

On the Relationship between Iranian ESP Teachers' Technological Pedagogical Content Knowledge and their Reflective Teaching in Online Classrooms

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Abstract

This study was done to investigate the relationship between technological pedagogical content knowledge and reflective teaching of Iranian ESP teachers in online classrooms. To meet the goals, 254 ESP teachers from different universities in Iran were selected to take part in the study. The technological pedagogical content knowledge and teachers' reflective teaching questionnaires were used as the main instruments of the study. Pearson correlation and multiple regression were calculated to analyze the data gathered from the questionnaires. The findings showed that the relationship between Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching in online classrooms was significant and the components of TPACK significantly predicted the Iranian ESP teachers' reflective teaching. The findings of the study assist ESP teachers to employ technological pedagogical content knowledge to enhance their reflective teaching in the teaching process.

Keywords: ESP Teachers, Reflective Teaching, Technological Pedagogical Content Knowledge, Teaching Process, Multiple Regression

1. Introduction

All educational systems have been affected by the use of the internet and technology all over the world. After the pandemic, all classes were shifted to online ones. Technological development, changes that result from this development, and being educated for it seem to be needed for all individuals. Today learning environments are mixed with technology and some changes occur in the content of the courses which lead teachers to manage the classes online and apply technological tools in the online conditions; as a result, teachers should have the required management and skill for the integration of technology in education (Kazu & Erten, 2014).

Meanwhile, ESP has been considered an innovative approach to language teaching which has occurred for various reasons such as expansion in technical and scientific activities,

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a revolution in traditional ways of teaching, and changes in the psychology of learning integrated with individual learning differences, learning styles, and strategies. These reasons have made ESP classes receive great attention and importance (Ghafourania & Ahmadian Sabet, 2014). Thus, the role of ESP teachers in learning settings is very crucial. In some developing countries like Iran, university teachers including ESP ones are becoming interested in online education (Kaviani, 2022) and ESP classes have shifted to online ones.

One skill that teachers need to have to be able to lead their online ESP classes well in the modern world is the capability to use technological instruments in the process of teaching and learning which can be observed through the Technological Pedagogical Content Knowledge (TPCK) owned by the ESP teachers in ESP classes. TPCK is known as a kind of theoretical framework for the integration of technological tools, pedagogical methods, and subject matter in learning (Suprpto et. al., 2021). According to this framework designed by Mishra and Koehler (2006), the dynamic relationship among technology, pedagogy, and knowledge is important in the educational process and describes how this interaction occurs. TPCK consists of a set of skills that teachers need to possess to use information and computer technology (ICT) effectively in the classroom (Koehler et. al., 2007). In general, TPCK consists of three elements namely content knowledge (CK), technology knowledge (TK), and pedagogical knowledge (PK) which are intertwined with each other (Irwanto, 2021). Bowers and Stephens (2011) declare that the purpose of TPCK is to assist teachers increase the habit of using technology to assist their learners to acquire the concepts and connect them to the real world which can also be considered a kind of solution for the problems teachers faced with when integrating technology into the curriculum (Sahin et al., 2013). Moreover, TPCK can be regarded as an effective manner for the sophisticated conditions in online classes (Chai et al., 2013).

The other skill that teachers need to have to be able to enhance their knowledge of teaching is reflecting critically on their teaching experiences which have been known as reflective teaching (Russell, 2005). Reflective teaching is regarded as an approach to the teaching process which is based on the elements that teachers can improve themselves by looking back at what they have done and trying to find out the reasons why they have done such a thing (Namaziandost et al., 2022). A good teacher is to observe his/her teaching by reflecting on teaching practices and critical examination of experiences and looking back pondering on the things they have done in the classroom. It makes the teacher professionally sound (Richards & Farrell, 2005). In the Iranian context, these two variables have been studied separately by different researchers; however, the relationship between them has never been considered specifically among ESP teachers. Therefore, to fill the gap, the main aim of the study was to find out the correlation between ESP teachers' technological pedagogical content knowledge and their reflective teaching in online classes. The two research questions of the study were:

Q1. Is there any significant relationship between Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching?

Q2. Can the components of teachers' technological pedagogical content knowledge predict the Iranian ESP teachers' reflective teaching?

2. Review of Literature

2.1. Technological Pedagogical Content Knowledge

Technological pedagogical content knowledge has been considered to be the skill that teachers need to have for teaching their students more effectively. In this way, they require to educate their learners by using technology with specific strategies and instruments. Teachers try to teach their students by applying effective technology in their particular material fields and grade levels (Niess, 2008). TPCK is a suitable teaching method, using technology, which explains the context, increases the level of awareness of learning, and shows the way of controlling difficult matters in learning situations (Koh et al., 2017). The notion of TPCK has been used to clarify the relation between three kinds of knowledge: technological, material, and academic. Incorporating technology into the classroom often causes a change in how the material is taught. It helps teachers to choose and use effective applications, identify their features and use them in pedagogically interesting ways (Koh et al., 2017). Teachers who have TPCK perspectives are needed to understand the correct pedagogical concept for accompanying technology with teaching and learning activities. As mentioned above, TPCK includes different kinds of knowledge such as technological knowledge (TK) which refer to the teachers' knowledge using technologies in the teaching process (Mishra & Koehler, 2005), pedagogical knowledge (PK) refers to teachers' specialized knowledge in creating an effective environment for learners' learning (Ozmantar et al., 2008) and content knowledge (CK) which refers to the knowledge a teacher possesses in a certain field in which they need to have a good command of and be able to connect it with other ideas (Mishra & Koehler, 2006). This kind of knowledge has a great role in educators' teaching life.

Some scholars believed that TPCK can help teachers, researchers, and practitioners to achieve learning purposes via the application of technology in teaching, having a better understanding of the content and enhancing pedagogical knowledge while developing learning models (Hartati et al., 2019). Niess (2008) mentioned that TPCK is very fruitful for improving the teacher's knowledge of content, pedagogy, and technological knowledge as they need to teach and educate their students by using technology within their teaching context, integrating it with specific strategies and instruments. Meanwhile, teachers assist students in applying education through technology in their particular material. According to Koehler et al. (2007), the main components of TPCK can be considered as (a) TPK which is associated with the integration of technology into the teachers' instructional practices, (b) TCK which is related to the teachers' knowledge of presenting content through using the technology, (c) PCK which is connected with the teachers' knowledge of using the best strategies in presenting the intended subject content and (d) TPCK which is connected to the knowledge of teachers considering the presentation of the intended content through the application of technology and proper strategies.

Since the TPCK framework is relatively new, little research has been done regarding this issue in the process of teaching. Archambault and Crippen (2009) conducted a study on 596 educators' TPCK comprehensions in an online course. The findings of the study revealed that the pedagogical content knowledge of those teachers was at a high level. Also, their self-efficacy was improved by blending the technological element. Kulavuz (2011) investigated the effect of TPCK on the EFL earners of universities. The participants selected a location and

started to write an essay about that location. At the same time, the learners received feedback about their essays and photos. Kulavuz (2011) found out that TPCK significantly enhances the students' grammatical structure and their four language skills. In another study, Muniandy and Veloo (2011) tried to assess the effect of TPCK knowledge on 33 Malaysian teachers and found what their reactions were about applying YouTube clips to learners. The results revealed that those clips fulfilled the objectives of curriculum successfully, by engaging them in the context of learning.

2.1.1. Advantages of Using TPCK for Teachers. The most obvious benefit of using TPCK in language classes refers to the role it has for teachers which allows them to reflect on and examine their practice and the way technology can be integrated into their classes. Also, it focuses on the important intersections between technology, pedagogy, and content. Another benefit can go back to the positive culture which can be cultivated between educators who can share their experiences considering their trials and errors connected with integrating technology into their teaching. The supporting role of TPCK can be considered as another advantage it has due to the fact that it can support teachers' instruction and their assessment practices to foster student learning. TPCK can also be used to enhance teaching quality and increase teachers' abilities (Purwaningsih, et al, 2019). TPCK can improve the English competence of the learners' by utilizing various technological apps and tools in classes and help teachers to organize educational environments by adding more resources in classes (Bostan et al., 2021).

2.2. Reflective Teaching

Reflective teaching (RT) is "a holistic thought that enables a teacher to make choices and take alternative actions and allows teachers to think to improve teaching and learning decisions in the classroom" (Shanmugavelu et al. 2020, p.46). Reflection is a process of rethinking and analyzing some actions in class so teachers and students reach their teaching and learning objectives. Furthermore, Ryan (2013, p.12) considered reflective teaching as "a process of thinking, evaluating, and making sense of existing experiences as well as planning for future experiences, and is an integral component of both self-knowledge and self-regulation that allows the individual to evaluate monitor, and improve themselves." Reflective teaching includes thinking and rethinking the teachers' activities before, during, and after the process of teaching. Instructors have to reflect on the problems of students which are likely to happen during the achievement of targeted goals (Zalipour, 2015). Teachers have to ponder the teaching strategies they will need to consider in delivering the expected lesson (Zahid & Khanam, 2019). Impedovo and Malik (2016) stated that reflective teaching is an alternative way to enhance the teachers' knowledge regarding their teaching and is an approach to provoke the teachers to upgrade their teaching methods and make adjustments to their lessons. It has been argued that by using reflective teaching, "teachers become aware of their activities in the teaching process and as a result develop a better understanding of themselves as a teacher. In this regard, teachers' reflection acts as a knowledge-generation mechanism based on teachers' own experiences, which in turn guides their practice" (Mathew et al., 2017, p.128). Rogers (2001) argues that reflective teaching is an approach to teaching which is based on the idea that teachers can increase their understanding of teaching and the quality of their teaching by

reflecting critically on their teaching experiences and what they do in classes. Teachers with greater degrees of reflection are always thinking about ways to develop their teaching quality and consider everything they do as teachers (Fathi et al., 2021).

Various scholars have been working on the idea of reflective teaching. Liou (2001) examined the effect of reflective teaching on pre-service EFL teachers' critical and descriptive discussion of topics in Taiwan. The results demonstrated that reflective teaching had a significant effect on the student's critical discussion of the selected topics. At the same time, they did not demonstrate much improvement in their ability to reflect. Mandernach et al. (2013) explored the teachers' use of reflecting teaching practice in English language teaching. They have selected eight English language teachers from the Lalitpur district, who have been doing reflective teaching practices in the school. This research found that reflection helps reformative practices and guides teachers to become aware of reality. A reflective teacher gets more satisfaction than a non-reflective teacher; in other words, a reflective teacher invents new ideas to teach and it is not always easy. Shokouhi et al. (2015) investigated reflective practices from a sociocultural perspective and proposed a framework under the rubric of strategically mediated reflective practice in Iran. Soodmand Afshar et al. (2015) conducted a study on the relationship between reflective teaching and reflective thinking among Iranian EFL teachers and how age and teaching experience can influence their reflection. The results indicated a significant positive correlation between reflective teaching and reflective thinking of Iranian EFL teachers. Babaei et al., (2016) explored the relationship between reflective teaching and teachers' self-efficacy beliefs in Iran. Pearson product-moment correlation analysis showed a significant positive relationship between the general factors of teacher reflectiveness and self-efficacy. In another article in the context of Iran, Namaziandost et al. (2022) tried to disclose the relationship between reflective teaching, emotion regulation, and immunity. Their findings documented that the EFL teachers' reflective teaching was correlated with immunity and emotion regulation. Moreover, Kurosh et al. (2020) studied the relationship between Iranian EFL teachers' reflective teaching and their self-efficacy perception. The findings revealed that except for the ELT teachers, other discipline teachers' self-efficacy perceptions were not related to their reflectivity.

3. Method

3.1. Participants and Setting

The participants in this study included a group of 254 male and female ESP teachers with the age ranges of 35-60 (with men of 45.5). Among the participants of the study, there were 130 (51.18%) male and 124 (48.81%) female ESP teachers. The selection was done from all available subjects based on convenience sampling. Convenience sampling as a non-probability sampling method was used because by applying this method the researcher could access teachers who are easy to contact and obtain their participation. They had different teaching experiences (between 5 to 25 years) in different ESP fields. The teachers who were teaching in different universities in different cities of Iran (such as Tehran University, Ferdowsi University in Mashhad, Shiraz University, etc.) were selected as the main participants of the study. According to Krejcie and Morgan Table (1970), this study's sample size should be 254

teachers, considering 95% of the level of confidence and 0.05 degree of accuracy. All of the participants were native speakers of the Persian language.

3.2. Instrumentation

3.2.1. Technological Pedagogical Content Knowledge. The Technological Pedagogical and Content Knowledge Scale was designed and developed and validated by Koh and Sing (2011). It included 26 items based on 5- a point Likert scale of 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Moreover, it included five subscales which were technological knowledge (TK), content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), and technological pedagogical content knowledge. TPACK was designed to measure the multidimensional construct of technological pedagogical and content knowledge. The components of the TPACK questionnaire are technological knowledge (5 items), content knowledge (3 items), pedagogical knowledge (6 items), pedagogical content knowledge (6 items), and technological pedagogical content knowledge (6 items). The reliability of the complete TPACK scale was reported as 0.85 (Koh & Sing, 2011), and it was reliable enough to be used in the study.

3.2.2. Reflective Teaching. A 29-item questionnaire with a Likert Scale ranging from 1(Never) to 5 (*Always*) (Akbari et al., 2010) was used to collect the required data regarding the teachers' reflective teaching. The questionnaire items had five constructs such as practical (6 items), cognitive (6 items), learner (3 items), meta-cognitive (7 items), and critical (7 items). Akbari et al. (2010) validated the questionnaire on a sample of 300 teachers using exploratory and confirmatory factor analyses. The validation process enabled them to reduce the original 42 items to 29 items. The Cronbach alpha reliability of the questionnaire was reported to be 0.91 in Akbari et al.'s study (2010) and it had high reliability to be used in the current study.

3.3. Procedures

To assess the relationship between the variables of the current study, the following steps were done. The process of conducting the study started in January 2023 and lasted until April 2023. In the first step, a group of 254 male and female ESP teachers with the age range of 35-52 in universities (such as Tehran University, Ferdowsi University in Mashhad, Shiraz University, etc.) of Iran was selected based on Krejcie and Morgan's (1970) Table. The selection was done from all available subjects based on convenience sampling. In the second step, the data collection procedure was initiated by giving the teachers' TPACK questionnaire and the reflective teaching questionnaire to ESP teachers. The questionnaires were changed into a Google form and the link was sent to the participants. Before the administration of the instruments, the participants were well-informed about the constructs of the study. They were become assured that their answers would be kept confidential, and they were asked to be honest and respond according to what represented them as a teacher. It took approximately 45 minutes for each participant to fill out the form. Finally, SPSS software was utilized to assess the relationship between the TPACK and RT of Iranian ESP teachers.

3.4. Study Design

The quantitative method was used to answer the research questions. The quantitative method is related to the analysis of numerical data gathered from the instruments of the study (Gay et. al., 2009). Furthermore, to explore the relationship between the TPCK and RT variables of the study, a correlational design was used.

4. Results

4.1. Results of the First Research Question

To answer the first research question of the study, 'Is there any significant relationship between Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching?', two questionnaires (TPCK and RT questionnaires) were distributed among the candidates of the study. To show the relationship between the teachers' TPCK and their reflective teaching, descriptive statistics and Pearson correlation were utilized. The results of descriptive statistics for both questionnaires are shown in Table 1.

Table 1
Descriptive Statistics for Both Questionnaires

	N	Sum	Mean	Std. Deviation
TPCK	254	24459.46	96.29	9.53
RT	254	27029.00	106.41	13.73
Valid N (listwise)	254			

According to Table 1, the number of teachers was 254. The sum of the scores for the teachers' TPCK was 24459.46, the mean score was 96.29 and the standard deviation was 9.53. Furthermore, the sum of the scores for the teachers' reflective teaching was 27029.00, the mean score was 106.41 and the standard deviation was 13.73. Finally, the Pearson correlation was used to answer the first research question.

Table 2
Results of Pearson Correlation

		NTPCK	RT
NTPCK	Pearson Correlation	1	.29**
	Sig. (2-tailed)		.000
	N	254	254
RT	Pearson Correlation	.29**	1
	Sig. (2-tailed)	.000	
	N	254	254

According to Table 2, the p-value is 0.00. The results showed that the relationship between the teachers' TPCK and their reflective teaching was significant since the level of significance was less than 0.05. Furthermore, the Pearson correlation was .29 ($r=.29$). Therefore, it can be concluded that there was a significant and low correlation between the teachers' technological pedagogical content knowledge and their reflective teaching (RT).

4.2. Results of the Second Research Question

The main goal of the second research question was to predict the relationship between the components of teachers' TPACK and their reflective teaching. To predict the relationship between the components of teachers' technological pedagogical content knowledge and their reflective teaching, multiple linear regression was used. The results of descriptive statistics are shown in Table 3.

Table 3

Results of Descriptive Statistics for the Reflective Teaching and the Components of Teachers' TPACK Questionnaires

	Mean	Std. Deviation	N
RT	106.41	13.73	254
TK	18.18	4.87	254
CK	11.01	3.34	254
PK	44.46	5.71	254
TPCK	22.66	4.51	254

Based on the results of Table 3, the mean of the teachers in the reflective teaching questionnaire, the mean and standard deviation were 106.41 and 13.73. Furthermore, the mean and standard deviation of the scores for the technological knowledge (TK) as the first component of TPACK were 18.18 and 4.87. The mean and standard deviation of the scores for the content knowledge (CK) as the second component of TPACK were 11.01 and 3.34. The mean and standard deviation of the scores for the pedagogical knowledge (PK) as the third component of TPACK were 44.46 and 5.71. Finally, the mean and standard deviation of the scores for the technological pedagogical content knowledge (TPCK) as the fourth component of TPACK were 22.66 and 4.51. The results of the model summary are shown in Table 4.

Table 4

Results of Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.39 ^a	.15	.14	12.72

From the data in the table above, it can be seen that the value of R is 0.39, so it can be concluded that there is a moderate relationship between the components of TPACK and the teachers' reflective teaching. Based on the results of the table, since the R-square is .15, we can conclude that the components of TPACK can explain 15% of the variability of our dependent variable (reflective teaching) and the remaining 85% influenced by other factors.

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The results of the ANOVA test are shown in Table 5. The ANOVA, Table 5, indicates that the model fits and there is linearity between the components of TPACK as predictors and the reflective teaching as the dependent variable since the level of significance

was less than 0.05. Indeed, the results showed that the components of TPCK can significantly predict teachers' reflective teaching.

Table 5
Results of ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7358.23	4	1839.55	11.35	.000 ^b
	Residual	40345.31	249	162.03		
	Total	47703.59	253			

Table 6 shows the results of the Coefficient more clearly. This table shows that the pedagogical knowledge (PK) and technological pedagogical content knowledge (TPCK) as the components of the TPCK significantly predicted the teachers' reflective teaching since the levels of significance were less than 0.05. Also, as the Beta value in Table 6 reveals, 35% of the relationship between the components of TPCK and the teachers' reflective teaching can be predicted by the component of technological pedagogical content knowledge. Furthermore, as the Beta value in Table 6 reveals, 19% of the relationship between the components of TPCK and the teachers' reflective teaching can be predicted by the component of pedagogical knowledge. Therefore, it can be concluded that the components of the teachers' TPCK significantly predicted the ESP teachers' reflective teaching.

Table 6
The Results of Multiple Regression Analysis

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	62.86	8.29		7.57	.000
	TK	-.13	.16	-.04	-.79	.43
	CK	.06	.24	.01	.26	.79
	PK	.46	.14	.19	3.27	.001
	TPCK	1.08	.17	.35	6.05	.000

5. Discussion

The first goal of the study was to assess the relationship between the Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching. Moreover, the second goal of the study was to predict the relationship between the components of the teachers' technological pedagogical content knowledge and their reflective teaching. The results showed that there was a significant positive relationship between Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching. Furthermore, the components of the teachers' technological pedagogical content knowledge significantly predicted the Iranian ESP teachers' reflective teaching.

Therefore, based on the findings of the study, the teachers' technological pedagogical content knowledge and their reflective teaching are interdependent. The results of the study revealed that the teachers' TPCK provides an environment for teachers to increase their reflective teaching and enhance their teaching process. Therefore, ESP teachers with high TPCK beliefs generate stronger reflective teaching strategies than teachers with lower TPCK beliefs. Furthermore, it can be declared that teachers who possess a high sense of reflectivity show a strong commitment to teaching, spend more time in subject matters in their areas of perceived inefficacy, and devote more overall time to academic matters and this would naturally lead to students' better performance in the classroom.

The findings of the study are in line with the study conducted by Archambault and Crippen (2009) who investigated the perspectives of teachers regarding the use of TPCK in online classrooms and they concluded that the teachers' TPCK had a significant effect on their self-efficacy in online classrooms. Therefore, TPCK is a useful method for the process of teaching and it amplifies the teachers' awareness of teaching and provides a situation for students to enhance their motivation and interaction in the process of learning. Furthermore, the TPCK elements can assist the teachers to apply effective teaching technological tools and instruments in order to overcome the difficulties of the ESP students in the process of learning their specific field of study. The findings of the study are also in congruence with the study conducted by Ryan (2013) who concluded that reflective teaching can help teachers to monitor, evaluate and improve their teaching process. Furthermore, Mandernach et al. (2013) stated that reflective teaching provides a situation for teachers to find effective teaching methods to motivate learners to learn more effectively. The results of the study were in congruence with the findings of Joo, et.al, (2022). They conducted a study regarding the relationship between the pre-service teachers' reflectivity and their technological pedagogical content knowledge. The results showed that there was a significant relationship between the pre-service teachers' reflectivity and their TPCK. Similarly, Najari, et.al, (2021) examined the relationship between the components TPACK issue and self-efficacy as well as the benefaction of the TPACK concept in the Iranian EFL context. The findings showed the relationship between the components of TPCK and self-efficacy was significant and the teachers had positive attitudes regarding the usefulness of TPCK and its components in the process of foreign language learning and their findings were in line with the results of the current study. Technological pedagogical content knowledge impacts teachers' instruction, choice of activities, levels of effort, and persistence with students which, in turn, positively impacts teacher-reflective teaching, commitment, and professional retention that, in turn, translates into higher student growth and learning. Reflective teachers are far more likely to plan more effective lessons, take more responsibility for student achievement, persist when students face challenges, and search extensively for appropriate strategies and styles, and materials to improve students' achievement. In addition, they are more likely to remain committed to their work and tend to overcome situations that challenge their ability to teach. They are more optimistic and take personal responsibility for their failures and successes (Fathi et al., 2021).

Furthermore, TPCK and reflective teaching produce higher student achievement because they use effective management strategies and styles that stimulate students' autonomy and reduce custodial control, and keep students on task. Moreover, they implement influential

instructional styles, which enhance students' academic growth, and modify students' perception of their abilities (Joo et al., 2022). Being more confident of their teaching abilities, reflective teachers are more likely to invite parent involvement in school-related activities. This model likely enables creative and innovative approaches to classroom and educational situations and problems, which lead to improved learning opportunities for students (Shokouhi et al., 2015).

6. Conclusion

This study was done to assess the relationship between the Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching. The findings of the study showed that there was a significant relationship between the Iranian ESP teachers' technological pedagogical content knowledge and their reflective teaching. More specifically, the technological pedagogical content knowledge and pedagogical knowledge as the components of TPACK significantly predicted the teachers' reflective teaching. To help teachers to be great reflective teachers, lots of suggestions and tools are suggested. As an example, Fatemipour (2013) presents three reflective tools: technological pedagogical content knowledge tools, peer observation, audio recording, and students' feedback. Reflective teaching provides teachers with some changes and improvement in their thinking, it can be considered a professional means of development. It is also a self-questioning process about the teaching practices and the way teachers present the materials in the classroom and makes a relationship with other colleagues who have the same question (Ashraf et al., 2016). Reflective teaching helps teachers in re-examining their teaching and using problem-solving techniques to improve upon their work. It is also mentioned that by using technological pedagogical content knowledge, reflective teachers will derive meaning from their experiences, thereby improving their work (Disu, 2017).

The present study was limited due to the fact that the gender and age of the teachers were not included in the investigation as determining factors. Meanwhile, the number of teachers who took part in the study was limited to only 254 male and female ESP teachers. Another limitation of the study could be teachers' honesty in filling out the questionnaires. At the same time, there were some delimitations including the method of the study which was chosen to be quantitative, and the design which was selected to be correlational. The participants were decided to be only ESP teachers and the data collection method was using two questionnaires.

The results of the study have implications for the administrators of ESP courses that instructors may be trained to enhance their technological pedagogical content knowledge and reflective teaching. Educational planners and managers have the duty of planning curricula and learning environments to assist teachers in gaining knowledge relevant to technology and pedagogy in their fields. The Ministry of Education in Iran may incorporate study findings and revise its policy to shift its focus to technological education for developing new institutes of such kind to decrease the burden on traditional institutes because students studying in such technological courses are highly satisfied with their studies. In the same way, higher education universities may design and launch technological courses to reach a large number of students, especially those who do not have access to higher education institutes, to provide them with educational

opportunity. The results of the current study have shed light on the relationship between Iranian ESP teachers' reflective teaching and their technological pedagogical content knowledge. The outcomes of the study revealed that components of TPCK increased the perceptions of teachers' reflective teaching, and beliefs on student engagement, classroom management, and instructional strategies separately as well. These results imply the requirement of ESP teachers' TPCK development to improve the teachers' reflective teaching. Furthermore, some factors such as age and gender may influence the teachers' TPCK and their reflective teaching. Thus, there is a need for further studies to explore the effect of gender and age on the teachers' TPCK and their reflective teaching.

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References

- Akbari, R., Behzadpoor, F., & Dadvand, B. (2010). Development of English language teaching reflection inventory. *System*, 38, 211-227. <https://doi.org/10.1016/j.system.2010.03.003>
- Archambault, L. & Crippen, K. (2009). Examining TPACK among K-12 online distance educators in the United States. *Contemporary Issues in Technology and Teacher Education*, 9(1), 71-88.
- Ashraf, H., Samir, A., & Yazdi, M. (2016). Reflective teaching practice in an EFL context: A qualitative study. *International Journal of English Linguistics*, 6(7), 48-58.
- Babaei, M. & Abednia, A. (2016). *Australian Journal of Teacher Education*, 41 (9), 1- 26.
- Bostan, D., & Sener, S. (2021). The Role of Technological Pedagogical Content Knowledge (TPACK) of English Teachers on High School Learners' Acceptance of Mobile Learning Tools. *Shanlax International Journal of Education*, 9, 42-52. Doi: <https://doi.org/10.34293/education.v9iS1-May.3998>
- Bowers, J. S., & Stephens, B. (2011). Using technology to explore mathematical relationships: A framework for orienting mathematics courses for prospective teachers. *Journal of Mathematics Teacher Education*, 14(4), 285–304. <https://doi.org/10.1007/s10857-011-9168-x>
- Chai, C.-S., Koh, J. H.-L., & Tsai, C.-C. (2013). A review of technological pedagogical content knowledge. *Educational Technology & Society*, 16(2), 31–51. <http://www.jstor.org/stable/jeductechsoci.16.2.31>.
- Disu, A. (2017). A phenomenological study on reflective teaching practice. *ELT*, 12(2), 154-165.
- Fatemipour, H. (2013). The efficiency of the tools used for reflective teaching in ESL contexts. *Science Direct*, 93 (4), 1398-140.
- Fathi, J., Greenier, V., & Derakhshan, A. (2021). Self-efficacy, reflection, and burnout among Iranian EFL teachers: The mediating role of emotion regulation. *Iranian*

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- Journal of Language Teaching Research*, 9(2), 13-37. Doi: 10.30466/IJLTR.2021.121043
- Gay, L. R., Mills, G. E., & Airasian, P. W. (2009). *Educational research competencies for analysis and applications*. NY: Merrill/Pearson.
- Ghafourania, N. & Ahmadian Sabet, Sh. (2014). The most prominent roles of an ESP teacher. *International Education Studies*, 7 (11), 1- 9.
- Hartati, T., Heryanto, D., Annisa, N., Nuriyanti, R., Saputra, A. H. & Sutedi, R. (2019). Technological Pedagogical Content Knowledge (TPACK) in the context of improving the quality of learning for pre-service PPG elementary school students. *EDUTECH*, 18 (2), 174-181.
- Impedovo, M. A., & Malik, S. K. (2016). Becoming a reflective in-service teacher: Role of research attitude. *Australian Journal of Teacher Education (Online)*, 41(1), 100-112. Doi: <https://search.informit.org/doi/10.3316/informit.793470578009259>
- Irwanto, I. (2021). Research trends in technological pedagogical content knowledge (TPACK): A systematic literature review from 2010 to 2021. *European Journal of Educational Research*, 10 (4), 2045- 2054. Doi: 10.12973/eu-jer.10.4.2045.
- Joo, Y. J., Park, S., & Lim, E. (2022). Factors influencing preservice teachers' intention to use technology: TPACK, teacher reflective teaching, and technology acceptance model. *Educational Technology & Society*, 21(3), 48–59.
- Kaviani, M. (2022). The impact of Instagram on learning English vocabulary among Iranian pre-intermediate EFL learners. *Journal of Research in Techno-based Language Education*, 2 (1), 15- 24. Doi: [10.22034/JRTLE.2022.147055](https://doi.org/10.22034/JRTLE.2022.147055)
- Kazu, I. Y. & Erten, P. (2014). Teachers' technological pedagogical content knowledge self-efficacies. *Journal of Education and Training Studies*, 2 (2), 126- 144. Doi: 10.11114/jets.v2i2.261
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610. Doi: <https://doi.org/10.1177/001316447003000308>
- Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy, and technology. *Compute. Educ*, 49(4), 740–762. Doi: <https://doi.org/10.1016/j.compedu.2005.11.012>
- Koh, J. H. L., Chai, C. S., & Lim, W. Y. (2017). Teacher professional development for TPACK-21CL: Effects on teacher ICT integration and student outcomes. *J. Educ. Compute*, 55(3), 172–196. Doi: <https://doi.org/10.1177/0735633116656848>
- Koh, J. H. L., & Sing, C. C. (2011). Modeling pre-service teachers' technological pedagogical content knowledge (TPACK) perceptions: The influence of demographic factors and TPACK constructs. *Proceedings Ascilite Hobart*, 12(2), 735-746. <http://hdl.handle.net/10497/14126>
- Kulavuz, D. (2011). English language teachers' learning to teach with technology through participation in an online community of practice: A netnography of webheads in action. *ELT*, 12 (3), 220-235. Doi: <https://digitalcommons.usf.edu/etd/4713>
- Kurosh, Sh., Yousefi, M. H. & Kashef, H. (2020). Iranian teachers' reflective teaching practice in relation to self-efficacy perceptions: Investigating teachers' discipline. *International*

- and Multidisciplinary Perspectives, 21 (3), 356- 370. Doi: <https://doi.org/10.1080/14623943.2020.1748591>
- Liou, H. C. (2001). Reflective practice in a pre-service teacher education program for high school English teachers in Taiwan, ROC. *System*, 29(2), 197–208. Doi: [https://doi.org/10.1016/S0346-251X\(01\)00011-2](https://doi.org/10.1016/S0346-251X(01)00011-2)
- Mandernach, B. J., Donnelly-Sallee, E., & Dailey-Hebert, A. (2013). Teachers' use of reflecting teaching practice in English language teaching. *Society for the Teaching of Psychology, Division 2, American Psychological Association*, 2(1), 120-130.
- Mathew, P., Mathew, P., & Peechattu, P. J. (2017). Reflective Practices: A means to teacher development. *Asia Pacific Journal of Contemporary Education and Communication Technology*, 3(1), 126-131.
- Mishra, P., & Koehler, M. (2005). Educational technology by design: Results from a survey assessing its effectiveness. *Society for Information Technology & Teacher Education International Conference*, 85(3), 1511-1517.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teach. College Rec.* 108 (1), 1017–1054. Doi: <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Muniandy, B. & Veloo, S. (2011). Managing and utilizing online video clips for teaching the English language: Views of TESOL pre-service teachers. *2nd International Conference on Education and Management Technology, IPEDR*, 13(1), 173-178.
- Najari, R., Abbasian, G., & Yazdanimoghaddam, M. (2021). Assessment and development of Iranian EFL teachers' technological pedagogical content knowledge (TPACK). *ELT*, 2 (3), 156-169.
- Namaziandost, E., Heydarnejad, T., & Rezai, A. (2022). *Iranian EFL teachers' reflective teaching, emotion regulation, and immunity: Examining possible relationships. Current Psychology*. Switzerland.
- Niess, M. L (2008). Knowledge needed for teaching with technologies-call it TPACK. *AMTE Connect*, 17 (1), 9–10.
- Ozmantar, F., Akkoç, H., Bingolbali, E., & Turkey, T. T. (2008). Voices in shaping the subjectivity of pedagogical content knowledge. *International Group for the Psychology of Mathematics Education*, 81(3), 120-135.
- Purwaningsih, E., Nurhadi, D. & Masjkur, K. (2019). TPACK development of prospective physics teachers to ease the achievement of learning objectives: A case study at the state university of Malang, Indonesia. *Journal of Physics: Conference Series*. Doi: 10.1088/1742-6596/1185/1/012042
- Richards, J. C., & Farrell, T. S. (2005). *Professional development for language teachers: Strategies for teacher learning*: Cambridge University Press.
- Rogers, R. R. (2001). Reflection in higher education: A concept analysis. *Innovative Higher Education*, 26(1), 37-57. Doi: <https://doi.org/10.1023/A:1010986404527>.
- Russell, T. (2005). Can reflective practice be taught? *Reflective Practice*, 6 (3), 199–204. Doi: <https://doi.org/10.1080/14623940500105833>

-
- Ryan, M. (2013). The pedagogical balancing act: Teaching reflection in higher education. *Teaching in Higher Education, 18*(2), 144-155. Doi: <https://doi.org/10.1080/13562517.2012.694104>
- Sahin, I., Celik, I., Akturk, A. O., & Aydin, M. (2013). Analysis of relationships between technological pedagogical content knowledge and educational internet use. *Journal of Digital Learning in Teacher Education, 29*(4), 110–117. Doi: <https://doi.org/10.1080/21532974.2013.10784714>
- Shanmugavelu, G., Ariffin, K., Vadivelu, M., Mahayudin, Z., & Sundaram, M. A. R. (2020). Questioning techniques and teachers' role in the classroom. *Shan Lax International Journal of Education, 8*(4), 45-49. Doi: <https://doi.org/10.34293/education.v8i4.3260>.
- Shokouhi, M., Moghimi, S. A., & Hosseinzade, S. (2015). Introducing reflective practice from a sociocultural perspective: Toward a strategically mediated reflective practice framework. *Applied Linguistics and Language Research, 2*(4), 74-83.
- Soodmand Afshar, H. & Farahani, M. (2015). Reflective thinking and reflective teaching among Iranian EFL teachers: Do gender and teaching experience make a difference. *Procedia- Social and Behavioral Sciences, 192* (24), 615- 620.
- Suprpto, N., Sukarmin, S., Puspitawati, R. P., Erman, E., Savitri, D., Ku, Ch. & Mubarak, H. (2021). Research trend on TPACK through bibliometric analysis (2015- 2019). *International Journal of Evaluation and Research in Education, 10* (4), 1375- 1385.
- Zahid, M., & Khanam, A. (2019). Effect of reflective teaching practices on the performance of prospective teachers. *Turkish Online Journal of Educational Technology- TOJET, 18*(1), 32-43.
- Zalipour, A. (2015). *Reflective practice: Teaching development unit*. Wakaito: The University of Wakaito.