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Efficacy of In-service Education and Training (INSET) Courses in Improving EFL Teachers' Technological Pedagogical and Content Knowledge (TPACK)

Maryam Mahmoodi[1], Mojgan Rashtchi[2], Gholam-Reza Abbasian[3]

[1] Ph.D. Student, Department of Foreign Languages, Faculty of Literature, Humanities, and Social Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran, *maryammahmoudi75@yahoo.com*

[2*] Associate Professor, TEFL Department, Faculty of Foreign Languages, North Tehran Branch, Islamic Azad University, Tehran, Iran, *mojgan.rashtchi@gmail.com*

[3] Assistant Professor, Imam Ali University, Tehran, Iran, *gabbasian@gmail.com*

Abstract

Teachers' knowledge base refers to what teachers should know and be able to implement in their classes. This study investigated to what extent in-service education and training (INSET) courses were influential in developing teachers' knowledge base. From different models, the researchers selected Mishra and Koehler's (2006) technological pedagogical and content knowledge (TPACK) model that assumes an interrelationship between the components of teachers' knowledge base. Thus, an exploratory sequential mixed methods study was designed in three phases. In the first phase, the questionnaire of English Language Teacher's Knowledge Base (ELTKB) was developed and validated with 335 randomly selected EFL teachers from Guilan province. In the second phase, the quantitative follow-up phase, twenty-nine 11th grade EFL teachers' knowledge base improvement was examined after attending online INSET classes. The results of the paired sample t-tests revealed statistically significant differences between the participants' knowledge base components before and after the courses. In the third phase, semi-structured interviews explored the participants' viewpoints concerning the content of the INSET courses. The teachers' perceptions declared in interview sessions were not in complete conformity with the results obtained from the second phase of the study. The teachers had some complaints about the content of the courses and provided some suggestions. The findings of this study can benefit teacher educators, policymakers, INSET programmers, and English teachers. Also, the ELTKB can be employed by researchers as a valid tool for measuring TPACK that is an essential concept for explaining the relationship between teachers' content, pedagogy, and technology-related knowledge.

Keywords: In-service Education and Training Courses (INSET), Mishra and Koehler's Model, Teachers' Knowledge Base

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1. Introduction

The degree an educational system is successful relates to the extent to which teachers are equipped to take active roles in the process of teaching and learning. In-service training courses have a decisive role in preparing teachers, both theoretically and practically, in dealing with the challenges they encounter in their profession. In Iran, in-service education and training courses (INSET) are held by the Education and Training Organization to promote teachers' capabilities in language proficiency, content knowledge, and pedagogical skills. The classes have gained a more crucial role after the paradigm shift from Grammar Translation and Audio-lingual methods in the curriculum to Communicative Language Teaching (CLT) approach that emphasizes communicative rather than linguistic competence. The INSET courses provide both online and offline classes throughout the country with the primary objective of training teachers to gain the skills and knowledge required for teaching the newly developed high school English textbooks (Prospect series and Vision series) via CLT methodology. Moreover, growing interest in technology and its remarkable effect on language learning has encouraged INSET programmers to plan some additional courses. The courses not only can prepare teachers to integrate technology and content of the lessons effectively but also can result in the enhancement of their learners' knowledge.

INSET is a teacher preparation program that provides an opportunity for teachers to promote their teaching knowledge, skills, and abilities. The program aims at English teachers' professional development and can affect students' language learning, as well (Johnson, 2009). As an international program, INSET contributes to the development of the educational system in all countries. However, it has no predetermined characteristic since different countries, depending on their value systems, facilities, needs, and standards may have various expectations from the program. In the same vein, Freeman (2002) argues that the effectiveness of such programs is beyond prescriptions. That is why Wang and Hill (2011) emphasize context as a vital factor in the success of such programs as they assert, "educational theories and practices that have proven successful in one place may not bear the same fruit when transplanted" (p. 213).

One goal of INSET programs is to improve pre-service and in-service teachers' knowledge base, and the researchers of the present study believed it was necessary to delve into the characteristics of the program and examine whether it boosts teachers' knowledge in different areas and meets their needs and expectations. They assumed that having a clear view of the issue might help administrators, policymakers, and teacher educators in accomplishing their future goals that are for the betterment of the country's educational system regarding English language teaching. The issue under

scrutiny grows to be more critical when it is recalled that the content of junior and secondary high school textbooks has recently undergone drastic changes, and research studies are required to investigate whether the content of INSET courses corresponds with what the newly developed materials expect from teachers.

According to Mishra and Koehler (2006), teachers' knowledge base consists of content knowledge (CK), pedagogical knowledge (PK), technological knowledge (TK), pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPCK) which then was referred to as technological pedagogical and content knowledge (TPACK, by Koehler & Mishra, 2009). Thus, the researchers in the first phase of the study developed and validated a questionnaire to evaluate teachers' knowledge base. It is worth mentioning that several studies (e.g., Birjandi & Derakhshan Hesari, 2010; Eghtesadi & Hassanabadi, 2016; Peacok, 2009; Schmidt et al. 2009; Uysal, 2012) have developed different data gathering tools to investigate the effectiveness of pre-service or in-service programs. However, no study has employed a knowledge-based framework for developing and validating an instrument to explore the degree to which teachers could benefit from INSET programs. In the second phase, the quantitative follow-up phase, the researchers examined whether the courses had affected teachers' knowledge base. The third phase of the study aimed to look into teachers' perceptions about the quality of the courses.

2. Literature Review

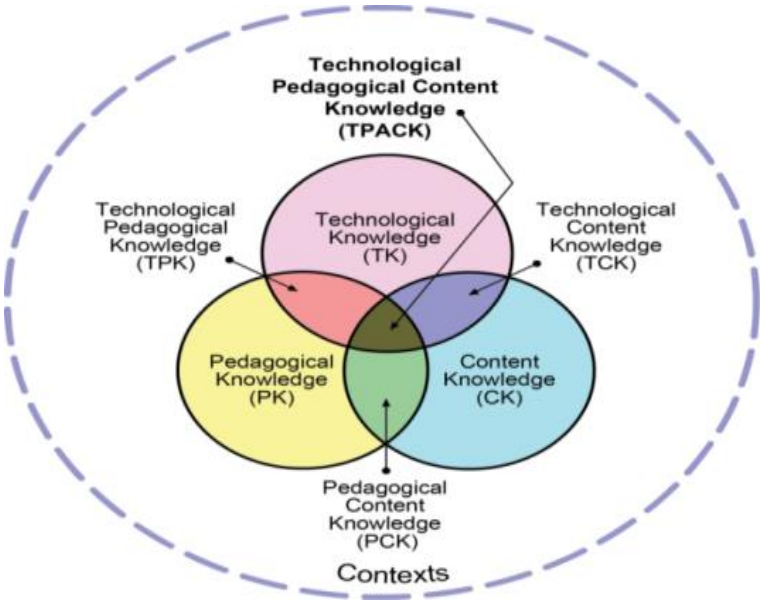
In 1987, Shulman, for the first time, proposed teachers' knowledge base and since then many scholars (e.g., Day, 1993; Freeman & Johnson, 1998; Malderez & Wedell, 2007; Mishra & Koehler, 2006; Richards, 1998; Richards & Farrell, 2005) have tried to portray their models of teachers' knowledge base. Shulman criticizes traditional views regarding teachers' knowledge base and argues that in the past, policymakers and teacher educators viewed teachers' knowledge base, not more than of having general pedagogical skills and content knowledge. Similarly, Ersanli (2016) states that in the past, knowledge base was, merely "an intersection of two main domains; pedagogical and content knowledge (PCK)" (p. 18). Shulman's (1987) model of teachers' knowledge base consists of six components of content knowledge, general pedagogical knowledge, pedagogical content knowledge, curriculum knowledge, knowledge of the learner, and knowledge of educational goals and their philosophical orientations.

However, the advent of technology, which has brought about changes in many aspects of human life, does not exclude classrooms. In this digital era that classrooms are equipped with computers, teachers are reflective

practitioners (Kumaravadivelu, 2001; Sabah & Rashtchi, 2016), and teaching is value-based (Freeman & Richards, 1993), teachers' knowledge base should be defined differently. Therefore, Koehler and Mishra (2009) adjust their model of teachers' knowledge base (Mishra & Koehler, 2006) to meet the advent of technology to the teaching/learning domain, and thus, cause a reform in the definition of teachers' knowledge base. As shown in Figure 1, their model consists of three main areas of TK, PK, and CK and some overlapping areas that include TPK, PCK, and TCK. TPACK is the area where all types of knowledge intersect.

Figure 1

Technology, Pedagogy, and Content Knowledge (Koehler & Mishra, 2009)



CK, as mentioned by Koehler and Mishra (2009), refers to the specific nature of a discipline or subject matter that is different from one educational context to another. Later Koehler, Mishra, Akcaoglu, and Rosenber (2013) add to the definition of CK by stating that CK establishes the mode of thinking necessary for each field. PK, according to Mishra and Koehler (2006), includes teachers' "deep knowledge about the processes and practices or methods of teaching and learning" which "encompass, among other things, overall educational purposes, values, and aims" (p.4). In Mishra and Koehler's (2006) model, TK is the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs. As regards PCK, Mishra and Koehler draw on Shulman (1986) who considers it as "the most useful forms of

representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations- in a word, the ways of representing and formulating the subject that make it comprehensible to others" (as cited in Mishra & Koehler, 2006, pp. 1022-1023). In other words, PCK is "the manner in which subject matter is transformed for teaching" and happens when a teacher finds out how of teaching something to learners (Mishra & Koehler, 2006, p. 1021). Moreover, TCK, according to Koehler and Mishra (2009), limits the choice of technology to the types of contents that are going to be taught and conveys the way technology and content affect each other. TPK, on the other hand, is an understanding of how teaching and learning can change when different types of technologies are used in classroom settings, and include "knowledge of tools for maintaining class records, attendance, and grading, and knowledge of generic technology-based ideas such as Web Quests, discussion boards, and chat rooms (Mishra & Koehler, 2006, p. 1028).

Finally, TPACK, for Koehler and Mishra (2009), is employing technology as a means for good teaching. It needs recognition of the "representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face" (p.66). Additionally, TPACK, as Koehler and Mishra put forth, embraces the realization of "students' prior knowledge and the way technologies can be employed as a basis for developing "new epistemologies or strengthen old ones" (p. 66).

As Figure 1 shows, Koehler and Mishra's (2009) model signifies the interaction between content, pedagogy, and technology in explaining teachers' knowledge base; they argue that skilled teaching is "different from knowledge of all three concepts individually" (p. 66). The first reason, then, for selecting this model in the current study was that it accepts an interrelation between the different components of teachers' knowledge base. Moreover, the model integrates "technology as a key component to the framework, creating technological pedagogical content knowledge (TPACK) which involves an understanding of "the complexity of relationships among students, teachers, content, technologies, practices, and tools" (Archambault & Barnett, 2010). Thus, on reasonable grounds, the researchers of the present study followed Koehler and Mishra's (2009) model as a basis for their research.

Several studies have focused on the efficiency of INSET programs. For example, Birjandi and Derakhshan Hesari (2010) investigated teachers' perceptions about the status of the in-service EFL programs and reported that although the participants found the quality of the classes acceptable, they complained about their focus on theoretical rather than practical issues.

Hashemian and Azadi (2014) explored 94 senior high school English teachers' perceptions regarding the in-service training courses in Isfahan. Their study revealed that speaking and listening did not receive any attention and similar to the participants of Birjandi and Derakhshan Hesari, most of the teachers believed that theoretical rather than practical knowledge was the primary concern of the classes. In the same vein, Razi and Kargar (2014) inspected 56 junior and senior EFL teachers' views regarding the four aspects of linguistic competence, teaching (pedagogic) skills, testing skills, and classroom management skills that were expected to be part of the in-service training classes. They found that the highest percentage of teachers' answers went for their expectations to improve linguistic competence and general language proficiency and testing, whereas management skills received the least attention in the in-service training courses. In another study, Kazemi and Ashrafi (2014) explored how much the INSET classes met the needs of the Iranian teachers and administrators. The results of the semi-structured interviews revealed that such courses were discouraging since they neither provided an opportunity for teachers to exchange their experiences and opinions nor met the teachers' needs. Mohammadi, Karimian, and Talebinejad (2015) investigated 80 Iranian EFL teachers' attitudes toward the current in-service training programs and found that albeit, the participants contended that the courses were sufficient, they did not have a positive attitude toward the programs and believed that their content was not compatible with actual classroom settings. Eghtesadi and Hassanabadi (2016), also, evaluated INSET courses and reported that teachers criticized the lack of general English training courses that could foster language proficiency.

The crucial role of INSET courses in developing TPACK that is highly influential in EFL teachers' professional success, was the initial incentive of the researchers to conduct the present study. Thus, the researchers designed a sequential exploratory mixed methods study. As Creswell (2014, p. 16) puts forth, in the design, the study begins with a qualitative phase and "explores the participants' views ... to build an instrument that best fits the sample under study" and then to use the instrument in the "follow up quantitative phase." Therefore, the researchers designed three distinct but related phases to conduct this study. In each phase, they employed different instruments for data collection. Also, various participants contributed to the procedure of the study. The following research questions were formulated to meet the objectives of the study:

1. Does the newly developed ELTKB questionnaire, as a reliable and valid instrument, measure Iranian EFL teachers' knowledge base in the seven components of CK, PK TK, TPK, PCK, TCK, and TPACK?

2. Is there any difference between Iranian EFL teachers' knowledge base before and after attending the INSET classes?

3. How do Iranian EFL teachers perceive the efficacy of the INSET classes in promoting the components of their knowledge base?

3. Method

3.1. Participants

In the first phase of the study, 335 (128 junior high school and 207 secondary high school) EFL teachers in Guilan province answered the newly developed ELTKB questionnaire, which was sent to them via e-mails or online applications. The participants were selected through cluster random sampling from all schools in the province. From among the participants, 205 were males, and 130 were females with teaching experience of 5 to 27 years. In the second phase of the study, thirty 11th grade EFL teachers who had registered to take part in INSET courses were selected based on purposive sampling. The criteria for selecting the teachers were participating in the online INSET classes held by Education and Training Organization, and familiarity with the content of the newly developed 11th grade English textbook. However, one of the teachers refused to participate in the study. In the third phase, from among the 29 teachers who participated in the second phase, ten teachers volunteered to attend an interview that was conducted by one of the researchers.

3.2. Instruments

3.2.1. English Language Teacher Knowledge Base (ELTKB) Questionnaire

The researchers developed a questionnaire, English Language Teacher Knowledge Base (ELTKB), based on Mishra and Koehler' (2006) TPACK model (Appendix A). It was a self-evaluation scale used to explore EFL teacher participants' perceptions regarding knowledge base in each of the TPACK domains (PK, TK, CK, TPK, PCK, TCK, and TPACK) before and after attending the INSET classes. The ELTKB questionnaire consisted of two sections. The first section gathered the participants' demographic information. The second section contained 56 close-ended items with a 5-point Likert-type scale which asked questions about teachers' CK (5 questions), TK (4questions) TCK (7 questions), PK (11 questions), PCK (13 questions), TPK (6 questions), and TPACK (10 questions), to examine whether the programs covered all seven components of knowledge base in its content. The pilot testing of the questionnaire with 50 EFL teachers resulted in retaining 56 items. The several steps followed to validate the questionnaire are explained below (Results section). The valid and reliable questionnaire

was used to measure teachers' knowledge base in the second phase of the study.

3.2.2. Semi-structured Interviews

After administration of ELTKB questionnaire, the researchers employed semi-structured interviews to triangulate the data. The interview questions were derived from the topics addressed in ELTKB questionnaire. Three English language professors and two English language teacher trainers reviewed the items before the interviews (Appendix B). The purpose of the interviews was to discover the participants' perceptions regarding the compatibility of the courses with their expectations.

3.3. Procedure

The first step in the procedure of the study was developing ELTKB questionnaire. The researchers prepared 150 items after a thorough investigation and analysis of the literature. Then to examine the appropriateness, intelligibility, and clarity of the items, a panel discussion was conducted on the details of the initial draft. Ten professionals in the field of applied linguistics, survey design and statistics, and teacher training were consulted. The experts rated the items based on a Likert-scale from 1) 'not important,' to 2) 'somehow important,' 3) 'important,' and 4) 'extremely important' to include in the survey. By considering the experts' opinion, each item with the 70 percent agreement was kept; otherwise, it was discarded. Afterward, the questionnaire went through standardization procedure.

In the next step, the researchers administered the standardized questionnaire twice among 11th grade EFL teachers (N=29), first in October 2017 at the beginning of INSET courses and next in March 2018 after the participants had attended the classes. In the third phase of the study, ten of the teachers volunteered to take part in the semi-structured interviews. Each interview session took about 45 minutes through which the respondents tried to express their viewpoints regarding their experience in the INSET classes they had attended.

3.4. Data Analysis

For standardizing ELTKB questionnaire, the researchers measured its reliability and validity. For reliability, they run Cronbach's alpha. For estimating validity, the researchers followed two procedures to determine the validity of ELTKB. First, experts were consulted to verify the congruence of the items with the theoretical framework underlying the current study. Second, after determining sampling adequacy through Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity (BTS), exploratory factor analysis comprising the correlation matrix, communalities, total variance, component

matrix, rotated matrix, component transformation matrix, and reproduced correlation were conducted on 56 items. In the second phase of the study, a series of paired sample t-tests were performed to compare the components of teachers' knowledge base before and after attending INSET classes. For analyzing the data derived from the interview sessions, in the third phase of the study, open, axial, and selective coding systems introduced by Strauss and Corbin (1990) were utilized. Open coding was done by examining all transcripts from teachers' comments and opinions about the INSET classes. In the axial coding stage, the mutual concepts generated from open coding section were grouped under broader categories of CK, TK, PK, TPK, PCK, TCK, and TPACK. In selective coding, all categories came under a more comprehensive concept; that is, teacher knowledge base, in which all categories were integrated to generate a core concept.

4. Results and Discussion

4.1. Results

4.1.1. First Phase

As mentioned above, the researchers developed a questionnaire on teachers' knowledge base. The reliability estimate computed through Cronbach's alpha showed a high index (r=0.87). As shown in Table 1, KMO= 0.812>0.7) was high and BTS was significant (chi-square =2256.981, df =10, p<0.001); thus factorability of data was verified, and conducting factor analysis was acceptable.

Table 1

KMO & BTS of ELTKB Questionnaire

Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.812
Bartlett's Test of Sphericity	Approx. Chi-Square		2256.981
	df	10	
	Sig.	.000	

Table 2 (See Appendix C) shows the eigenvalues associated with each linear factor before extraction, after extraction, and after rotation, which is valuable for the interpretation of the data — all factors with eigenvalues greater than 1were extracted. Rotation optimizes the factor structure. As the table indicates, more than 90 % of the variance in the items of CK, TK, TPK, and TPCK was explained by the two extracted components. Besides, Rotation Sums of Squared Loadings in the third column of the table reveals about 94 % of the variance in the items of PK, PCK, and TCK, which was explained by the three extracted components.

Following Yong and Pearce (2013), who believed "unrotated factors are ambiguous" (p. 84), the present study employed rotated component

matrix for reliable interpretation (Table 3, See Appendix D). According to Comrey and Lee (1992), loadings should be 0.30 or larger to provide any interpretive value. The results of the factor analysis revealed that all variables support the seven constructs of the ELTKB questionnaire; namely, CK, PK, TK, PCK, TPK, and TPACK. Thus, no item was extracted, which meant that 56 variables could support the factors, and the questionnaire, as a reliable and valid tool, could measure EFL teachers' knowledge base. The researchers conclude that the answer to the first research question is positive.

4.1.2. Second Phase

Paired sample t-tests were run to answer the third research question. Table 4 illustrates the means and standard deviations obtained from the participants' evaluation of the components of their knowledge base before and after attending the INSET courses.

Table 4

Descriptive Statistics, 11th Grade Teachers' Knowledge Base Before & after INSET

		Mean	N	SD	Std. Error Mean
Pair 1	CK1	1.586	29	.2445	.0454
	CK2	2.559	29	.2797	.0519
Pair 2	TK1	2.250	29	.4381	.0813
	TK2	2.655	29	.6028	.1119
Pair 3	TCK1	1.960	29	.3391	.0629
	TCK2	2.827	29	.2205	.0409
Pair 4	PK1	2.385	29	.3388	.0629
	PK2	3.520	29	.3554	.0659
Pair 5	PCK1	3.313	29	.2024	.0376
	PCK2	3.744	29	.1780	.0330
Pair 6	TPK1	2.287	29	.4199	.0779
	TPK2	3.1379310	29	.49415023	.091761395
Pair 7	TPCK1	2.0076628	29	.22262074	.041339634
	TPCK2	3.493	29	.2137	.0397

The results of the paired sample t-tests (Table 5) show that there was a statistically significant difference between the teachers' evaluation of their CK1 (M=1.85, SD=0.24) and CK2(M=2.55, SD=0.27), (t (28) = -16.39, $p < 0.001$); TK1 (M=2.25, SD=0.66), and TK2 (M=3.52, SD= 0.86), ($t(28)=-6.60$, $p<0.001$). Also significant differences were observed between PCK1 (M=3.31, SD= .02) and PCK2 (M=3.74, SD= 0.17), ($t(28)= -8.50$, $p<0.001$);

TPK1 (M=2.28, SD= 0.71) and TPK2 (M= 3.13, SD=1.06), (t (28)= -15.27, p< 0.001); and TPCK1 (M=2.00, SD=0.37) and TPCK2 (M=3.49, SD=0.93), (t (28)= -27.79, p<0.001). Therefore, it could be deduced that teachers' knowledge base improved in all its components after attending the INSET courses.

Table 5

Paired Samples t-tests, 11th Grade Teachers' Knowledge Base Before & after INSET

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	SD	SD. Error Mean	Lower	Upper	t	df	Sig. 2-tailed
Pair 1 CK	-.9724	.3195	.0593	-1.09	-.8509	-16.391	28	.000
Pair 2 TK	-.40517	.3301	.06130	-.530	-.2796	-6.609	28	.000
Pair 3 TCK	-.866	.4318	.08019	-1.03	-.7027	-10.812	28	.000
Pair 4 PK	-1.13	.3648	.06775	-1.27	-.9962	-16.752	28	.000
Pair 5 PCK	-.4310	.2728	.05066	-.5348	-.32725	-8.508	28	.000
Pair 6 TPK	-.8505	.2999	.05569	-.9646	-.736479	-15.271	28	.000
Pair 7 TPACK	-1.48	.2877	.05343	-1.594	-1.3759	-27.797	28	.000

4.1.3. Third Phase

The result of the interviews regarding the influence of INSET classes on teachers' CK showed that almost all interviewees believed that the program improved neither their general English language proficiency nor their language skills (reading, writing, listening, speaking, vocabulary, grammar). Regarding their TK improvement, the participants seemed not to be very satisfied with the INSET classes. They insisted on the need for disciplined classes with highly prepared instructors to teach technology. Some of them complained about the allotted time for such an important subject. Moreover, all respondents unanimously mentioned that their technology class did not guide them directly on how to use technology to improve their language proficiency. However, teachers reported the influential impact of the INSET classes on their PK. They believed that they could find opportunities to get familiar with the CLT approach, assessment, and error correction procedures. However, teachers stated that reflective teaching, a critical component of PK, was overlooked in the INSET, and 85% suggested the inclusion of model teaching to observe CLT in practice.

Regarding the benefit of INSET for improving PCK, teachers believed that the classes emphasized theoretical issues without paying much attention to teachers' needs, problems, beliefs, and perceptions. For example, teacher 8 stated:

> "*We expected more meaningful sessions, which would help us get familiar with the content of lessons both theoretically and practically. The formal training seems very boring and ineffective."*

Concerning TPK, teachers 9 and 3 both agreed that combining technology and teaching strategies could enhance students' learning. Moreover, teacher 2 expressed:

> "*What of teaching was determined, but how of teaching was not the concern of the classes.*"

The results of the interviews regarding the degree to which the classes could affect TPACK indicated that the respondents viewed working with technological devices enjoyable for both teachers and students. However, for teachers 2 and 3, the classes were not very functional. They stated that since technological tools were not available in schools, it was almost impossible to apply their knowledge while engaged in teaching. For example, teacher 3 complained about the lack of technological support in the school she was working and stated,

> "*We need more technological resources. Unfortunately, our school doesn't have Wi-Fi, a DVD player or a laptop to listen to the CDs of the lessons."*

Although the interviewees reported that the technology classes could familiarize them with new strategies, they were not sufficient for successful teaching as more practice with the use of technology was required. All teachers expected more technological support from authorities to equip schools with the necessary technological devices so that they could implement what they had learned in real classroom settings.

4.2. Discussion

In the first phase of the study, ELTKB questionnaire with 56 items was developed. The results of Cronbach's alpha and factorial analysis showed that the instrument enjoyed reliability and validity. This finding led the researchers to conclude that the answer to the first research question of the study was positive, and the newly developed questionnaire could measure the teachers' knowledge base in the seven domains mentioned by Mishra and Koehler (2006). This finding is contrary to Archambault and Barnett (2010) who based on 456 responses conducted factorial analysis on their twenty-four item survey and concluded that the "highly accepted seven mutually exclusive domains of the TPACK theory may not exist in practice" (p. 1658). However, the results of the current study are in line with Schmidt et al. (2009), who developed a seven-factor survey by assessing 124 primary

school teachers' TPACK in different subject areas. Although their study revealed a high-reliability coefficient, the small sample size raises some uncertainty with the validity of the instrument.

The researchers used the responses of twenty-nine teachers to ELTKB before and after attending INSET classes to answer the second research question of the study. The results of the paired sample t-tests showed a statistically significant difference between all components of the respondents' knowledge base. Thus, the researchers construe that the classes could promote teachers' knowledge base. This finding emphasizes the necessity of INSET programs in teachers' professional life as they pass through cyclical developmental stages to gain experience (Khoshnevisan, 2017). Learning is an ongoing activity, and English teachers should continuously participate in training courses. Such courses can support teachers, prepare them for future actions, and enable them to confront the realities of the classroom (Rashtchi & Khoshnevisan, 2019). The courses provide teacher educators with the opportunity to show teachers how to plan their teaching and employ different theories, strategies, and technologies, to foster their students' motivation for learning English.

The third research question of the study dealt with the teachers' perceptions regarding the INSET courses. What could be inferred from the interview results was that the interviewees were not satisfied with the content of the courses; a finding which was in contradiction with the statistical results. One reason for this finding can be attributed to the selection of the interviewees. The researchers assume that those who were more meticulous or probably less satisfied with the courses volunteered to take part in the interview sessions. Another reason could be ascribed to the differences between quantitative and qualitative studies, and the reason for the intelligibility of mixed methods studies. Statistical significant differences indicate the characteristics or behaviors of groups, while interviews demonstrate individual differences.

Moreover, the controversy can imply that although the teachers were not satisfied with the classes, in practice, the courses were successful in affecting their knowledge. The controversial results of the present study are reflected in the research findings of studies conducted in Iran, too. For example, while Birjandi and Derakhshan Hesari (2010) and Eghtesadi and Hassanabadi (2016) report teachers' satisfaction, Khanjani, Vahdani, and Jafarigohar (2017) recount their participants' dissatisfaction with the programs.

Overall, the interviewees in the present study mostly delineated their dissatisfaction with the lack of enough attention to the improvement of teachers' language proficiency, subject matter knowledge, and culture

difference awareness, which are considered as essential areas of teacher's CK. Moreover, the teachers complained about the use of Persian as the medium of instruction. The insufficiency of training regarding TCK and the need for more practical classes that could lead to the integration of technology into English teaching classes was their concern.

However, despite some complaints, the results of the statistical analysis and interviews indicated that the participants, in general, believed that their TK had developed adequately in INSET classes. Technology course was a privilege to the teachers because it could help them create online groups and share their TK and teaching experiences with colleagues. The participants of the present study in agreement with those of Khanjani et al. (2017) stated their dissatisfaction with classroom management and assessment literacy; components of PCK that they believed were the overlooked features in their education program. Also, in line with several studies in the field (Gatbonton, 2008; Liu, 2013; Park & Oliver, 2008), this study found that INSET program could enhance teachers' PK as well as PCK. Regarding TPK, the results of the interviews were following the interview results in that the teacher participants were satisfied with the improvement of TPK after attending the INSET classes. However, they expected more practice on what and how to teach. They believed that such guidance could help them implement the knowledge they had acquired with high confidence and motivation. The interviews clarified that the classes did not concentrate enough on teachers' professional needs.

TPACK showed a higher mean score than other components of knowledge as opposed to Messina and Tabone (2012), and Graham, Cox, & Velasquez (2009) that reported the lowest mean score for TPACK although in the interviews the teachers complained about the inadequacy of the INSET classes to prepare them practically to teach the new books with the help of technology.

5. Conclusion and Implications

The purpose of the present study was to develop a standard questionnaire that could measure teachers' knowledge base in the seven components suggested by Mishra and Koehler (2006). The researchers, through factorial analysis, were successful in verifying that the seven modules of teachers' knowledge base existed. The validated questionnaire can smooth the progress of further studies in the domain of TPACK. On the other hand, the results of the second phase showed that attending INSET program could improve EFL teachers' knowledge base. This finding signifies the importance of teacher training courses and their impact on facilitating English language teaching.

Furthermore, the efficacy of such classes shows that investment in them is cost-effective as teachers, learners, and as a result, parents can benefit from their effects. Training skillful and knowledgeable teachers can reduce the time, energy, and expense spent on the learning of the English language. The improvement of teachers' knowledge in cultural, content, and, linguistic issues can bring about a change to English language teaching in high schools and can make the situation of language learning more desirable. However, the interviews reflected some complaints concerning the content of the classes, which the researchers believe, can cultivate the essence of such courses. Authorities should pay more attention to the quality of the classes and should try to consider the attendees' opinions to enhance the efficacy of the classes. It is worth mentioning that the shortcomings should not question the necessity of in-service and pre-service teacher training courses. The researchers of the present study suggest 'participant-centered' INSET classes to provide teachers with the opportunities to exchange experiences and find solutions to their professional problems. However, the researchers declare some limitations that call for caution in generalizing the findings. First, the participants were limited to teachers in Guilan province. Second, focused interviews, stimulated recall techniques, and thinking protocols that can provide a deeper understanding of teachers' TPACK were not employed.

References

Archambault, L. M., &Barnett, J. H. (2010). Revisiting technological pedagogical content knowledge: Exploring the TPACK framework. *Computers & Education, 55*(4), 1656-1662.

Birjandi, P., & Derakhshan Hesari, A. (2010). Teachers' perceptions of the present and optimum status of the in-service EFL teacher preparation programs. *English Language Teaching, 3*(4), 47-57.

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis.* Hillsdale, NJ: Lawrence Erlbaum.

Cresswell, J. W. (2014). *Educational research: Planning, conducting, an evaluating quantitative and qualitative research (4th ed.).* Boston: Pearson.

Eghtesadi, A. R., & Hassanabadi, S. (2016). An evaluation of in-service training courses for the seventh grade English package for Iranian schools (Prospect 1). *Journal of Applied Linguistics and Language Research, 3*(5), 130-143.

Ersanli, C. Y. (2016). Improving technological pedagogical content knowledge (TPACK) of pre-service English language teachers. *International Education Studies, 9*(5), 18-27.

Freeman, D. (2002). The hidden side of the work: Teacher knowledge and learning to teach. A perspective from North American educational research on teacher education in English language teaching. *Language Teaching, 35*, 1-13.

Freeman, D., & Johnson, K. (1998). Reconceptualizing the knowledge-base of language teacher education, *TESOL Quarterly, 32*(3), 397- 417.

Freeman, D., & Richards, J. C. (1993). Conceptions of teaching and the Education of second language teachers. *TESOL Quarterly, 27*(2), 193-216.

Gatbonton, E. (2008). Looking beyond teachers' classroom behaviour: Novice and experienced ESL teachers' pedagogical knowledge. *Language Teaching Research, 12*(2), 161-182.

Graham, C., Cox, S., & Velasquez, A. (2009). Teaching and measuring TPACK development in two pre-service teacher preparation programs. In I. Gibson, R. Wever, K. McFerrin, R. Carlsen & D. A. Willis (Eds.). *Proceedings of society for information technology teacher education international conference* (pp. 4081-4086). AACE. Retrieved August 25, 2016, from *http://www.editlib.org/p/31297*

Hashemian, M., &Azadi, G. (2014). EFL teachers' understanding of the teaching portions of INSET programs, *Journal of Research in Applied Linguistics, 5*(1), 62-76.

Johnson, K. E. (2009). *Second language teacher education: A socio-cultural perspective*. New York, NY: Routledge.

Kazemi, A., & Ashrafi, M. (2014). In-service training programs for Iranian EFL teachers revisited. *International Journal of Asian Social Science, 4*(10), 1062-1076.

Karimi, M. N. (2011). Variations in EFL teachers' pedagogical knowledge base as a function of their teaching license status. *The Journal of Teaching Language Skills*, *3*(3), 83-114.

Khoshnevisan, B. (2017). Developmental stages of preservice teachers: A critical analysis. *TEIS News*. Retrieved December 25, 2018, from *http://newsmanager.commpartners.com/tesolteis/issues/2017-09-25/2.html*

Koehler, M. J., Mishra, P., Akcaoglu, M., & Rosenberg, J. (2013). The technological pedagogical content knowledge framework for teachers and teacher educators. In R. Thyagarajan (Ed.). *ICT integrated teacher education: A resource book* (pp. 2–7). New Delhi: Commonwealth Educational MediaCentre for Asia. Retrieved June 25, 2016, from *http://cemca.org.in/resources/books*

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60-70. Retrieved December 25, 2016, from *https://www.citejournal.org*

Kumaravadivelu, B. (2001). Toward a post method pedagogy, *TESOL Quarterly,35*(4), 537- 560.

Khanjani, A., Vahdani, F., Jafarigohar, M. (2017). EFL teacher education in Iran: Does it promote trainers' pedagogical content knowledge? *Journal of Research in Applied Linguistics, 8*(2), 159-186.

Liu, S. (2013). Pedagogical content knowledge: A case study of ESL teacher educator. *English Language Teaching*, *6*(7), 128-138.

Malderez, M., &Wedell, A. (2007). *Teachers teaching: Processes and practices.* London: Bloomsbury.

Messina, L., &Tabone, S. (2012). Integrating technology into instructional practices focusing on teacher knowledge. *Social and Behavioral Sciences,46*, 1015-1027.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers CollegeRecord,108*(6), 1017-1054.

Mohammadi, S., Karimian, Z., &Talebinejad, M. R. (2015). Iranian EFL teachers' attitudes towards in-service professional development programs. *Journal of Applied Linguistics and Language Research, 2*(3), 48-60.

Park, S., & Oliver, J. S. (2008). Revisiting the conceptualization of pedagogical content knowledge (PCK): PCK as a conceptual tool to understand teachers as professionals. *Research Science Education,38*, 261-284.

Peacock, M., (2009). The evaluation of foreign-language-teacher education programmes. *Language Teaching Research, 13*(3), 259-278.

Rashtchi, M., & Khoshnevisan, B. (2019). The developmental stages of teachers: A critical analysis. In B. J. Waynne & C. Cobanoglu (Eds.). *Advances in global education and research* (Vol. 3, pp. 2-8). Sarasota, Florida: ANAHEI.

Razi, N., &Kargar, A. A. (2014). Evaluation of in-service foreign language teacher education program in Iran. *International Journal of Language Learning and Applied Linguistics World, 5* (1), 221-236.

Richards, J. C. (1998). *Beyond training: Perspectives on language teacher education.* Cambridge: Cambridge University Press.

Richards, J. C., & Farrell, T. S. (2005*). Professional development for language teachers: Strategies for teaching learning*. New York, NY: Cambridge University Press.

Sabah, S., & Rashtchi, M. (2016). Critical thinking in personal narrative and reflective journal writings by in-service EFL teachers in Iran: Assessment of reflective writing. *Journal of Teaching Language Skills, 35*(3), 157-182.

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK): The development and validation of an assessment instrument for pre-service teachers. *Journal of Research on Technology in Education,42*(2), 123-149.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4–14.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Uysal, H. H. (2012). Evaluation of an in-service training program for primary-school language teachers in Turkey. *Australian Journal of Teacher Education, 37*(7), 14-29.

Wang, H., & Hill, C. (2011). A paradigm shift for English language teaching in Asia: From imposition to accommodation. *The Journal of Asia TEFL, 8*(4), 205-232.

Yong, A, G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology,9*(2), 79-94.

Appendices

Appendix A: English Language Teachers' Knowledge Base Questionnaire (ELTKB)

The purpose of this questionnaire is to examine the effect of INSET courses on English teachers' knowledge base. You are requested to answer the questions, sincerely. All responses will be kept confidential. For any queries, do not hesitate to contact maryammahmoudi75@yahoo.com. Thank you for your time and patience.

Section I. Bio-data: In this section, please choose the option that applies to you.

1. Gender
1. Male 2. Female
2. Teaching experience
1. Less than 5 2. Between 5 to 20
3. Between10 to 15 4. More than 15
3. The school grade you teach
1. Junior high school 2. Secondary high school
4. University degree
1. BA 2. Student of MA or MA
3. Ph.D. candidate or Ph.D.
5. The number of INSET courses you have participated since 2012
1. Two to three times 2. Three to five times
3. More than five times

Section II: The following questionnaire aims to examine the effect of the INSET programs on English language teachers' knowledge base (Content Knowledge, Pedagogical Knowledge, Pedagogical Content Knowledge, Technological Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, Technological Pedagogical and Content Knowledge). The questionnaire is a 5-point Likert-type scale, 1(strongly disagree = SD), 2(disagree = DA), 3(neutral = N), 4(agree =A) and 5(strongly agree= SA). Please read the items carefully, and then tick the option that best represents your position.

INSET classes helped me …					
1. improve my English grammar.					
2. improve my pronunciation.					
3. improve my reading comprehension.					
4. improve my listening skill.					
5. improve my writing skill.					
6. use computer, projector and electronic board.					
7. use office programs such as word, PowerPoint and the like.					
8. solve primary problems which may happen to the electronic devices such as a computer, printer, scanner, and electronic board.					
9. attach video, picture or text.					
10. use electronic devices such as a computer, laptop, cell phone to increase my reading skill.					
11. use electronic devices to increase my listening skill.					
12. use electronic devices to learn pronunciation and falling and rising of sentences.					
13. use grammar training software to increase my grammatical competence.					
14. understand the cultural differences between my native language and second language with the help of watching movie.					

15. improve my formal and informal writing skill with the help of electronic devices and training software. 16. improve my vocabulary knowledge with the help of training software. 17. know the different learning styles of my students. 18. involve shy and introvert students in the classroom discussions. 19. manage students' group work. 20. explain the lesson according to the needs of the students. 21. do reflection after my teaching. 22. use a variety of techniques for teaching language skills (listening, speaking, reading, writing). 23. use different teaching materials (flash cards, pictures, graphs, etc.). 24. consider students' differences in their level of intelligence. 25. communicate with school principal and parents to enhance my students' learning. 26. use the experience of other teachers in teaching. 27. use different techniques (oral questions, written questions, role play, class activity, etc.) to assess their leaning. 28. provide a stress-free environment for my students. 29. teach vocabulary with its phonology. 30. assess the accuracy of my students' pronunciation. 31. teach grammar explicitly and implicitly. 32. evaluate my students' grammatical knowledge in each lesson. 33. consider vocabulary instruction in teaching reading skill. 34. manage time for teaching each skill (listening, speaking, reading and writing). 35. compare native and foreign language conversations in teaching listening skill to make them more understandable for my students. 36. perform before, while and after activities for teaching each skill properly. 37. recognize students' problems after teaching each skill and solve them. 38. use different techniques and strategies to involve all students while teaching each skill (listening, speaking, reading, writing). 39. evaluate students' ability after teaching each skill (listening, speaking, reading, writing). 40. evaluate my own teaching after teaching each skill (listening, speaking, reading, writing). 41. recognize my students' learning style (audible, visual, kinesthetic, etc.) by the help of electronic devices (DVD player, CD player, computer, etc.). 42. involve students in out of class activities and projects to increase their learning opportunities. 43. use various electronic devices to teach each skill differently. 44. increase students' learning to communicate with principal and their parents with the help of e-mail, telegram and text message. 45. assess the students' learning with the help of electronic devices. 46. reduce the anxiety level of the students with the help of electronic devices. 47. teach pronunciation of the words with the help of electronic devices (computer, laptop, CD player). 48. teach falling and rising of the sentences with the help of electronic devices (computer, laptop, CD player). 49. assess the students' grammar knowledge with the help of electronic devices. 50. use teaching grammar with the help of electronic devices 51. use pictures, graph and voice to brain storm students in teaching reading skill. 52. use electronic devices to teach vocabulary 53. use electronic devices to perform before, while and after activities of teaching of each skill					

54. assess my students' vocabulary knowledge with the help of electronic devices					
55. evaluate my teaching of vocabulary, grammar and all skills (listening, speaking, reading and writing) through recording of my classes.					
56. enhance my students' writing competence through applying different techniques of teaching with the help of electronic devices.					

Appendix B: Interview Questions

1. Could the INSET course help you improve your language skills (reading, speaking, listening and writing)?

2. Could the INSET course help you improve your technological knowledge (using computer, laptop, etc.) in your teaching?

3. Could the course help you find better way for

a. managing your classroom?

b. using different techniques and methodologies for teaching different skills?

c. using different types of assessing your students' learning?

4. Could the course help you mix technology to teaching language skills?

5. Could the course help you do reflection after teaching?

6. Have you encountered any problems implementing what you have learned in these classes?

7. Have the INSET classes had any NEGATIVE impact on your classroom, your students, or you professionally?

8. Do you have any other ideas or suggestions that you would like to share about?

Appendix C: Table 2

Table2

Initial Eigenvalues &Total Variance Explained for Teachers' Knowledge Base

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	%of Variance	Cumulative%
1	2.73	54.73	54.73	2.73	54.735	54.735	2.69	53.89	53.89
2	1.72	34.52	89.26	1.72	34.526	89.261	1.76	35.36	89.26
3	.53	10.73	100.00						
4	3.8E-15	7.741E-14	100.00						
5	-3.E-15	-7.29E-14	100.00						
6	2.39	59.93	59.93	2.39	59.93	59.93	2.26	56.67	56.67
7	1.43	35.83	95.76	1.43	35.83	95.76	1.56	39.09	95.76
8	.169	4.231	100.00						
9	1.7E-15	4.E-14	100.00						
10	3.051	43.586	43.586	3.051	43.586	43.586	2.903	41.469	41.46
11	2.179	31.125	74.711	2.179	31.125	74.711	2.088	29.832	71.30
12	1.472	21.025	95.737	1.472	21.025	95.737	1.711	24.436	95.73
13	.298	4.263	100.00						
14	339E-15	5.E-14	100.00						
15	3.12E-16	4.E-15	100.00						
16	-9.E-16	-1. E14	100.00						
17	6.11	550.94	50.949	6.114	50.949	50.949	4.336	36.135	36.13
18	3.3.170	26.416	77.365	3.170	26.416	77.365	3.780	31.498	67.63
19	2.012	16.767	94.131	2.012	16.767	94.131	3.180	26.498	94.13

20	.704	5.869	100.00						
21	6.24E-15	5.20E-14	100.00						
22	4.52E-15	3.E-14	100.00						
23	1.88E-15	1.E-14	100.00						
24	1.21E-15	1.E-14	100.00						
25	3.8E-16	3.E-15	100.00						
26	1.6E-16	1.E-15	100.00						
27	-2.502E-15	-2.0E-14	100.00						
28	-2.918E-15	-2.4E-14	100.00						
29	5.693	47.444	47.444	5.693	47.444	47.444	5.599	46.655	46.65
30	3.732	31.096	78.540	3.732	31.096	78.540	3.159	26.321	72.97
31	1.748	14.567	93.107	1.748	14.567	93.107	2.416	20.132	93.10
32	.827	6.893	100.00						
33	8.842E-15	7.3E-14	100.00						
34	6.1E-15	5.E-14	100.00						
35	5.39E-15	4.E-14	100.00						
36	2.3E-15	1.E-14	100.00						
37	9.03E-16	7.E-15	100.00						
38	-1.3E-15	-1.E-14	100.00						
39	-2.9E-15	-2.E-14	100.00						
40	-6.9E-15	-5.E-14	100.00						
41	3.672	61.19	61.199	3.672	61.199	61.199	3.641	60.685	60.68
42	1.876	31.275	92.474	1.876	31.275	92.474	1.907	31.789	92.47
43	.452	7.526	100.00						
44	1.5E-15	2.E-14	100.00						
45	2.3E-16	3.E-15	100.00						
46	-2.1E-15	-3.E-14	100.00						
47	4.706	47.056	47.056	4.706	47.056	47.056	4.600	46.004	46.00
48	4.441	44.409	91.466	4.441	44.409	91.466	4.546	45.462	91.46
49	.557	5.574	97.040						
50	.296	2.960	100.00						
51	6.8E-15	6.E-14	100.00						
52	4.6E-15	4.E-14	100.00						
53	1.3E-15	1.E-14	100.00						
54	3.96E-16	3.E-15	100.00						
55	-1.1E15	-1.E-14	100.00						
56	-4.0E-15	-4.E-14	100.00						

Appendix D: Table 3

Table 3

Rotated Component Matrix[a]

	Component		
	1	2	3
Q1	.047	.956	
Q2	-.766	-.619	
Q3	.882	-.157	
Q4	.940	.050	
Q5	.6680	.666	
Q6	.948	.264	
Q7	.940	-.335	
Q8	.694	.646	
Q9	-.056	.982	

Q10	-.965	-.154	-.011
Q11	-.320	.386	.858
Q12	.133	.965	.125
Q13	.136	.917	-.006
Q14	.903	-.357	-.13
Q15	.998	.044	.028
Q16	.880	-.260	.391
Q17	-.055	.995	.067
Q18	.234	.956	-.016
Q19	.858	-.003	.390
Q20	.464	.526	.711
Q21	.120	.081	.989
Q22	-.807	-.197	.011
Q23	.026	-.983	-.160
Q24	.120	.081	.989
Q25	-.844	-.307	.219
Q26	.672	.643	.255
Q27	.842	-.069	-.069
Q28	.156	-.118	.969
Q29	-.807	-.197	.011
Q30	.026	-.983	-.160
Q31	.120	.081	.989
Q32	-.844	-.307	.219
Q33	.672	.643	.25
Q34	.842	-.069	-.069
Q35	.121	.890	-.362
Q36	.997	-.010	-.063
Q37	.036	.925	-.371
Q38	-.997	.010	.063
Q39	.287	-.129	.908
Q40	-.620	-.629	.46
Q41	.913	.242	-.157
Q42	.241	-.851	-.258
Q43	.110	.136	-.843
Q44	.934	-.068	.300
Q45	.852	-.311	.065
Q46	.790	.419	.446
Q47	.893	-.27	
Q48	.934	-.170	
Q49	.946	.311	
Q50	.332	.882	
Q51	.946	.311	
Q52	-.265	.912	
Q53	-.786	.528	
Q54	-.338	.919	
Q54	.146	.953	
Q55	.802	-.298	
Q56	.962	-.088	

Extraction Method: Principal Component
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 3 iterations.

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