group of five students per teacher were conducted. Table 2 shows the use of instruments.

	Self-Perceived	As Perceived by Others
Appropriation of TPACK during the remote learning period	Questionnaire	FGD with Students
Readiness to sustain TPACK skills to deliver hybrid learning	Teacher In-Depth Interview	Class Observation

Table 2: Research Design

In reference to Schmidt et al. (2009) who developed a questionnaire to operationalize Mishra and Koehler's model (2006), this study constructed a questionnaire capturing the seven domains of TPACK: Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical and Content Knowledge by further adapting instruments developed by Rolando et al. (2021) and Zaeni et al. (2021). The TPACK instrument by Rolando et al. (2021) was targeted for biology teachers while that of Zaeni et al. (2021) integrated higher order thinking skills (HOTS) into the items intended for math teachers. Therefore, this study modified some statements from both instruments and created new items catered to language teachers. Then, more items were adapted from Lund (2003), who investigated English teachers' appropriation in ICT-rich environments.

Some items pertaining to seven TPACK domains were provided with paired statements to reveal their TPACK ability in the beginning of their distance learning journey from March to April of 2020 and the situation in September of 2021. The questionnaire was piloted to five teachers and some items were revised accordingly. The validation of the questionnaire engaged a total of 145 teachers of English and Indonesian from 50 senior high schools, 35 junior high schools, and five elementary schools from 56 cities in 13 provinces in Indonesia in early September of 2021. Through some statistical analysis, the validation study found the questionnaire to be valid and reliable. The item analysis using confirmatory factor analysis has indicated the valid measurement of the survey items. Five of the six indicators have been reported as 'fit' with only one 'marginal fit.' The construct reliability value has been reported to range between .71 and .94 indicating the confirmation of the reliable survey items (Tamah et al., 2022). The questionnaire is available in Appendix 1.

A rubric (See Appendix 3) was developed to guide the class recordings observation. The rubric covers factors related to the implementation of TPACK: teacher, students, platforms/tools, and learning processes. In-depth interview and FGD questions were formulated by the researchers' team involving a pre-service teacher and an in-service teacher. Then, the questions were tried out with five teachers not involved in the study and revised accordingly before administering them to the study participants (see Appendix 2 for interview prompts).

After a briefing on the written research procedures via *Zoom* video-conferencing application, all seven teachers signed an informed consent form and filled in the online questionnaire in mid-September of 2021. Then, after the teachers had taught their online classes from October to November of 2021 and sent the recordings, each of them was interviewed online and were asked to choose five students to meet online with the researchers for an FGD. For the first three study participants, all three researchers were present in the interviews and FGDs and assessed the class recordings to fine-tune the instruments and establish inter-interviewer reliability. Afterwards, two researchers did each observation, interview, and FGD.

Responses from the questionnaire were used as preliminary data to describe the context and challenges of emergency remote teaching for the six teachers in this study. The challenges they faced during the imposed learn-from-home mode were further revealed through a case study of six teachers. Observation results of the six class recordings were compared with those conducted in April 2020 in our previous study when they just started their emergency remote teaching. Data from in-depth interviews and FGDs with students demonstrated how the extended suspension of face-to-face classroom meetings had enabled teachers to appropriate their TPACK abilities to adjust their teaching practices to the continuing remote learning.

To answer the research questions, responses from the questionnaire were analyzed through descriptive statistics on SPSS, verified with teacher interview and observation results and triangulated with results of FGDs with students of each teacher. Qualitative data from observations, interviews and FGDs were coded and clustered by themes using NVivo.

Findings and Discussion

In light of the enormous information and insights out of our data, findings presented in this paper are mostly summaries of the results. All names are pseudonyms and all teachers' quotes are written as is.

Prior to presenting and discussing the findings to address the research questions, Table 3 presents an overview of the study participants' progression over a period of twenty months.

No.	Teacher	Years of Service	Online Learning Engagement Level and Contexts in March-June 2020	Online Learning Engagement Level and Contexts in September-November 2021
1	Rosa	> 15 years	No or little learning process (Lack of Appropriation) She did not conduct emergency remote teaching and had never used any online platform before the school closure.	Quit the project
2	Aaron	> 15 years	No or little learning process (Lack of Appropriation) He did not conduct optimal online learning and had never used any online platform before the school closure.	Intermediate (Appropriation of Conceptual Underpinnings) He used English most of the time, as well as *Google Meet* and *PowerPoint* with animations. He sent materials to students before class although he sometimes forgot. It was still teacher-centered and direct teaching but more interactive with questions and annotating points on slides. Although he did not use any supporting apps, the few he did, effectively supported his teaching.
3	Andy	< 5 years	Rudimentary (Appropriating a Label) He had never engaged in any form of emergency remote teaching or blended learning before the pandemic started. Then, he learned to use learning materials in synchronous online sessions.	Rudimentary (Appropriating a Label) He had participated in information technology (IT) workshops at the beginning of the pandemic but then got tired of exploring various learning resources and apps. He used basic video conferences and shared *PowerPoint* slides to conduct direct teaching.
4	Alisa	between 10-15 years	Basic (Appropriating Surface Structures) She used synchronous online sessions. She sent instruction and learning materials via *WhatsApp* (WA) and email. She received many questions from students and answered them via WA and email.	Basic (Appropriating Surface Structures) Twenty-two students were on-camera. She involved a student as her assistant. She engaged students through songs related to the topic of the day. A student assistant was involved in displaying the *PowerPoint* slides. All questions were elicited by the teacher. The whole-class session was teacher-centered.
5	Paula	> 15 years	Intermediate (Appropriation of Conceptual Underpinnings) She used *Google Meet* for videoconferences and a *Moodle*-based LMS. She also used a few supporting Apps. In addition, she communicated with her students through *WhatsApp*.	Intermediate (Appropriation of Conceptual Underpinnings) She used the *Moodle* LMS to upload Assignment and Materials and keep students' Attendance. Her scoring rubric was initially shown to the students. Nine students gave individual presentation. The presenting students showed their speaking ability by describing the topic (using *PowerPoint*) and then feedback/comment was provided by the teacher (one-to-one communication). Interaction was only between the teacher and presenting students; the others were there listening only.
6	Salma	between 10-15 years	Intermediate (Appropriation of Conceptual Underpinnings) She used *WhatsApp* groups, *Zoom, Office 365, One Note,* and *Class Note.* She knew how to use the share-screen feature in *Zoom* (*PowerPoint* and video). She provided assignments through *Office 365* while planning to use *Class Note*. She used *Kahoot* and *Mentimeter* for quizzes. She asked students to make a video and upload it to her *Instagram*. Some	Advanced (Achieving Mastery) Thirty-three students were present (Grade 7); all were on-camera. Hybrid was already being used in her school at that moment. She used *YouTube* clips to explain telling time, *Jamboard* for group activities, *Kahoot* for assessment, and *Mentimeter* for surveys. Sway for presentation but handicapped by connection issues. The screen of the different apps did not show well. Using the LMS, *Microsoft Teams*, she gave pretty challenging assignments and gave feedback on *Teams*. Other than a few technical glitches, the class was managed well. At the end, *Kahoot* was used for assessment, and she asked students for feedback. Students regarded her as an excellent teacher. She used almost 100% English.

			parents were concerned with the security system of *Zoom*. She was responsive to what was mandated by the *Dinas Pendidikan* (the local education authority)	
7	Aurora	between 10-15 years	Intermediate (Appropriation of Conceptual Underpinnings) She used *Google Classroom, Zoom, Google Meet,* and *Edpuzzle.* She made use of *Google Classroom* to attach videos and *PowerPoint*. For students who didn't show up in online class, she asked her students to do tasks in *Edpuzzle*. She could make use of the grading system in *Edpuzzle* and transfer it to an *Excel* file. She also could use the rubric feature of the LMS.	Advanced (Achieving Mastery) She seemed skillful in operating the LMS, *Google Meet,* and supporting apps through a few technical glitches due to internet connection issues. She used *Padlet* as an organizer to upload attendance, mindmapping, learning video on noun clauses, E-module, and a sample of "About Me" *Sway* presentation. She used 60% English while sometimes code-switching to Indonesian for class instruction. The learning video was played to explain noun clauses, but she also re-explained it after the video.

Table 3: Participants' online learning engagement

To answer the two research questions, this study attempted to track the progression of the seven teachers as listed in Table 3 from the beginning of the pandemic suspension to September, 2021.

Progression of online learning engagement in reference to degrees of appropriation

In March to June of 2020, two of these seven teachers admitted using little or no online learning in their classes, one at the Rudimentary level, one Basic, three Intermediate, and none Advanced. In Grossman's (1999) framework, two were at the lack of appropriation, one at the appropriating a label, one at appropriating surface structures, three at appropriating conceptual underpinnings and none at achieving mastery. One month after starting this current study, one of the two teachers who admitted no or little online learning in 2020 quit the project stating that she "did not have much progress because of the overwhelming constraints" (Rosa, 7 October 2021). Teaching in a remote region where students' access to the internet and gadgets was very limited, this teacher seemed to stall at the lack of appropriation level and revealed that the constraints dominated affordances, thereby reducing technology's functional potential in her activity context.

The other teacher Aaron, who had been at the lack of appropriation level at the beginning of the pandemic, significantly jumped to the appropriating conceptual underpinnings level twenty months afterwards while three teachers remained at the same level as before – Andy at the appropriating surface structures level, Alisa at the appropriating surface structures level, and Paula at the appropriating conceptual underpinnings level. On a positive note, this study reveals that two teachers who had reached appropriating conceptual underpinnings at the beginning of the school suspension in 2020 progressed into achieving mastery. In summary, this graph shows the teachers' levels of progression (Figure 2).

Notes: 1: Lack of Appropriation; 2: Appropriating a Label; 3: Appropriating Surface Structures; 4: Appropriating Conceptual Underpinnings; 5: Achieving Mastery

Figure 2: Teachers' progression of the appropriation levels

The graph shows an overall progression of the study participants over a period of twenty months. Findings and discussion of individual cases, particularly on how they progressed higher or remained at the same level, are organized, based on self-perceived data from teachers' questionnaire responses and interviews, followed with those as perceived by others from online class observations and students' FGDs.

Self-Perceived

The self-perceived appropriation of TPACK during the school closure is revealed through the questionnaire results and teachers' in-depth interviews. The questionnaire elicited teachers' perceptions of their TPACK abilities on the seven domains through 26 pairs of statements on a Likert scale of 1 (strongly disagree) to 4 (strongly agree). The following Table 4 presents a summary of the questionnaire results on the seven TPACK domains. Each number is an average of their chosen responses to the statements within each domain.

Teacher	PK		CK		TK		PCK		TPK		TCK		TPACK	
	Then	Current	Then	Current	Then	Current	Then	Current	Then	Current	Then	Current	Then	Current
Aaron	3.80	3.80	3.90	3.33	4.00	4.00	3.00	4.00	3.00	3.75	3.33	4.00	3.00	4.00
Andy	3.80	3.80	3.23	4.00	3.00	2.67	4.00	3.67	4.00	4.00	4.00	3.67	3.80	4.00
Alisa	1.60	2.80	2.90	3.00	2.67	3.00	2.67	3.00	2.75	3.25	3.00	3.00	2.40	4.00
Paula	3.50	4.00	4.00	4.00	3.00	4.00	3.00	4.00	3.00	4.00	3.00	4.00	3.00	3.80
Salma	3.00	4.00	4.00	4.00	3,00	4.00	3.00	4.00	3.00	4.00	3.00	4.00	3.00	3.80
Aurora	3.00	4.00	4.00	4.00	3.00	4.00	3.00	3.33	2.50	3.25	3.00	3.67	3.00	4.00
Average	3.12	3.73	3.67	3.72	3.11	3.61	3.11	3.67	3.04	3.71	3.22	3.72	3.03	3.93
Increase		0.62		0.05		0.50		0.56		0.67		0.50		0.90

Notes: *Then* refers to March-April 2020; *Current* refers to September 2021.

Table 4: Results of the teachers' self-perceived abilities on the seven domains of TPACK

The results showed that on average there was an increase in their self-perceived TPACK abilities on all seven domains. The increase spans from 0.50 to 0.90 except for the Content Knowledge domain, which yields only 0.05 increase.

Furthermore, the questionnaire also put five pairs of questions asking respondents what technology they used at the beginning of the remote learning period and currently. A summary of the responses is presented in Table 5.

Teacher	Timeframe	Communication Channel	Video Conference	LMS	Supporting Applications	Learning Resources
Aaron	2020	Line	Not one at the beginning	Google Meet	None	Social-Media, Ministry websites, & other sites
	2021	WhatsApp	Google Classroom	Google Meet	None	Social-Media, Ministry websites, & other sites
Andy	2020	Microsoft Teams	Microsoft 365	Microsoft Teams	Slido	Social-Media, Ministry websites, & other sites
	2021	WhatsApp	Microsoft 365	Microsoft Teams	Slido	Social-Media, Ministry websites, & other sites
Alisa	2020	Microsoft 365	Microsoft 365	Microsoft Teams	Kahoot, Quizziz	Social-Media, Ministry websites, YouTube, Canva, other sites
	2021	Microsoft 365	Microsoft 365	Microsoft Teams	Kahoot, Quizziz	Social-Media, Ministry websites, YouTube, Canva, other sites
Paula	2020	WhatsApp	Google Meet	Moodle	FlyExam, Quizizz	Social-Media, Ministry websites, YouTube, & other sites
	2021	WhatsApp	Google Meet	Moodle	FlyExam, Quizizz	Social-Media, Ministry websites, YouTube, & other sites
Salma	2020	WhatsApp	Microsoft 365	Google Meet	Kahoot, Quizizz	Social-Media, Ministry websites, YouTube, & other sites
	2021	WhatsApp	Microsoft 365	Google Meet	Kahoot, Quizizz	Social-Media, Ministry websites, YouTube, & other sites

Aurora	2020	WhatsApp	Google Classroom	Google Meet	Quizizz, Mentimeter / Pollev, Edpuzzle	Social-Media, Ministry websites, YouTube & other sites, Wooclap, Wordwall, GC, Sway, Quizziz, and Edpuzzle
	2021	WhatsApp	Google Classroom	Google Meet	Quizizz, Wordwall, Wooclap, Edpuzzle	Social-Media, Ministry websites, YouTube & other sites, Wooclap, Wordwall, GC, Sway, Quizziz, and Edpuzzle

Table 5: Online class technology use

This table shows there is no significant change in the use of video-conferences tools and LMS. This constancy may be due to the quick mandate by the education authority for all schools in their respective regions to use particular platforms. Amidst all the available platforms, *Microsoft* and *Google* stood out as winners due to the authority's mandate.

As a communication channel among education stakeholders, *WhatsApp* remained popular as it has always been among the general public in Indonesia. As a matter of fact, the very first action by teachers, as soon as the Ministry of Education and Culture announced school suspension in March 2020, was establishing *WhatsApp* groups with their students. This communication channel was still being maintained to complement the use of LMS. In the interview, one of the teachers in this study stated that he did not use any LMS in the few months following the school suspension announcement and so expanded the use of *WhatsApp* as a substitute for LMS to send materials and assignments, as well as receive students' works. In our previous study, this teacher admitted that little or no learning processes happened due to various reasons (Lie et al., 2020). When probed about his current situation, he mentioned using *Google Classroom* as an LMS but still did not use any of the supporting applications that other teachers did as reported in Table 5. The rest of the teachers in this study reported using a more variety of supporting applications and learning resources. In interviews, they mentioned that, over the months, they had learned to try and use them to make their online classes more engaging.

As perceived by others

Aaron who had progressed from the lack of appropriation level at the beginning of the pandemic to appropriating conceptual underpinnings twenty months afterwards was reported as a better teacher than before by his students in the FGD. They could understand his teaching and appreciated his use of English most of the class time. He used *Google Meet* and shared his content on *PowerPoint* animated to support his content explanation. He never engaged students in group work on the synchronous sessions and, yet, he had done his best to make the class activities more interactive by asking questions and giving students the chance to ask questions. Therefore, on a scale of 1-10, students rated him 9. One student in the FGD reported and was confirmed by the others, out of 33 students in his class, only 22 of them could consistently participate in his video conferences. The rest had access issues.

Aaron's class recording started with 14 students online and ended with only 11 of them, most of whom were off camera. As the students reported in the FGD, his class on narrative texts was engaging with his animated *PowerPoin*t slides, and he frequently annotated some points on the slide to make the points across. He swiftly switched between explanations and questioning to monitor students' understanding. Moreover, he occasionally praised students for giving out correct answers. In brief, although Aaron did not use a great variety of learning technology to support his teaching, he picked only a few – *Google Meet* and *PowerPoint* – and used these very basic platforms effectively to support his pedagogy and content delivery. In reference to Grossman et al. (1999), this teacher was aware of his constraints during the pandemic:

> *For my personal job as a teacher during this pandemic, I try my best to teach every… on every schedule that I have. But the basic problem that I have is most of the students, they are not serious to fulfil the online classes, so the reason is… the major reason is they have signal problems, they don't have enough financial support to buy the credit for their mobile phone. I think those two factors are the main causes that are blocking the students to take part actively.* (Aaron, 19 October 2021).

He knew that applying more attractive platforms would be more engaging for some of his students but realized that many others would not be able to participate due to the connection issues. Therefore, he adopted the pedagogical tools available for use in particular social environments (e.g., his class of mixed socio-economic classes) and through this process internalized ways of thinking endemic to specific cultural practices (e.g., using videoconferences to share his animated *PowerPoint* and deliver the content). Pedagogical tools include conceptual and practical tools. In the context of our current study, conceptual

tools are the teachers' principles and ideas about their content while practical tools are their technological skills ingrained into their TPACK (Mishra & Koehler, 2006). He chose to use the basic technology and did his best to engage his students through his pedagogical tools. In brief, he did not let the constraints hinder the affordances of his pedagogy.

On a different note, Andy, Alisa, and Paula remained at the same level. At the beginning of the pandemic, they went through IT training and attempted to innovate in their teaching, but, over the months, they got tired of the available resources. Like Aaron, they did not make use of the variety of technological tools and demonstrated teacher-centered style. However, unlike Aaron, these teachers did not manage to reconcile their practical tools with the pedagogical tools to meet the educational needs of their students. In other words, these three teachers did not employ technology to engage their students, enhance their pedagogy, and achieve the learning objectives.

On a brighter note, in addition to the basic video-conferencing tools and the LMS, two teachers who achieved mastery demonstrated skills in employing a variety of learning apps, such as Padlet*, Kahoot, Mentimeter,* and *YouTube* clips, to engage students and deliver their materials. On the flip side, instead of explaining the content materials themselves, these two teachers asked their students to listen to downloaded digital materials (*YouTube Clip* and some E-modules). Afterwards, they emphasized the important points of the digital materials. During their online classes, their activities were interrupted with a few technical glitches. Yet, this constraint did not deter them from continuing to use a variety of tools. At the appropriation of conceptual underpinnings level at the beginning of the pandemic, these teachers used "the tools in innovative ways and/or in new contexts. Such teachers might design integration programs, ICT-rich environments, and situations conducive to learning where technologies are integrated in disciplinary, cross-disciplinary, and social relations'' (Lund, 2003, p. 50). Almost two years afterwards, they further upgraded their TPACK skills and achieved mastery.

To sustain the innovative practices and achieve mastery, these two teachers managed to transform the synergy of conceptual and instrumental appropriation. They were not perfect yet and not 100% of their students could be engaged, but these teachers were able to adapt to current practices and discourses of online learning. In the perspective of Grossman et al. (1999), these teachers have situated themselves as learners in the activity setting of online learning and "appropriated the conceptual underpinnings of a pedagogical practice." (p. 18) Their progress to the highest possible level of appropriation promises renewal and innovation. In his study of EFL teachers, Lund (2003) notes that "teachers would know how ICTs might infuse and change social practices (like learning a language through participation in diverse practices) and design environments and activities that are conducive to such practices." (p. 50) At first observation of their recorded classes, the two teachers' use of digital materials created by others seemed like shifting their own responsibility to technology. Nevertheless, this act of capitalizing on technology may signal coping strategies by non-native teachers of English to provide model language input for their students, as well as themselves. A study on the language use of teachers of English found that some teachers resisted using English as a medium of instruction because they were not confident about their English proficiency (Lie et al., 2022).

Grossman et al. (1999) mention two factors affecting appropriation are the social context of learning and the individual characteristics of the learner. This study does not deal with the second factor as exploring individual characteristics of teachers as learners would require further in-depth inquiry into each study participant. The first factor was visible in each teacher's path during the 20-month period of remote learning. Their interactions with their students in their respective environments, the provision of online learning resources (gadgets, reliable internet connection, and resources), the authority mandate, and the learning community with their fellow teachers shaped their decision to choose what kind of technological tools they used and how they used them to support their content delivery and pedagogy.

Readiness to sustain TPACK skills to deliver hybrid learning

Regardless of the teachers' appropriation level, most students in the FGDs expressed preference for offline learning over emergency remote teaching because they believed they performed better and needed non-virtual interactions with their classmates. A few of them opted for hybrid learning for fear of the potential third wave of the outbreak. In spite of students' preferences, hybrid learning has been occurring in some schools and is likely to expand–pending on the outbreak potentials–to some others that have started to be completely offline since January 2022. In consideration of this context, it is worthwhile to inquire teachers' readiness to sustain their TPACK skills to deliver hybrid learning.

Self-Perceived

A pair of statements in the questionnaire asked them to self-rate their TPACK abilities at the beginning of the pandemic closure and currently on a scale of 1-10 (very low-very high). Table 6 shows a summary of their responses.

Teacher	In March-April 2020	In September 2021
Aaron	5	8
Andy	8	5
Alisa	4	4
Paula	7	8
Salma	7	8
Aurora	8	9
AVERAGE	6.50	7.00

Table 6: Self-rating of their overall TPACK abilities

Overall, there is an increase in their self-rating. However, two cases of anomaly emerged in one teacher Andy rating himself currently lower (5) than before (8) and another one Alisa rated herself low and the same (4) at the beginning of the pandemic suspension and currently. Andy's self-perceived decline was also apparent in his responses on the TPACK domains. While his content knowledge (CK) was perceived to be improving, in three (TK, PCK, and TCK) out of the seven domains, he reported a decrease in his abilities (See Table 4). Probed about the decline, Andy mentioned in the interview that he had tried to upgrade his mastery of technology to enhance his online teaching and used them in his class. Nevertheless, he expressed his frustration that his teaching did not reach the learning outcomes as he found it challenging to monitor whether his students were on task during their remote learning. He often received complaints from some working parents that their children were not learning optimally at home as they were not able to supervise their children. Ironically, some of the submitted assignments indicated traces of parents' work. In brief, despite all this effort to upgrade his professional competences and make his online class more engaging, he was not sure whether his seventh graders were learning.

Although Alisa reported consistent improvement across the seven TPACK domains, she rated herself low (4 out of 10) and did not report any improvement in her overall TPACK performance over the period of 20 months, In the interview, she said, "TPACK is new for me, and so I still need to learn a lot more."

Teachers' readiness to sustain TPACK competences to deliver hybrid learning was captured in two series of questions. Pertaining to the cognitive side, the first series of questions asked what they thought about their various roles in a technology-assisted learning environment with response choices of *not important at all, insignificant, significant,* and *determining.* Table 7 summarizes their responses.

Teacher	Pedagogical Knowledge		Content Knowledge		Tech Know-ledge	Pedagogical Content Knowledge		Tech Pedagogical Knowledge	Technological Content Knowledge	
	Catalyst	Pedagogue	Language Input Model	Instructor	Tech Expert	Facilitator	Designer	Curator of Internet Resources	Navigator of Internet Resources	Interpreter of Internet Resources
Aaron	3	3	3	2	3	3	3	3	3	3
Andy	3	3	3	3	3	3	3	3	3	3
Alisa	2	3	3	3	3	3	-	2	3	2
Paula	4	4	3	3	3	4	4	4	3	3
Salma	4	4	3	3	3	3	4	4	3	4
Aurora	3	4	4	4	3	3	4	2	3	3

Notes: 1 = Note important at all; 2 = Insignificant; 3 = Significant; 4 = Determining

Table 7: The importance of roles in a technology-assisted learning environment

The questions asked how important teachers perceived the various roles in a technology-assisted learning environment. The researchers then clustered those ten roles across the TPACK domains. Then, this series of questions was wrapped up in a question where teachers saw themselves in a technology-enhanced learning environment on a scale of 1 (traditional) through 8 (virtual). The responses are listed in Table 8.

Teacher	March-April 2020	Sept-Oct 2021	Positioning
Aaron	Lack of Appropriation	Appropriation of Conceptual Underpinnings	7
Andy	Appropriation of a Label	Appropriation of a Label	5
Alisa	Appropriation of Surface Structures	Appropriation of Surface Structures	6
Paula	Appropriation of Conceptual Underpinnings	Appropriation of Conceptual Underpinnings	7
Salma	Appropriation of Conceptual Underpinnings	Achieving Mastery	7
Aurora	Appropriation of Conceptual Underpinnings	Achieving Mastery	7

Table 8: Teachers' self-perception in the spectrum of traditional-virtual

Teachers who showed progression in their appropriation levels (Aaron, Salma, and Aurora) were leaning more towards perceiving their roles as virtual than traditional teachers. Those who remained at the same level rated themselves 5 and 6.

To complement the first series, the ten questions in the second series dealt with the affective side and asked about their beliefs and feelings as teachers in a technology-enhanced learning environment. Five of the questions were stated in affirmative statements while five others in negative statements as seen in Table 9.

Affirmative Statements	Negative Statements
I believe I have valuable professional quality to offer.	I feel empty.
I believe I can offer my expertise as a competent language teacher.	I feel marginalized as a language teacher.
I feel my identity as a teacher is more affirmed.	I feel my identity as a teacher is deprived.
I feel more useful than before.	I feel insecure.
I feel like working in two different environments-physical and virtual that are enriching each other.	I feel like working in two conflicting environments-physical and virtual.

Table 9: Statements eliciting teachers' beliefs and feelings in technology-enhanced learning environment

The four choices are on a Likert scale of *Strongly Disagree* to *Strongly Agree*. Four out of six teachers consistently responded *Strongly Agree* to all the affirmative statements and *Strongly Disagree* to all the negative ones. Alisa, who rated herself low in the other sets of questions, responded *Agree* to the affirmative statements and *Disagree* to the negative ones. Consistent with his previous responses, Andy gave ambivalent responses as he chose *Strongly Agree* to all the ten statements. In the interview, he explained his situation:

> *At the beginning of the pandemic, the school organized IT workshops for us, one of them is training on using Microsoft Teams. Now, I can use Teams pretty well.... We teachers have become more innovative and creative in designing our online class, hoping that our students will respond well. But as this pandemic continues and our learning processes are limited, we get tired. So do many students. Only a few students have demonstrated their best learning performances.… The other day, a couple of them presented their video clips on KineMaster very well, but the rest didn't care.* (Andy, 15 October 2021)

Moreover, he shared his experiences working in two conflicting environments _physical and virtual. His school had a policy of allowing students to learn from home while teachers taught from the school. They also allowed students who had no internet access to use the school computer lab. A few students in his class

did that, and this situation gave him extra burden of supervising the students on-site while delivering the materials through videoconferences, ensuring the coverage of the curriculum content, and maintaining the LMS.

> *Although the Ministry recommended [that] we use the adaptive curriculum during this pandemic, I feel obliged to deliver all the prescribed content to my students. I would feel guilty if I didn't*. (Andy 15 October 2021)

As perceived by others

Delivering the curriculum content seemed to be Andy's focus as seen in the video recording of his online class. There were 22 students in his class. He used *Microsoft Teams* in his class for the whole 60 minutes to teach procedural text and required that all his students be on-camera. He explained the learning materials deductively, starting with the rules and structures of different types of texts and asking students occasionally to make their own sentences. Some students were active, volunteering to answer, but there is no telling how many students were on task. During the 60-minute period, there was no group work in the learning activities, and no other supporting application was used. He used *PowerPoint* to present the learning objectives and explain the materials and student worksheets for exercises. Based on the observation rubric, his online engagement was at the higher point of rudimentary level on his technology use, but, on content and pedagogy, he reached the basic level, as he used a direct teaching strategy to deliver his content. Moreover, he attempted to contextualize the learning process by using examples of making local dishes. Although his class was teacher-centered, his learning objectives were met as shown in the students' responses during class. Learning materials were either uploaded on LMS or sent to students prior to class.

In the FGD, Andy's students confirmed that his teaching style made them understand the lesson, but they never did any collaborative work with other students. He explained the lesson clearly and gave them the chance to ask for clarification. His assignment on procedural text was to make a local dish at home and write the recipe, but they were not assigned to make any digital poster, video clip, or podcast out of the process. In the era where *Tik Tok, Reel,* and *Podcast* are used casually for social media postings, Andy's indifference to multimodality in his online class, as reported by his students was very distinct compared to the other five teachers. Moreover, this minimal use of technology at the time of study seemed to conflict with his interview. However, a careful reading of all the data concerning Andy made sense of the discrepancy. He had "become more innovative and creative in designing his online class" after the series of IT training at the beginning of the school closure. Then, as this pandemic has dragged on indefinitely, his enthusiasm in technology use in his classroom has worn out.

Nevertheless, this observed phenomenon does not categorize him as an ineffective teacher. His commitment to content mastery and pedagogy prevailed over his willingness to integrate more advanced technology into his teaching.

The three teachers who demonstrated progression at appropriating TPACK skills were likely to be more ready for the hybrid learning. As a matter of fact, since August 2021, Salma has started conducting hybrid learning with 25% of her students attending her class offline and the rest online. In the interview, Salma talked about the difficulties of looking after students who were physically in her classroom and those on the video-conference platform. She had to use three gadgets in her hybrid classroom, the first for the videoconferencing, the second one to focus on her, and the last to focus on the whiteboard. Even after some experimenting in the first few weeks, she found hybrid teaching more complex than online teaching.

In summary, readiness to sustain TPACK skills in a hybrid learning requires that teachers not only adapt to and engage in current practices and discourses, a process of appropriating, but also transform themselves as perpetual learners, so that knowledge construction can be developed. In reality, however, as Grossman et al. (1999) suggests:

> *multiple and competing desired outcomes often coexist within an activity setting, though typically some predominate. The overriding motive for a setting, then, while not specifying the actions that take place, provides channels that encourage and discourage particular ways of thinking and acting.* (p. 7)

In Andy's case, for example, online teaching, as an activity setting, has conflicting goals. He was expected to innovate and engage his students with a variety of technological tools, but, at the same time, he felt compelled to deliver the content materials within the syllabus. In this challenging activity setting, Andy resorted to complying with the curriculum. At the appropriating a label level, "a person learns the name of a tool but knows none of its features" (Grossman et al., 1999, p. 16). Andy mentioned he underwent IT training at the beginning of the pandemic and perhaps attempted to use them at some point but, at the time of observation, resorted to perpetuating his teacher-centered pedagogy through his video conferences. For teachers like Andy, to anticipate hybrid learning or even further emergency remote teaching, improving

practices in interaction with their learning environment and by the help of tools is currently a necessity in the face of uncertainty.

Conclusion and Recommendations

The pressure for schools to reopen and resume to the new normal led teachers and students to the path of hybrid learning. In the face of future uncertainty, teachers need to be prepared for any type of learning and equip themselves with the appropriate pedagogical and technological tools. This study has shed light on teachers' appropriation of TPACK skills during the school closure and teachers' readiness to sustain the skills to deliver hybrid learning.

To sum up, this study investigated teachers' progression and stagnation in their appropriation levels of online learning engagement. Progression was not narrowly measured by the number of technological tools they used but by how they synergized the technology use with their contextual learning environments to support their pedagogy and content mastery. Teachers who demonstrated progression perceived themselves consistently on the cognitive and affective sides of integrating technology into their teaching. This optimistic perspective was enacted into their online class practices as confirmed by their students' opinions and researchers' observations of their online classes. Furthermore, these teachers admitted to more readiness to engage in hybrid learning than those who remained at the same level. In brief, teachers' progression corresponded to their readiness to maintain their TPACK skills in hybrid learning. One caveat in these findings was that teachers' stagnation in their appropriation of technology-enhanced learning did not mean they are bad teachers. As our previous study (Lie et al., 2020) revealed, some factors other than the teachers themselves determined their online learning engagement, such as students and the support system.

Hence, this study offers three recommendations for policy and better practices and several ideas for future research. First, in regard to the findings, teachers' lack of readiness to sustain their TPACK skills in hybrid learning needs to be recognized. Teachers who resisted improving their technology use in this study were concerned about leaving their underprivileged students behind because of connectivity issues. Paradoxically, however, their reluctance to appropriate technology use during the remote learning has serious consequences. Other studies have revealed that teachers' lack of readiness resulted in significant learning loss (Purwaningsih & Lie, in press). Therefore, this study urges the Indonesian government to identify reasons for teachers' stagnation and execute recovery strategies to overcome the learning loss.

Second, as revealed in the cases of teachers who demonstrated progression, innovations in teaching and learning practices in the context of hybrid learning should be enhanced and shared with other teachers to build up the knowledge base of best practices in online learning.

Third, these best practices should prepare teachers to expand into blended learning. The distinction between the two models is not yet widely recognized in Indonesia. Lessons learned out of this study should propel strategic actions to provide quality education for all. Blended learning can serve as a breakthrough to carry technology-assisted learning for students in remote regions.

Finally, based on the current findings, several future research avenues are suggested. First, further research should be conducted to investigate how teachers used the lessons learned during the ERT to transform their pedagogical practices and what factors drove them to progress further beyond the pandemic. Second, it would be worthwhile to explore teachers' readiness to venture into blended learning. How teachers' readiness and motivation can propel the implementation of blended learning beyond the pandemic would contribute to the knowledge base of best practices given the various constraints. Third, longitudinal studies should also be conducted to further examine what recovery strategies teachers executed to overcome the learning loss during the pandemic. Finally, studies on the role of the school as an ecosystem in enhancing teachers' pedagogical practices would give a more holistic understanding of the challenges and possibilities.

Due to the extended pandemic, face-to-face interviews and school visits were not possible. Interviews through video-conferencing tools limited this study to obtain rich data and follow a thorough data collection procedure, as Miles et al. (2014) suggested. Nevertheless, despite the limitations in the data collection and analysis as described, the researchers express hope to turn the table on the education constraints amidst the pandemic and to rely on teachers' resilience in expanding their affordances.

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Appendix 1

Main Questionnaire Questions

Statements/Questions	Type of Responses
A. Pedagogical Knowledge (PK) 1. I am able to choose learning strategies to meet my students' needs. 2. I am able to build learning steps to help my students learn more effectively. 3. I am able to stretch my students 'thinking by creating challenging tasks for them. 4. I am able to guide my students to adopt appropriate learning strategies 5. I am able to help my students to monitor their own learning 6. I am able to help my students to reflect on their learning strategies 7. I am able to guide my students to discuss effectively during group work	Rating on Likert Scale of 1-4 Each statement refers to teachers' situations in the beginning of the school closure in March 2020 and when schools reopened in August 2021.
B. Content Knowledge (CK) 1. I have sufficient knowledge about English/Indonesian. 2. I can think about English/Indonesian like an expert. 3. I am able to develop deeper understanding about English/Indonesian.	
C. Technological Knowledge (TK) 1. When remote learning started in the middle of March 2020, rate your own skills then in using the following: 2. Rate your own skills now (August 2021) in using the following 3. What did you use to teach in March 2020? Choose all that apply. 4. What do you use to teach now? Choose all that apply.	Q1 and Q2, rating on Likert Scale of 1-4 • Video Conferences (Zoom, GMeet, Teams, etc.) • LMS (Schoology, Moodle, Microsoft 365, etc.) • Other supporting applications (WhatsApp, Telegram, WeChat, etc.)
D. Pedagogical Content Knowledge (PCK) 1. Without using technology, I can address the common misconceptions my students have in the lessons. 2. Without using technology, I know how to select effective teaching approaches to guide student thinking and learning in the lessons. 3. Without using technology, I can help my students to understand the lessons through various ways	Rating on Likert Scale of 1-4 Each statement refers to teachers' situations in the beginning of the school closure in March 2020 and when schools reopened in August 2021.
E. Technological Pedagogical Knowledge (TPK) 1. I can help students apply their knowledge in real life. 2. I can help students search information on their own. 3. I can help students present their information in various ways (text, graphics, video, comic, etc.) 4. I can help students collaborate with others by using technology.	
F. Technological Content Knowledge (TCK) 1. I can search and use the right technology to upgrade my English/Indonesian. 2. I can assess my own knowledge of English/Indonesian. 3. Through technology, I can collaborate with colleagues to broaden and deepen my knowledge of English/Indonesian.	
G. Technological Pedagogical Content Knowledge (TPACK) 1. I can integrate technology with the methods to teach English / Indonesian. 2. I can choose the right technology to enhance what I teach, how I teach, and what students learn. 3. I can create independent learning modules with technology. 4. I can evaluate technology-assisted English/Indonesian learning based on indicators. 5. I can assist my colleagues to integrate technology, pedagogy, and content in my school.	

Appendix 2

Follow Up Semi-Structured Interview Questions for Teachers

Note to Interviewer: Please read each participant's survey responses thoroughly before conducting the interview.

Intro:
How did your online learning go?
How is hybrid learning (limited face-to-face teaching) now?
Are you enjoying your teaching? Then and now?

1. In EFL, what are the advantages of an ICT learning environment? Give examples.
2. What is your biggest challenge to deliver remote learning? Why so?
   What is the biggest change for a teacher going from a "traditional" to a technology- rich learning environment? (Just to confirm or probe further based on their survey responses)
   a. → TK
      Is there any change in the use of technology in your teaching as a teacher?
   b. → PK
      Without the use of technology, is there any change in your pedagogical skills (e.g., classroom management, student interaction) between the beginning of the pandemic and now?
   c. → CK
      Without the use of technology, is there any change in your knowledge of English/Indonesian between the beginning of the pandemic and now?
   d. -> PCK
      Without the use of technology, is there any change in your pedagogical skills to teach English/Indonesian between the beginning of the pandemic and now?
   e. → TPK
      (Note to interviewer: please have the types of tech this subject uses)
      Is there any change in your pedagogical skills (e.g., classroom management, student interaction, opening and closing class, taking attendance) between the beginning of the pandemic and now? In what ways?
   f. → TPACK
      Has your ability to integrate TPACK skills in your teaching changed during the pandemic? What caused the changes? Students? Trainings? School support? Other external factors (e.g., housekeeping matters)?
3. What lessons did you learned during the emergency remote teaching?
4. Has the school closure changed you as a teacher? In what ways? Give examples.
5. How do you assess your teaching trajectory since March 2020 till now?
6. How are you taking the transition from full remote teaching to the current face-to-face meeting?
7. What skills did you learn during the emergency remote teaching? Which skills can you sustain?

Contingency;
External factor: students have NO access:
So what do you do to mitigate the situation?

Follow Up Semi-Structured Interview Questions for Students

Note to Interviewer: Please read each teacher's survey responses thoroughly before conducting the interview with their students. Probe further.

1. How is/was your distance learning going on?

2. Which do you prefer?
   Option A: regular class session (like before the pandemic)
   Option B: remote learning during the pandemic (how did it go in your class with Teacher X?)
   Option C: Hybrid/Blended Learning (during PTMT) (Pembelajaran Tatap Muka Terbatas)

3. What do you think overall of Teacher X [in terms of personality, teaching style, etc.]?

4. Do you see him/her different now than in the beginning of the pandemic? In what ways?

5. How is he/she teaching differently now?

6. How is/was his/her technological skills?

Appendix 3

Online Class Observation Rubric

TPACK				
	Teacher	Students	Platforms/ Tools	Learning Process
None (Lack of Appropriation)	Online learning does not happen or happens very minimally due to several factors.			
Rudimentary (Appropriation of a Label)	Teacher used social media and communication channel to teach, deliver learning materials, and connect with students.	Students found info on their own with technology	PowerPoint to teach, social media for communication, students used MS Word for assignment	The process was one-way. Teacher-centered (75%). In Thornburg model: Campfire. More students were off-cam and passive.
Basic (Appropriation of Surface Structures)	Teacher used strategy to combine content, technology, and teaching approach	Students used technology to plan and monitor their learning	Search engine for content, editorial tools for spelling/vocabulary, basic video-conferencing tools, students used Google docs for assignments	Teacher-centered (50%). Used video-conferencing tool and LMS. Learning materials were uploaded on LMS or sent to students prior to class.
Intermediate (Appropriation of Conceptual Underpinnings)	Teacher selected and used technology appropriately to enhance teaching and conduct learning assessment	Students used technology to construct different forms of knowledge representation	E-learning platform, advanced video-conferencing tools, curate online resources for teaching, students use Google Doc to comment and give feedback, use graphic design tools for posters	Used video-conferencing tool, various apps, and LMS along with their features to engage students. Learning materials were uploaded on LMS or sent to students prior to class. Student-centered (75%) or may be teacher-centered but students were engaged.
Advanced (Achieving Mastery)	Teacher used a range of online tools to teach and assess. Teacher showed leadership to help others in the use of technology	Students collaborated with each other using technology	Video/audio-editing software for teaching, use E-learning platform for group discussion and assessment, webinar with native speakers, students record video and upload for feedback	Very engaging student-centered learning. Combining synchronous and asynchronous learning. All learning spaces (Thornburg) were utilized.