

Investigating English language teachers at tertiary level in adopting technological pedagogical content knowledge: Challenges in the 21st century

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Abstract

In this 21st century era, English teachers must have good knowledge of English as well as the skills of using various technology in order to make their teaching-learning process go smoothly. Nowadays, technology is like the primary need in every sector, especially in education sector. English lecturers should be able to adapt with the changes of teaching environment since the use of computers, laptops and other tools are becoming the big necessity in our daily life. There are three things that must be considered; technology, pedagogy and content knowledge. By understanding them, the teaching-learning process will become perfect. This article aims to find the perceptions of TPACK how it helps English lecturers achieve their goals. The data were taken from 3 English language lecturers of three different departments as the respondents. This mini research used descriptive quantitative in which the data were collected through observation and were analysed with data reduction, interpretation, and description. The findings shows that the score for content knowledge (CK) for all teachers ranges 78%-80 %, pedagogical knowledge (PK) ranges 55%-65%, technological knowledge (TK) ranges 60%-75%. Meanwhile score for Technological Content Knowledge (TCK) ranges 77%-82%, Technological Pedagogical Knowledge ranges (TPK) 60%-67%, TPACK 72%-75%. These imply that lecturers of polytechnics are good and skilful to integrate the technology with pedagogic and content knowledge.

Keywords: TPACK; 21st century; English teachers

INTRODUCTION

In this digital era, modern people depend much on technology in every aspect of life. We can see everywhere that most people cannot leave the house without gadgets (Muliastari, 2019). Gadgets like handphone is used as the primary tool. Even in educational field, technology can help students to learn (Rikarno, 2019). In other words, technology assists students in many ways. There is the booming ed-tech industry (Herold, 2016). It makes people do the jobs faster and more

efficiently. The use of technology helps the teaching-learning process go smoothly and makes students more motivated, creative and explorative (Selwyn, 2012). Technology facilitates students to explore more on a solution to a problem. By doing this way, it will strengthen students' concepts and trains their critical thinking skills (Chai et al., 2011).

Digital technology is now a prominent feature of education provision and practice in many countries and context (Selwyn, 2013). Internet use and other forms of technology become common. In fact, it is not easy to integrate technology with the lesson being taught, especially for teachers who are not actively engaged with it. Therefore, in order to make teachers be able to choose the right technology for their teaching-learning process, teachers should know well the teaching materials very well (Bates et al., 2020). Furthermore, teacher should be able to determine the appropriate teaching strategy which fits to technology being chosen (Alayyar et al., 2012).

Technological Pedagogical Content Knowledge (TPACK) is a very important knowledge that English teachers or lecturers have to possess and develop their teaching skills. Actually, there are 7 (seven) aspects that teachers must master before teaching. Those are TK, PK, CK, PCK, TCK, TPK and TPACK which need to be explored by initial teachers before they integrate technology into teaching language (Drajati et al., 2021). They sometimes find obstacles in designing lesson plans. This commonly happens everywhere when teachers want to make their teaching process go smoothly.

Teachers in tertiary level, like in polytechnics, also need to work harder to integrate technology into teaching language because some of them are graduating from public university (non-teachers' educational institutions). They need to adopt and integrate pedagogical and content knowledge. Many years ago, TPACK was first initiated by Shulman (1987) then developed by Mishra and Koehler (2006) has to be taught to pre-service teachers before they teach in real classrooms (Drajati et al., 2021). The teachers at tertiary level (lecturer) should work harder to integrate TPACK in their teaching process. TPACK is considered as potential framework which could give new direction for teachers in making the classroom activity go smoothly and successfully (Hewitt, 2008). Therefore, the 21st century lecturers must know digital literacy but they must master other skills, namely communication skills, creative, critical thinking, and problem solving. In Indonesia, the similar research had been conducted by Suyanto et al. (2020) which focused on Biology teachers in high school.

This paper aims to investigate how polytechnic lecturers adopt TPACK model to teach English language for adult students at State Polytechnic of Jakarta. The observation was conducted through lesson plans and interviews few English lecturers. The observation was also conducted during pandemic Covid-19 where students have been studied through online-system.

TPACK

Technological Pedagogical Content Knowledge (TPACK) developed by Mishra and Koehler (2006) is combination of technology, pedagogic, and content which are

implemented into one context. According to Mishra and Koehler (2006), the framework of TPACK is as described below:

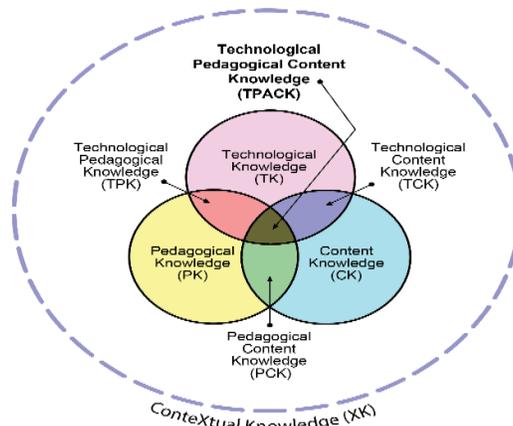


Figure 1. Framework TPACK from Mishra and Koehler (2006)

The TPACK components as explained by Mishra and Koehler (2006) is that “TPACK is an emergent from knowledge that goes beyond all three core components (Content, Pedagogy, and Technology), technological pedagogical content knowledge is an understanding that emerges from interactions among content, pedagogy and technology knowledge”. TPACK is foundation how a teacher can teach effectively with technology. It also requires an understanding of some concepts on technology and pedagogical techniques to teach the materials constructively. In addition, this framework shows how technology helps students solve problems and how technology builds broader knowledge to develop new methods or strengthen old methods.

TPACK is a kind of framework which explains the relationship between pedagogical knowledge and technological knowledge. In TPACK, teachers’ knowledge plays important roles in integrating technology in teaching-learning process to become more efficient and effective. This integration is considered as a teaching component which is closely related with PCK (Oyanagi & Satake, 2016).

Professional teachers must possess good TPACK competencies because TPACK lies in four competency fields: pedagogic, personality competency, social competency, and professional competency (Hofer & Harris, 2012). They explain that TPACK may boost up self-confidence, and the enhancement of content competency, pedagogic, and technology to design the teaching materials and lesson plans.

Within the context of 21st century, TPACK is very much appropriate with the learning process to make students gain many skills, such as: sociocultural, cognitive, metacognitive, productivity, and technological skills (Voogt & Roblin, 2012). It means that the teachers and students will be actively engaged with the classroom activity. Moreover, teachers will motivate students to think critically and do the problem-solving. In line with this statement, the readiness of teachers to adapt with the current technology really matters (Tondeur et al.,

2017). Teachers must be tactful to integrate any forms of technology with the teaching materials

METHOD

The methodology used in this research was descriptive quantitative approach in which there were three (3) lecturers as respondents who were coming from 3 departments: IT Engineering Department, Mechanical Department and Electronic Department. Those respondents were chosen by using random sampling technique. They willingly joined the research. The data were collected through observations guided by the observation rubric (See Table 1) via zoom meeting when the classes were going. Then, the data were calculated by quantitative analysis of Miles and Huberman’s method called data reduction (Sugiyono, 2013) and were interpreted by tabulating the data using Likert Scale (See table 2).

The variables scored were based on the rubrics which were already determined. As Koh (2013) says that a rubric is an established criteria used for scoring or rating students’ tests, portfolios, and performances. It describes the levels of performances that someone must reach the standard achievement. The rubric used was as follows:

Table 1. Observation rubric

No	Aspects	Indicators	Notes
1	Technological Knowledge (TK)	1. Teacher masters technology very well 2. Teacher uses attractive technology 3. Technology used is easy to operate 4. Technology being used is the latest 5. Technology used could solve the students’ problems	The score uses Likert Scale
2	Pedagogical Knowledge (PK)	1. Teacher has various strategy in strengthen the pedagogical concepts 2. Teacher uses correct methods and evaluation, 3. Managing the class very well, and 4. Make reflection to students. 3. Teacher manages the class very well 4. Teacher makes reflection to students	
3	Content Knowledge (CK)	1. Teacher understands the teaching materials very well 2. Teacher has capability to deliver the materials very well 3. Teacher is able to give examples related with the subject given 4. Teacher is able to answer the questions related with the materials	
4	Technological Content Knowledge (TCK)	1. The technology used was relevant with the materials 2. Technology being used may improve students’ understanding 3. Technology may develop students’ creativity	
5	Pedagogical Content Knowledge (PCK)	1. Teachers use correct lesson plans 2. Teachers give various problems to students 3. Teachers used appropriate teaching strategy in delivering specific content	

6	Technological Pedagogical Knowledge (TPK)	<ol style="list-style-type: none"> 1. The use of Computer application 2. Choose the appropriate technology related with teaching materials 3. The use of internet to submit the assignment or homework.
7	Technological Pedagogical Content Knowledge (TPACK)	<ol style="list-style-type: none"> 1. Teachers are capable to combine knowledge of English language, knowledge of technology, and pedagogic effectively 2. Teachers are capable to implement the teaching strategy to achieve the teaching goals 3. Teachers are capable to choose the appropriate teaching methods combining with appropriate technology.

Based on the given rubric in Table 1, the evaluation can be made and interpreted.

Table 2. Likert Scale

Interval	Criteria
3.25<score<4.00	Very Good
2.50<score<3.25	Good
1.75<score<2.50	Bad
1.00<score<1.75	Very Bad

(Widoyoko, 2014)

As Likert Scale given above, it can be explained that the formula was used to convert the score into percentages as it can be elaborated as follows:

$$\text{Percentages} = \text{score gained} / \text{max score} \times 100\%$$

Then, the final data will be converted into score of qualitative as follows:

Table 3. Qualitative Score

Score	Ranges (%)	Qualitative Score
1	0-20	Very bad
2	21-40	Bad
3	41-60	Fair/enough
4	61-80	Good
5	81-100	Very good

(Sugiyono, 2013)

Table 2 shows that score ranges from 1-5 which indicates from Very Bad to Very Good. The score gained was based on deep and careful observations.

RESULT AND DISCUSSION

The TPACK analysis was divided into Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge

(TPK), Pedagogical Content Knowledge (PCK), and Technological Content Knowledge (TCK). The three (3) lecturers were named A (English Lecturer from IT Engineering Department), B (lecturer from Mechanical Engineering Department) and C (Lecturer from Electronic Engineering Department).

Content Knowledge (CK)

According to Schmidt et al. (2009), the content knowledge refers to certain knowledge that students learn in certain level and field. Content knowledge varies from one level to another level. Content knowledge is very important because it evaluates the logical thinking and critical thinking which are unique in any scientific disciplines.

The CK components being observed were: 1. Mastering the materials being taught, 2. Giving examples related with the subjects given, 3. Delivering the materials clearly, logically and effectively, and 4. Answering students' questions correctly. The result shows that all lecturers have good score which ranges 78 % -82 %. It means that they have mastered their knowledge very well in their fields. It is shown in table 4:

Table 4. Content Knowledge

Name	Score (%)	Criteria
A	82	Very good
B	78	Good
C	81	Very Good
Average	80.3	

Pedagogical Knowledge (PK)

For this category, all lecturers showed similar score for qualitative score. The PK components were namely 1. Having various strategy in strengthen the pedagogical concepts, 2. Using correct methods and evaluation, 3. Managing the class very well, and 4. Make reflection to students. All lecturers had score of average 68 as it was shown in table 5.

Table 5. Score for PK

Name	Score (%)	Criteria
A	62	good
B	68	fair
C	75	good
Average	68	

Table 4 showed that Lecturer A and C had a good method and strategy, and were able to manage the class very well. Although the time of teaching was limited, they were still giving opportunity to students to make reflections on their own performances. Lecturer B did not give opportunity to students to make their own reflections on their own performances and she did not give correct evaluation.

Technological Knowledge (TK)

Technological knowledge is related to the use of technology from standard level to digital technology. Nowadays, it is a must that a lecturer must understand

and skilful how to use technology which fits with him/her. He/she must know hardware and software of computer or technology in educational context. In addition, he/she must adapt with the latest technology. This ability should be developed again and again.

From the observations, it was shown that all lecturers were able to use the hardware and the software very well. They could make use of computer well and accordingly. Students were attracted by the various games using computers.

The components of TK being observed were namely: 1. Mastering technology very well, 2. Technology being used is attractive, 3. Technology being used were easy to operate, 4. Technology being used is the latest, 5. Technology being used could solve the students' problems. The score can be seen below:

Table 6. Score of TK

Name	Score (%)	Criteria
A	82	Very good
B	78	good
C	80	Very good
Average	80	

Technological Content Knowledge (TCK)

This implies that technology can create a new illustration on teaching materials (Schmidt, 2009). A lecturer may have a new approach to deliver his/her materials to students by using the latest technology. *Technological Content Knowledge* may also imply the reversible relationship between teaching materials and technology.

The components of TCK were namely, 1. The technology used was relevant with the materials, 2. Technology being used may improve students' understanding, and 3. Technology may develop students' creativity. The result can be seen as follows:

Table 7. Score of TCK

Name	Score (%)	Criteria
A	78	very good
B	78	good
C	79	good
Average	78.3	

Technological Pedagogical Knowledge (TPK)

For this category, Schmidt et al. (2009) explain how technology may assist teachers in teaching-learning process. The use of technology may also inspire teachers to choose the correct methods in delivering their teaching materials in order to achieve the pedagogical goals. Teachers are also able to determine the appropriate media which fits to pedagogical approach (Srisaswadi, 2012).

During pandemic, online teaching can be as good example for TPK. This activity has made teachers become more creative and innovative to integrate technology with the pedagogical approach. Since the lecturers are coming from polytechnics, they do not have obstacle to choose form of technology being used.

However, they sometimes forget the pedagogical approach. Most respondents were successful to choose the appropriate teaching methods which were attractive.

The components of TPK being observed were namely. 1. The use of Computer application, 2. Choose the appropriate technology related with teaching materials, and 3. The use of internet to submit the assignment or homework. This can be seen in table 8.

Table 8. Score of TPK

Name	Score (%)	Criteria
A	82	very good
B	82	very good
C	82	very good
Average	82	

Pedagogical Content Knowledge (PCK)

Mishra and Koehler (2006) say that *pedagogical content knowledge* is important to determine pedagogical approach which is related with specific content. They explain that specific approach will fit with specific content. Related with this, PCK will ease teachers to determine what pedagogical approach is relevant with the specific content to be taught.

Components of PCK which were observed were 1. Teachers used correct lesson plans, 2. Teachers gave various problems to students, and 3. Teachers used appropriate teaching strategy in delivering specific content. From the result of observations, all lecturers had various strategy in presenting their materials to students and students made good responses to the teachers. It can be seen as follows:

Table 9. Score of TCK

Name	Score (%)	Criteria
A	76	good
B	75	good
C	75	good
Average	75.3	

Technological Pedagogical and Content Knowledge (TPACK)

Modern teachers must understand and be capable to integrate technology with content being taught and combine them with appropriate pedagogical approach. These must be very well considered before teaching. Teachers must be skilful to make integration of three basic knowledge, namely: CK, PK and TK).

By following the TPACK framework, modern teachers will be more creative and innovative to make their teaching process more lively and more comprehensive for students. Modern teachers are also forcing students to think critically and logically.

The similar research has been conducted by Drajadi et al. (2021) who investigated the pre-service English language teachers before their started

teaching in the classroom. Her findings of research say that pre-service teachers often used technology as teaching tools and combined it with specific content and appropriate pedagogical approaches.

TPACK components being observed were as the following: 1) Lecturers are capable to combine knowledge of English language, knowledge of technology, and pedagogic effectively, 2) Lecturers are capable to implement the teaching strategy to achieve the teaching goals, and 3) Lecturers are capable to choose the appropriate teaching methods combining with appropriate technology. The result of observations for these components showed that all teachers were capable to combine all aspects. The qualitative score showed 'good' mark. It can be seen in Table 10.

Table 10. Score of TPACK

Name	Score (%)	Criteria
A	74	good
B	72	good
C	75	good
Average	73.7	

CONCLUSION

Based on the findings above, it can be said that the lecturers of polytechnics are capable to combine all aspects of TPACK. These can be seen from the scores of CK (80.3%), PK (68%), TK (80%), TCK (78.3%), TPK (82%), PCK (75.3%) and TPACK (73.7%). These imply that all lecturers are competent to deliver the materials by using appropriate technology and pedagogical approaches in order to make their teaching process effectively. TPACK helps teachers a lot to achieve the teaching goals (Harits et al., 2019). TPACK gives more advantages than disadvantages. By using TPACK, lecturers are assisted to make games and use any sources found in internet. During pandemic where almost teaching-learning process was done at home, technology helps much teachers and students to do communication and accomplish the jobs effectively. Teachers can upload the assignment in E-learning and students can submit their assignment through E-learning. In conclusion, modern teachers must be capable to make use of technology in delivering content by using appropriate teaching methods.

On the other hands, talking about the obstacles that lecturers had during pandemic are namely; 1. Teaching through *online* system make them difficult to apply pedagogical approaches because of the limited time. Lecturers must be tactful to make use of time, and 2. The communication connection sometimes was lost, so lecturers must repeat the materials again. Overall, technology gives more benefits for teachers to implement the specific materials combined with appropriate teaching methods. TPACK must be mastered by teachers who want to make their teaching goals be achieved successfully.

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