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TECHNOLOGY IN THE CLASSROOM: EFL TEACHERS' TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE

TEHNOLOGIJA U RAZREDU: TEHNOLOŠKA PEDAGOŠKA I SADRŽAJNA ZNANJA UČITELJA EFL-a

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Abstract

This is a mix-method study with a sequential explanatory design aimed at investigating the level of technology knowledge of EFL teachers in Indonesian senior high schools. In this study, a total number of 375 teachers from public schools located in the southern part of Sumatra Island, Indonesia, were voluntarily involved in the survey. To fit the context of the study, the TPACK survey was adapted from previous literature with the overall Cronbach's alpha ranging from .82 to .89. The adapted instruments were validated through content validity involving four experts in educational technology and one expert of English-Indonesian language translation. We also applied Cronbach's alpha testing, the reliability of the adapted instruments (0.75 to .89). Mean and p-value were reported in the quantitative report. Afterward, we interviewed teachers using semi-structured interview which questions were based on the survey items. The data were transcribed, translated, coded, and put into themes. Findings showed that all teachers had more knowledgeable of traditional, non-technological conception of pedagogy, and content than technological pedagogy and technological content.

Sažetak

Ovo je studija kombinirane metode s uzastopnim obrazloženjem usmjerenom na ispitivanje razine tehnološkog znanja nastavnika EFL-a u srednjim školama u Indoneziji. U ovom istraživanju dobrovoljno je uključeno ukupno 375 učitelja iz javnih škola smještenih u južnom dijelu otoka Sumatre u Indoneziji. Kako bi se prilagodio kontekstu studije, TPACK istraživanje je prilagođeno iz prethodne literature s ukupnim Cronbachovim alfa rasponom od .82 do .89. Prilagođeni instrumenti su potvrđeni valjanošću sadržaja koja uključuje četiri stručnjaka za obrazovnu tehnologiju i jednog stručnjaka za prijevod s engleskog na indonezijski jezik. Primijenili smo i Cronbachovo alfa testiranje, pouzdanost prilagođenih instrumenata (0.75 do 1.89). Srednja i p vrijednost su navedeni u kvantitativnom izvješću. Poslije smo intervjuirali nastavnike pomoću polustrukturiranog intervjua u kojem su se pitanja temeljila na anketnim stavkama. Podaci su prepisani, prevedeni, kodirani i stavljeni u teme. Nalazi su pokazali da su svi učitelji više poznavali tradicionalnu, netehnološku koncepciju pedagogije i sadržaje od tehnološke pedagogije i tehnološkog sadržaja.

1.   Introduction

The progress of technology always effects on the progress of education. On the other hand, the progress of education will produce new technology. At the end, it will effect on each other which nowadays invention and progress have made teaching and learning process easier and more interesting than those of previous years. It is strongly believed that technology will improve the quality of teaching and learning process /**1**/, /**2**/, /**3**/. Everything that teacher could bring or integrate into classrooms to make their job easier and more efficient can be called as technology. The earlier form of technology such as pencil and chalkboard has taken their role in the practice of teaching learning process. However, the teachers should not be only dependent on and familiar with these traditional technologies. The progress of information communication Technology (ICT) nowadays also need to be familiarly introduced to teachers in their teaching and learning progress because the users of the education today are not people which are in the same era with the teachers' generation /**4**/, /**5**/, /**6**/. Students in the 21st century are a digital generation that they are familiar with the newest technology and it is not difficult for them to cope with the newest technology /**7**/, /**8**/, /**10**/, /**11**/, /**12**/ because they are eager to know and use them. Most teachers nowadays were born in the 20th century and many of them took their degrees at the era when educational technology was at a very different phase of progress than technology on present. As a consequence, most of the teachers consider themselves as community who are not well-prepared to integrate technology in their activities in education. Moreover, they have limited appreciation and value or relevance of technology to teaching and learning progress because they have less adequate knowledge to handle ICT in their classroom /**11**/, /**12**/. Likely, this situation will not improve unless the teachers are able to conceive of ICT use that is line with their emerging pedagogical beliefs /**13**/.

Because of the development of technology among high school students, teachers as the main part of teaching and learning process have tremendous challenges and pressures to implement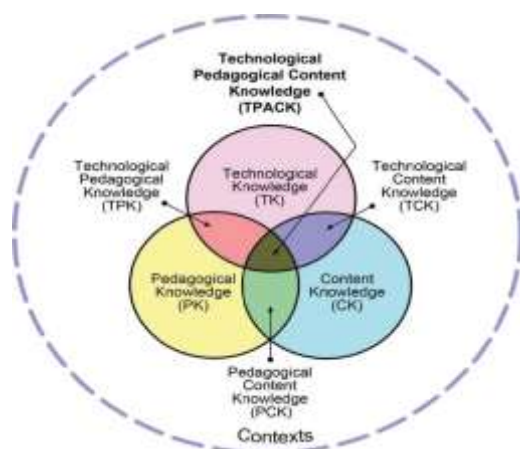 technological-based environment. Other tremendous pressures on ICT integration are from business, higher education, and politicians /**14**/. In most circumstances, today, around the world including in Indonesia, teachers are seen as primarily responsible parties for implementing the needed changes /**1**/, /**15**/. Understanding and investigating the gap between teachers' technology knowledge and teachers' responsibilities and capacity related to both technology capacity and pedagogical skill is important. This study, therefore, aimed at exploring this investigation as the technology integration of EFL teachers in Indonesian schools using TPACK framework. Using sequential explanatory method, we addressed two research questions; 1) what is the TPACK level of Indonesian EFL teachers?, and 2) what approaches to technology integration practice in Indonesian schools are perceived by EFL teacher?

2. Review of Literature

2.1. The technological pedagogical content knowledge framework

/**16**/ Mishra and Koehler established TPACK in order to respond the inexistence of theory evaluating the technology integration into instruction. Since the establishment, TPACK framework has been essential to studies about technology education as well as professional development in education /**17**/. TPACK is a mirror addition of /**18**/ Shulman's knowledge identification needed to teaching certain content known as PCK (pedagogical content knowledge, extended by the use of technology /**16**/. The framework (see Figure 1) explains about technological knowledge, TK (some certain tools, computer software, and hardware); pedagogical knowledge, PK (how to manage, order, and lead students); and content knowledge (CK) (the discipline or subject matter). Each part, TK, CK, and PK joins and combines technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK), and technological content knowledge (TCK). TPACK, the combination of TPK, PCK, and TCK, is about the complex connection of all related areas of knowledge. More significantly, the all parts of knowledge are the whole context where teachers' action rely /**16**/.

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Figure 1. TPACK framework (open source: http://tpack.org/)

Research on the TPACK framework has been growing in recent years. Many studies have been focusing on the theoretical framework whether the components which intersection of knowledge in the framework could be defined and formed as integrative activity, where in the space of knowledge in the TPACK framework are distinct or transformative, where in the space of knowledge in the TPACK framework are not different and holistic /**19**/. Other studies have been focusing on the refinement of the number of parts in the framework, some recommending and more parts are required to gain reflection on the technology integration complexity in education and role of contexts /**20**/, /**21**/, and others suggest that fewer parts are required in reducing the framework complexity. Moreover, some more important research has also focused on establishing different strategies to develop TPACK for teachers /**22**/. Many studies have also discussed on measurements of TPACK /**23**/. These efforts have resulted on various results. Many of them established methodologies to data but lack supporting reliability and validity or trustworthiness criteria. Some researchers have utilized the measurement of TPACK to confirm the offered structure of the TPACK framework /**24**/.

2.2 The significance of context in TPACK studies
In spite of the increasing and diverse studies into many elements of TPACK, it is crystal clear that context is still an under developed and under researched component of the TPACK. /**16**/ informed

level of grade, subject matter, students' experience, and kinds of provided technologies as the factors or elements that get TPACK to be in accordance with what they previously referred to as a "context bound" and conditioned form of knowledge /**25**/. Although context was reflected as a salient part of the framework since the introduction, it was not represented by a detail explanation for TPACK until the introductory chapter of the TPACK guiding book for Educators /**26**/.

Additionally, /**27**/ Kelly mentioned context to become one of the most complex, salient, and least comprehended components of the TPACK and published on context and TPACK in many journals /**27**/, /**28**/, /**29**/, /**30**/. In 2007, /**27**/ informed that the impact of teachers with the knowledge they have on students in line with the success of each teacher gain adaptation to the unique context. The frequent-changing context comprises physical elements, for instance, the learning environment design to the school characteristics /**29**/. Because the TPACK literature has been evolving and developing, Kelly's prior research has become important to other researchers' changings or modifications to the framework based on the salience of context described in this section. /**31**/ established a new modification to the TPACK framework; TPACK is bigger than the sum of its constituent areas of knowledge representing a transformative body of knowledge arising when teachers think that technology, pedagogy, and content is important in their teaching. In addition, the changing perspective considers both learners and context to be an integral part to teachers' TPACK. /**20**/ did not explicitly mentioned that their TPACK framework for context in line with the perspective of transformation, they included teachers and students, aligning their TPACK framework with the inclusion of learners.

In addition, teachers TPACK scores in context could be reduced by barriers appeared in technology integration in education including lack of computer and the Internet facility; limited technical support; a lack of ICT course programs; and a lack of time in fostering skills to use technological devices /**32**/, /**33**/, /**34**/, /**35**/, /**36**/, /**37**/. Especially for developing countries, they have plenty of barriers to be their national agenda to prepare not only teachers but also all related parties in the process of technology integration into national education system, particularly in the instructional

process /**38**/, /**39**/.

2.3. Instruments for Assessing TPACK

With the need of policies and curriculums implementation in education as well as effectiveness of training initiatives regarding to the integration of technology, plenty instruments have been developed to evaluate teachers either pre-service or in-service including TPACK. The first and most referred of survey on TPACK is the survey developed by /**24**/. Based on previous instruments, they developed their TPACK version of survey which utilized content validity involving education and technology experts and factor analysis. Many researchers have adapted the instruments in various context and studies /**40**/, /**41**/, /**42**/, /**43**/. However, they failed to meet all seven domains of knowledge in the survey which PK was the main concern.

These findings have been brought to have attribution to the definition construction that develops boundaries /**19**/. In a specific way, PK and CK are related resulting in the failure explained by /**44**/ who explained that if we have understanding and accept that pedagogy is not limited to classroom or any process of transferring the knowledge, the pedagogy would exist in something as a permanent and essential in any message. Similar reasons are then suggested for the existence of TPCK as an only factor joining TCK and/or TPK /**45**/. The lack of accuracy of between a construct and its boundaries might contribute to the way TPACK treated as subject-independent and as a consequence CK has not been informed with clarity /**46**/, /**47**/. This important imprecision has been revealed that PCK is subject-dependent /**18**/. Therefore, many instruments have been developed for the TPACK assessment of TPACK including in English language teaching.

2.4 Studies on TPACK with in-service English language teachers

As language teachers are the least domain in discussed literature review /**48**/, lack of research were conducted to have evaluation on either of training programs reports or existing condition of EFL language teachers. Some studies were conducted for the seven constructs of TPACK in English language teaching /**48**/, /**49**/, /**50**/, /**51**/. For example, /**49**/ Wetzel and Marshall conducted study on ways middle school English language teachers informing evidence of behaviors which is suitable

and fits the TPACK framework to be applied in the classroom. In addition, the data, gathered from observing and interviewing participants revealed that a basic foundation for technology integration in language learning (content) and project-based learning (pedagogy) was based on the study well-provided by the participants. Therefore, the teachers in the study showed TPK through well-planned classroom management and the interplay between domains of the framework. Additionally, /**50**/ Abera investigated the ELT program and EFL teachers TPACK in Ethiopia. The results of the structured questionnaire adapted from /**24**/ with interview, observations, and document analysis indicated that the teacher educational programs in this study have failed to contribute to educating connections between TK, PK, and CK since the teachers' TPACK was low.

In addition to these studies, another examination on EFL teachers' TPACK competency levels regarding respondents' gender, length of service, and workplace was conducted /**48**/, /**51**/, /**52**/. The results of TPACK-Deep survey /**52**/ indicated that the teachers had average levels of TPACK competency and there wasn't any significant correlation between the teachers TPACK with the participants' gender, experience, workplace, and frequency of using internet or computer. However, participants who experienced less than five years of teaching and worked in private schools gained higher TPACK scores than the other groups. /**48**/ Wu and Wang explored TPACK of 22 in-service EFL teachers at elementary schools in Taiwan and found almost similar result those senior teachers and public school teachers had less scores of TPACK than those of junior and private school teachers.

3. Methodology

We used a mixed method study using sequential explanatory (SE) design to investigate TPACK of EFL teachers of Indonesian high schools. The SE design has been implemented in various studies with different contexts /**53**/. Mixed method research mediates the examination of a phenomenon within its context using diverse data sources /**54**/, /**55**/. A sequential explanatory strategy was chosen because this study tends to apply quantitative research. Then, to obtain further and in-depth information about the unexpected results, it is followed by qualitative research /**56**/. The strategy is characterized by the collection and

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analysis of quantitative data in a first phase of research, followed by the collection and analysis of qualitative data in a second phase that builds on the results /**54**/, /**56**/. Researcher in this design typically organizes the report of procedures into quantitative data collection and analysis first, followed by qualitative data collection and analysis. This strategy emphasized how the qualitative findings helped to elaborate on or extend the quantitative results /**54**/. The data of the study were taken from January to April 2018.

For the quantitative design, we used a survey design which provides numeric description using questionnaires for data collection. Survey research aimed to describe the situation and the characteristics of a population. While for the qualitative design, we implemented case study approach /**54**/. A case study was appropriate design for this mixed method study because it is characterized by the attempt to present a bounded experience or activity within a finite amount of time /**54**/. It describes on "how" or "why" of their experiences was most suited to the research context /**57**/. The population of this study covered all 1350 EFL teachers of Indonesian senior high schools in one of Indonesian provinces located in the southern part of Sumatra Island /**58**/. We applied convenience sampling where we selected a group of teachers convenient to the researcher to be involved in the study. Convenience sampling is considered an appropriate method for descriptive mix method /**59**/. We invited 500 teachers to fill in the questionnaires. However, a total number of 375 respondents' answer could be measurable were the sample of the research survey with 10 teachers were interviewed.

In the quantitative phase, we distributed a survey questionnaire through Google form and printed material. The questionnaire was aimed at understanding EFL teachers' demographic information, technology use, TPACK. We used the TPACK survey instrument adapted from /**60**/ with overall Cronbach's alpha ranging from .82 to .89 which was constructed to measure TPACK for English language teaching with 75 items of statements based on previous related sources such as /**16**/, /**24**/, /**61**/, /**62**/. The survey validity was through content validity checked and discussed with the panel of experts, three in educational technology and two in English-*Bahasa Indonesia* translation. After the validity, the items were eliminated and some others were changed. The final instruments

were 65 items. The instruments were checked and revised in *Bahasa Indonesia* for the clarity by two Indonesian experts in English-*Bahasa Indonesia* translation and distributed for a pilot study with 50 EFL teachers. The reliability of the survey was measured by applying Cronbach alpha from.75 to .89 in the pilot test. SPSS was used to examine descriptive statistics, t-test and Analysis of Variance (ANOVA).

After the analysis of the quantitative phase, we conducted interview sessions to obtain in-depth information related to TPACK, especially on approaches to technology integration practice in Indonesia schools perceived by EFL teachers. During the distribution of the survey instrument in the first phase, we provided a question asking the respondents the availability interview availability. There were 35 respondents confirmed their agreement to get involved. However, we chose only 10 participants previously discussed regarding the areas, financial matter, and other significant or convenience sampling. We masked participants' identities, school, and other personal information in the data presentation to protect their right /**54**/, /**63**/. The interview was conducted from 60-80 minutes. The survey instrument was the set of guiding questions for a semi structure discussion or interview /**54**/. We used a room with no sounds from outside because on the transcribing data process, we utilized Google doc. Transcriber requiring clarity of the sound. With newest invention from Google, the data was filed through Google docs' voice typing where we only closed the sound of the recording to Google docs voice typing and it was automatically typed the recording files. We compiled the transcribed voiced to Microsoft word. After filing the data, we printed out the files and marked them with colors to examine the data. We meticulously read and re-read them to examine for both connections and redundancies done by the first author of this study. We coded and translated the transcription in manual ways into English while putting the translated findings into themes in line with the survey result. To deal with the trustworthiness /**64**/, we listed verbatim examples from the transcribed interviews. We also did member checking /**65**/.

Table 1. Survey and interview questions construct

Construct	Question to represent	No.
Questionnaire		
Demographic information	What content area did you recently teach?	1-6
Technology use	Time spent on technology such as computer or smartphone in a typical workday	7-10
TPACK	I can facilitate learning by creating a comfortable environment in which learners are willing to take risks	11-85
Interview		
Instructional strategy using technology	Could you describe an instructional strategy or activity that uses technology in your instructional activity?	Open ended
Technology resources availability	What technologies you and your students can access in your school?	Open ended
Professional development programs	Please inform any specific technologies that you are interested in learning during your technology training?	Open ended

4. Findings
4.1 TPACK level of Indonesian EFL teachers

In addressing address research question number 1 of this study, first we report the demographic information of the survey participants and teachers' technology profile followed by TPACK survey from TK to TPACK domain. We used Mean (M) and standard deviation discussing the findings of the study. The value of Likert-scale items assigned in the TPACK survey are strongly disagree (1), disagree (4), and most of the time able (5). Five hundred EFL teachers were invited to participate in this study. Of the 500 hundred invited participants', 399 survey instruments were returned or completed. However, merely 375 returned questionnaires were measurable and analyzed. Two hundred and eighty-five teachers (76%) were females while 90 teachers (24%) were males. Two hundred and six teachers (54.93%) were above 35 years old while 169 teachers (45.06%) were below 35 years old. The teachers informed a wide range of exposure to technology. For instance, when being asked about exposure to computers, 210 teachers had the exposure from 1 to 5 years. Table 1 informs a summary of the teachers or participants' teaching and technology experience.

Table 2. Participants' technology profile and difference regarding TPACK

Professional and Technology Experience	Response count	%	M	F	p
Started using technology					
Prior to age 10 years	28	7.47	2.54	4.373	< .01
Age 10-15 years	59	15.73	2.34		
Age 16-20 years	158	42.13	2.1		
After 20 years	130	34.67	1.9		
Exposure to computers					
1 to 5 years	210	58.82	2.11	3.088	< .05
11 to 15 years	143	38.13	2.09		
16 to 20 years	22	5.87	2.13		
Time spent on technology such as computer or smartphone in a typical workday					
Less than 1 hour	85	22.67	1.78	3.235	< .05
About 1–2 hours	102	27.2	2.2		
About 3–4 hours	101	26.93	2.49		
5 or more hours	87	23.2	2.61		
Comfort level using technology in teaching					
Not at all comfortable	76	20.27	1.68	4.235	< .05
Somewhat comfortable	115	30.67	1.87		
Comfortable	164	43.73	2.51		
Very comfortable	20	5.33	2.63		

Descriptive statistics were calculated for the seven constructs of TPACK by combining individual item scores within each construct, and internal reliability was established by verifying Cronbach's alpha (Table 3). Highest domain of the survey was Content Knowledge (M = 3.54). The Cronbach of this domain was .89, good. Domains involved technology gained lower rates of results; technological knowledge (M = 3.08), technological peda-

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gogical knowledge (M = 2.79), technological content knowledge (M = 2.32), and technological pedagogical and content knowledge (M = 2.13).

Table 3. Level of the TPCK of EFL teachers

(n=375)

The Technological Pedagogical Content Knowledge	M	SD	α
Technological Knowledge	3.08	1.00	.81
Pedagogical Knowledge	3.49	0.86	.87
Content Knowledge	3.54	0.92	.89
Technological Pedagogical Knowledge	2.79	1.08	.79
Pedagogical Content Knowledge	3.36	0.90	.85
Technological Content Knowledge	2.32	1.15	.77
Technological Pedagogical and Content Knowledge	2.13	1.15	.75

4.2. Significance difference based on demographic information based on TPACK

Instead of examining all variables significant differences based on demographic information, we evaluate TPACK as the most complete variable in this study. We examined the significant differences based on gender, started using technology, exposure to computers, time spent on technology such as computer or smartphone in a typical workday, and comfort level using technology in teaching. For gender and age, we employed t-test where the result informed that there are no significant differences between female and male teachers regarding TPACK (t = .529; *p* >.005). However, a significant difference based on age exist (t= 7.212; *p* <.001) concerning TPACK. Senior teachers' TPACK (M = 2.01) was reported to be lower than younger teachers (M = 2.42). Meanwhile, significant differences emerged regarding TPACK based on started using technology, exposure to

computers, time spent on technology such as computer or smartphone in a typical workday, and comfort level using technology in teaching. Table 2 informs complete results of the significance.

4.3. Approaches to technology integration practice in Indonesian schools

To discuss the second research question regarding approaches to technology integration practice in Indonesian schools perceived by EFL teacher, we interviewed 10 participants out of 35 participants who agreed to get involved in our interview session. The results of the data analysis were reported in 6 themes (see Table 4) including benefits of technology, students-centered learning, new technology discovery, access issue, and teacher-centered teaching. Benefits of technology was the most stated theme with 27 frequency of statements revealed in the interview. All the participants agreed that technology is very important in supporting teaching and learning process which the object of the process are students who considered as millennial, a generation that cannot be separated with the use of technology or ICT namely using social media, such as Facebook, WhatsApp, Twitter, and Youtube, to create a different sense of belonging, to make acquaintances, and to remain connected with friends /**66**/. All EFL teachers from any background and experience in the interview said that they cannot avoid the use of technology in the classroom because not only national curriculum set the policy and guidance /**58**/ but also the technology if the implementation has many impacts in the transformation of education in both theory and practice. As one participant said in the interview, she says "*These benefits should be embraced as new culture that encourages every stake-holder in Indonesian education (Annie).*" This awareness of affordances could be an indicator of the critical thinking required for effective integration of technology in instruction /**67**/. Hence, this theme is in accordance with the domain of TK in the TPACK framework.

Similarly, 27 statements related to technology barriers were found during interviews. Lack of technology sources, such as limited projector and computers, or Internet access (no domain) was the main barrier revealed in this theme. Almost all participants stated that they have to deal with some technology access issues such as a small

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number of projectors were provided by the government or other stakeholders. One of senior EFL teachers who is also academic administrator had a very good point of view regarding this matter, he conveyed:

"Even though Indonesia as one developing country in Southeast Asia has been committed to improving the quantity of technological devices by providing special budget on the technological resources, it is only a political promise in the time of general election. Indonesian schools have struggled in the competition of providing sufficient resource for technological advancement."(Adolfo)

Another thought-provoking issue informed by the interview participants was student-centered learning. Besides, general benefits of technology integration in the teaching and learning process, the EFL teachers also focused on the development of students-centered learning which is currently popular and influencing 21st century. One of the teachers informed,

"Using technology in the instructional process will trigger students-centered learning. When teaching for example introduction using Youtube, we expect that they can videotape their own introduction video and upload it in our official Youtube channel (Hani)."

This example aligns with TPK domain. In addition, a few student-centered learning instances were further TPACK domain indicators. For example, one teacher informing his teaching project stated,

"It is undoubtedly reported that the Youtube pro-

ject that I assign student to do at home will empower them to build knowledge about the topic I teach as they get involved consciously in researching, building, and uploading their own videos in our Youtube channel (Fitri)."

Teachers in the interview also revealed the new technology tools, application, or other new discoveries that make them either interested or confused with the rapid change of technological innovation. There were 17 statements coded from the data transcription. One female senior EFL teacher stated that the technology is like an addicts for young adults. She continued:

"I have a daughter that is 18 years old now who is in the first year of his colleagues and we always discuss new technology from the newest brand new smartphones to the latest technology application. I always am both impressed and confused with those innovative things; however, it must be there and we cannot avoid that." (Maria)

In contrasts, other more junior EFL teachers embraced this phenomenon by saying that the discovery or innovation would be very important to change the way they teach in the classroom and they enjoy it according with their capacity and ability in technology and pedagogy.

Table 4 Qualitative thematic evidence of TPACK

themes	Freq.	Representative Statement	Description (related TPACK domain)
Benefits of technology	27	"Using technology in teaching and learning process is very beneficial to create a supporting environment for students, millennial, who are accustomed to technology"	Participants informed benefits of technology in the instructional process (in relation with TK and TPK since teachers mention applying technology in education considering its benefits).
Barriers in technology integration	27	"Infrastructure and technology tools that we have are insufficient"	Participants elaborated lack of technology sources, such as limited projector and computers, or Internet access, lack of experience, and lack of training.

Students centered learning	19	"Students really embrace the technology integration in instruction, for example they could find information on the internet about English language"	Participants suggested students' involvement in the use of technology in learning (TPK and TPACK which depends on the inclusion of the subject matter such as students making creative videos to explain their understanding of a concept).
New technology discovery	17	"I just learned Edmodo and I will introduce it in my EFL class, awesome application for learning"	Participants informed new technology tools and opinions on how the tools might be integrated in the classroom (TK).
Teacher-centered learning	15	"I discussed hot potatoes with my colleagues and how it help support language teaching"	Participants reflected on how they start to use technology in their school (TPK as teachers talk about using technology)

While student-centered pedagogy was represented by 25 statements coded from the interview transcript, there were also statements of teacher-centered approaches of technology use (15 statements). In the interview, one participant says, "*I always learning new things about technology integration in education. For example, Edmodo form me is a new thing and I love it because it provides interaction between teacher to students and students to students in a synchronous situation. I decide to use it during my English class (Adrian)*." In the activity of classroom, teachers also seem to have new things to learn because their students seem to be more understand technology than do the teachers. One teacher stated that he always had a positive thinking about students' understanding about technology and sometimes discusses the integration or asks for help if he met a difficulty with the technology, application, or other technological components. However, he decided all technology tools used in his instructional activities. The teacher-centered decisions reflect the domain of TPK, as the teachers just beginning to use technology was thinking about it for their own use.

5. Discussion

Results inform Indonesian EFL teachers' all seven TPACK domains, showing CK as the greatest gain, followed by PK and PCK. As previously discussed, most Indonesian EFL teachers' technology profiles informed that they had exposure on technology between one to five years might cause the low level of TK, TCK, and TPACK. The results contrast with previous studies /19/, /48/, /51/, /52/, /60/ that PK gained the highest score among all seven domains of TPACK. This result may be related to the barriers experienced by the teachers as revealed in the interviews, that they had lack of experience in using technological tools in the teaching and learning process. They also mentioned about the support of provincial government to provide sufficient tools for the school.

No significant difference was detected for genders, female or male; however, the results of significant tests prove that experience-related information is significantly influence TPACK as the final-integrated framework. This findings confirmed that young teachers with more experience and comfort with technology perceived TPACK better than the senior teachers with less experience and comfort with technology. Using interview as an instrument in supporting the quantitative results, we elaborated in-depth information about approaches to technology integration practice in Indonesian schools. When the themes identified from the qualitative analysis were related to the TPACK framework (Table 3), the data suggested that even though many benefits informed by the participants, barriers were also stated in the interview. These benefits include technology supporting teaching and learning process, fostering students-centered learning, and increasing creativity reflected to TK and TPK domain in the teaching and learning process. Prior studies /38/, /67/ have concluded the awareness of technology benefits as an indicator of the critical thinking needed for the effectiveness of technology integration into teaching practice. Therefore, it is aligned with the TK and TPK domains of the TPACK framework.

On the other hand, barriers which include lack of

technology sources, such as limited projector and computers, or Internet access, lack of experience, and lack of training could be a factor reducing the Indonesian EFL teachers' TK and TPK score of M. These barriers were informed in not only many developing countries /68/ but also some developed countries /32/, /33/, /34/, /35/, /36/. The activities such as making creative videos to explain their understanding of a concept revealed by the participants primarily indicators of TPK. Some EFL teachers in the interview are eager to implement student-centered learning practices integrated with technology. However, technology access issues act as holdbacks. While there are noticeable developments in the technology infrastructure in Indonesia /1/, /58/, it will be a long journey for a developing country like Indonesia to resolve this problem /39/, /69/. In brief, developing countries have many things to solve in preparing their teachers to effectively integrate technology in teaching and learning process.

From our findings, Indonesian EFL teachers discovered new technologies, built upon their integration skills, and began planning how they might utilize the technology to improve their teaching, for example, one teacher just found out that Edmodo can be utilized in the process of teaching and learning. In addition, the EFL teachers also learned the new technology and always discussed the technology with their peers. The new technology discovery and teacher-centered learning align with TK and TPK /11/.

6. Conclusion and Policy Recommendations

This mix-method study with a sequential explanatory design aimed at investigating the level of technology knowledge of EFL teachers in Indonesian senior high schools. Our findings showed that all teachers had more knowledgeable of traditional, non-technological conception of pedagogy, and content than technological pedagogy and technological content. More specifically among the seven TPACK domains, our findings indicated that Indonesian EFL senior high school teachers had CK as the greatest gain, followed by PK and PCK. Also, most Indonesian EFL teachers' technology profiles indicated that that they had exposure on technology between one to five years might cause the low level of TK, TCK, and TPACK.

Our findings shed light on our understanding of the level of technology knowledge of EFL teachers in Indonesian senior high schools. The findings of the study showed that all teachers had more knowledgeable of traditional, non-technological conception of pedagogy, and content than technological pedagogy and technological content. Recommendations for policies and programs can be drawn from the results of this study. First, educational policymakers and school leaders should provide EFL teachers with continuous training related to technological pedagogical and content knowledge (TPACK) by making a commitment to educational technology on the part of school and should be explicitly stated in terms of goals and plans. Educational technology (TPACK) should not be about the fractional use of technological applications in teaching and learning, but Educational policymakers and school leaders have to articulate a wide-ranging vision of what this involves in. Second, educational policymakers, school leaders, teachers, and researchers should involve in strategic planning processes in schools to integrate and manage educational technology (TPACK) in teaching and learning processes. Moreover, educational policymakers and school leaders should provide teachers with programs for helping them communicate and work effectively using the prevailing technological tools. Next, educational policymakers and school leaders should promote a sense of community among teachers working with technology-enhanced instruction by collaborating with local educational organizations. Finally, educational policymakers and school leaders should reward teachers who have capable teaching with technology and also research and academic publication in different forms of digital media. These kinds of achievement should be considered portion of the educational personnel review processes.

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