Investigating EFL teachers' technological pedagogical content knowledge: Students' perceptions

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Abstract. Technological pedagogical content knowledge (TPACK) has received much attention recently, serving as a lens to examine the ways in which teachers integrate technology into teaching. Questionnaire instruments have been developed to examine teachers' TPACK. However, teacher-perceived TPACK may not fully reflect their real practices in classrooms. To address this problem, students' perspectives could be incorporated to achieve a balanced assessment of TPACK. Thus, the present study was to assess English as a foreign language (EFL) students' perceptions of their teachers' TPACK through a validated student-based TPACK instrument. Two hundred and fifty-seven EFL students of junior high school in Taiwan participated in this study. The results of the survey showed that the teachers were thought to be more proficient in the three individual domains of core knowledge than in the intersections between them. In particular, the students perceived that their teachers demonstrated content knowledge more adequately than their integrated TPACK. The resulting perceptions of the students could be used to help teachers enhance their teaching practices associated with technology.

Keywords: technological pedagogical content knowledge, teacher knowledge, EFL students' perceptions, TPACK instrument.

1. Introduction

Teacher knowledge of integrating technology into teaching is taking on a greater prominence in the field of educational technology; it is known as TPACK, which is proposed by Mishra and Koehler (2006) to expand Shulman's (1987) framework of pedagogical content knowledge (PCK). The TPACK model serves as

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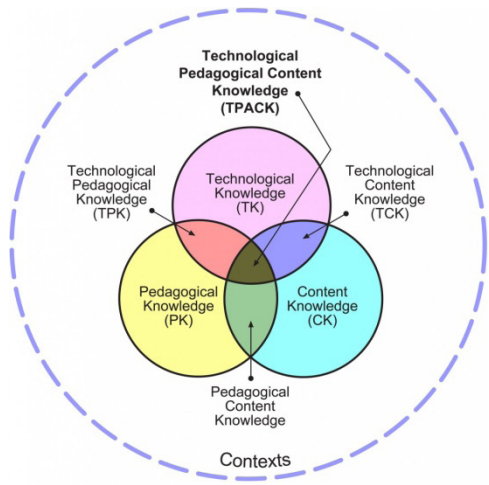
How to cite this article: Tseng, J.-J. (2014). Investigating EFL teachers' technological pedagogical content knowledge: Students' perceptions. In S. Jager, L. Bradley, E. J. Meima, & S. Thouësny (Eds), *CALL Design: Principles and Practice*; *Proceedings of the 2014 EUROCALL Conference, Groningen, The Netherlands* (pp. 379-384). Dublin: Research-publishing.net. doi:10.14705/rpnet.2014.000249

a theoretical underpinning, which can guide teachers to examine how technology is incorporated into teaching.

TPACK encompasses three bodies of core knowledge (technology, pedagogy, and content) and the intersections between them, as illustrated Figure 1 that follows: technological knowledge (TK), which refers to the teachers' ability to operate a variety of technologies for instructional purposes; pedagogical knowledge (PK), which deals with their competency of utilizing particular teaching strategies to improve student learning; content knowledge (CK), which is associated with their knowledge and skills of subject matter; technological pedagogical knowledge (TPK), which involves their ability to employ teaching strategies supported by technologies; technological content knowledge (TCK), which is concerned with their knowledge of using technologies to improve student learning of subject matter; PCK, which is known as their knowledge of employing various teaching strategies to represent subject matter; and TPACK, which requires the teachers to help their students acquire content using particular teaching strategies via the use of specific technologies.

Figure 1. The framework of technological pedagogical content knowledge[2]



The TPACK framework is utilized to explain the complexity involved in the integration of technology into classroom teaching. Questionnaire instruments have been developed to assess teachers' perceptions of their TPACK (Archambault & Crippen, 2009; Chai, Chin, Koh, & Tan, 2013; Xiang & Ning, 2014). Archambault

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and Crippen (2009) measured 596 K-12 online teachers' TPACK and found that the teachers gave higher ratings to the domains of PK, CK, and PCK. This suggested that they were aware of how to teach content using appropriate pedagogical strategies, but not of how to teach content using technology. Similarly, Chai et al. (2013) found that Chinese language teachers in Singapore perceived themselves to be most proficient in the domain of content knowledge but felt less competent in TPACK.

However, teacher-perceived TPACK may not reflect their real practices in classrooms. There is a need to examine teachers' TPACK from other perspectives. The present study intended to present a balanced assessment of TPACK by investigating students' perceptions of their teachers' TPACK. One research question was addressed: What were EFL students' perceptions of their teachers' TPACK?

2. Method

2.1. TPACK instrument

A student-based TPACK instrument developed by Tseng (forthcoming) was adopted in the present study due to the fact that it was contextualized in an EFL setting; its validity and reliability ensured.

There are 30 items in the questionnaire. Example items selected from each of the seven sub-scales are listed below for the convenience of reference.

- TK: My teacher knows about basic computer software (e.g. media players, word processing programs, and web browsers).
- PK: My teacher adjusts the ways he/she teaches according to student performance and feedback.
- CK: My teacher has sufficient knowledge of English rammar.
- TPK: My teacher uses technologies to interact more with us.
- TCK: My teacher uses digitalized teaching materials with which I can learn vocabulary better.
- PCK: My teacher conducts group activities in which I can use English more.

- TPACK: My teacher represents content using appropriate strategies via the use of various technologies.

2.2. Data collection and analysis

The questionnaire was administered to 257 students from the classes of three junior high English teachers in northern Taiwan. The three teachers often integrated technology into their teaching, so their students were thought to be qualified to take the survey which used a 5-point Likert-type scale (1=strongly disagree, 2=disagree, 3=not sure, 4=agree, 5=strongly agree). The students responded to each item by indicating the degree to which they agreed with it.

Descriptive measures were used to assess the degree the students perceived their teachers' TPACK illustrated in the items of the survey. The results included mean score and standard deviation for each item. These descriptive statistical measures were also tabulated for each subscale.

3. Results and discussion

Table 1 presents the descriptive statistics of the students' responses to the questionnaire. Overall, the mean scores of all sub-domains were over 4.00. The students generally agreed that their teachers exhibited good knowledge in all aspects of TPACK as described in the questionnaire. In particular, the teachers were thought to be more confident in the three individual domains of core knowledge, as compared to the intersections between them. This result suggested that the teachers were perceived to be less proficient in the ways in which the three bodies of knowledge are tactfully combined to enhance student learning.

Table 1. Descriptive statistics of sub-domains of the TPACK scale

Sub-domains	Items	N	Mean	SD
TK	5	257	4.22	.835
PK	3	257	4.23	.839
CK	4	257	4.38	.718
TPK	5	257	4.15	.864
TCK	5	257	4.08	.862
PCK	3	257	4.11	.925
TPACK	5	257	4.07	.853

More specifically, while the highest mean score went to the CK (*M*=4.38, *SD*=.718), the lowest mean score was obtained by the TPACK (*M*=4.07, .853). This meant

that the students perceived their teachers' CK a little more strongly than their TPACK. This result corroborates Chai et al.'s (2013) study that the teachers rated themselves highest in CK but lowest in TPACK.

In order to provide a picture of the students' responses to individual items, the items with higher and lower scores are presented as well. While the top five items are listed in Table 2, the items with mean scores lower than 4.00 are shown in Table 3. The teachers were perceived to be particularly proficient in content such as pronunciation and grammar; however, the students did not give equal rating to the way the content was enhanced with the computer. These results help readers gain a detailed understanding of what is strong and what is weak in the perceptions of teachers' TPACK.

Table 2. Top 5 items

Items	Sub-domains	M	SD
My teacher has good pronunciation.	CK	4.53	.781
My teacher keeps up with important new technologies (e.g. e-books, Facebook, and white board).	TK	4.45	.936
My teacher has sufficient knowledge of English grammar.	CK	4.37	.810
My teacher solves students' questions about English.	CK	4.33	.908
My teacher knows how to manage his/her class (e.g. drawing up clear class rules, creating a friendly atmosphere in class, and developing a good relationship between students and the teacher).	PK	4.32	.890

Table 3. Items with mean scores lower than 4.00

Items	Sub-domains	M	SD
The way my teacher teaches English with the computer is engaging.	TPACK	3.92	1.101
My teacher knows how to solve technical problems associated with hardware (e.g. setting up printers, using webcams, and changing hard drives).	TK	3.90	1.125

4. Conclusions

It can be concluded that what students perceived about their teachers' TPACK was consistent with what teachers perceived about their TPACK. Effective integration of technology into teaching requires teachers not only to know about technology, pedagogy, and content, but also to master the interplay between the three domains of core knowledge. Future studies could be conducted on pre- and post-surveys of TPACK of pre-service and in-service language teachers for their TPACK development.

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