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Investigating Iranian French Language Teaching Graduates' Perceived TPACK during the Covid-19 Pandemic

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ABSTRACT
This study investigates Iranian French Language Teaching M.A. Graduates' self-perceived Technological Pedagogical Content Knowledge (TPACK) to gain an insight into their preparation for their professional teaching career based on TPACK's seven sub-components, and understand the way in which their perceived TPACK is related to the type of teaching training received, as well as prior teaching experiences. The data were collected through an electronic questionnaire (Baser et al, 2016), composed of 39 questions regarding TPACK's seven sub-components. Forty-eight Iranian pre-service French Language instructors responded to the questionnaire. Results indicated that in general, participants have a positive assessment of their TPACK, although improvements could be made in certain areas, such as the use of technology in interactive and collaborative language teaching and learning. In addition, while there was no significant relationship between type of teacher-training received and pre-service instructors' perceived TPACK, participants with prior teaching experience demonstrated higher Pedagogical and Content Knowledge, which seems to suggest that these two knowledge areas are best developed through on-the-field teaching experiences, rather than theoretical coursework.

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1. Introduction

In today's complex and multifaceted world of education, for quality teaching, in addition to extensive content expertise and appropriate pedagogical knowledge and experience, instructors also need practical knowledge and literacy in applying digital technologies to their teaching (Comb, 2021; Olivier, 2018; WF; Borthwick & Hansen, 2017). Redecker (2017) writes in the introduction to her *Digital Competence of Educators (DigCompEdu)* "… the ubiquity of digital devices and the duty to help students become digitally competent requires educators to develop their own digital competence" (p. 4), and the *Council for the Accreditation of Educator Preparation (CAEP)*'s Standard 1.5 demands that educators " model and apply technology standards as they design, implement, and assess learning experiences to engage students and improve learning, and enrich professional practice" (2015). Numerous studies around the world have focused on the investigation of language teachers' technology knowledge and integration in their teaching practices (Miller et al, 2020; Manegre and Sabiri, 2020; Azis, 2020; Mahbub, 2020; Wen and Wen, 2020; Flanigan and Babchuk, 2020; Demiroz and Turker, 2020; Esfandiari and Sokhanvar, 2020; Bagheri, 2020). These studies mainly reveal an enthusiastic, but questioning perception among instructors regarding the use of technology in education, since the vast domain of technology-enhanced teaching and learning is complicated, challenging, and demanding.

Due to the recent Coronavirus pandemic and educational institutions' obligation to pursue their instruction through virtual courses, language instructors face the dilemma of increasing their digital literacy, and adapting their teaching practices to meet students' needs in various virtual environments, such as e-learning and content sharing platforms, social networks, and online or offline software and applications. They are requested to learn the ways in which content can be transmitted and understood efficiently through appropriate technologies, and prepare themselves for technology-based language teaching approaches and practices, including synchronous or asynchronous teaching and knowledge/skill transmission, as well as course material design and sharing, activity design, interactions with students and colleagues, and learner assessment. Many (future) instructors, however, are not ready for embracing technology in their teaching practices, since although technology is part of their everyday life, its pedagogically-appropriate integration in their teaching is sometimes challenging due to the lack of sufficient technological knowledge and literacy (Taopan et al., 2020; Taghizadeh, & Hasani Yourdshahi, 2019; Atabek, 2020), lack of sufficient experience in using technology (Liu et al., 2019), lack of adequate training in technology integration in language teaching (Taghizadeh, & Hasani Yourdshahi, 2019; Cementina, 2019), lack of institutions' necessary technological infrastructures (Taopan et al., 2020; Khatoony & Nezhadmehr, 2020), and instructors' inability to create meaningful educational activities using rapidly-advancing technologies (Taopan et al., 2020).

This study investigates Iranian French Language Teaching M.A. students' knowledge and competencies regarding the use of technology in their teaching through their self-reported perception of their TPACK or Technological Pedagogical Content Knowledge (Mishra and Koehler, 2006). TPACK is one of the

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leading models for assessing instructors and students' knowledge and expertise in the educational and professional use of digital technologies (Voogt et al. 2013; Hew et al., 2019; Scott & Nimon, 2020). Since its introduction in the field of education, TPACK has been recognized as a "valuable framework for describing and understanding teachers' technology integration into their teaching in a variety of educational settings" (Fathi & Yousefifard, 2019, p. 2), including language classrooms. Constructed on Shulman's (1986) concept of Pedagogical Content Knowledge (PCK), TPACK is a framework designed by Mishra and Koehler (2006) to account for students and teachers' assessment of their knowledge of technology integration in the teaching of their specialized subject matter through an exploration of three domains of core knowledge, i.e., Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). According to TPACK, "instructional practices are best shaped by content-driven, pedagogically-sound, and technologically-forward thinking knowledge" (Serhat, 2019, p. 1). The framework helps (future) instructors to present content effectively, and adapt their teaching practices through context-based technology to activate, manipulate and strengthen students' existing knowledge, develop new skills and competencies, and improve learning experiences. It is therefore important for graduating Language Teaching students/future language teachers to situate and assess their technological knowledge and skills and understand the ways in which this knowledge could not only enrich their content and pedagogy knowledge, but also serve as the medium for knowledge transmission, pedagogical interaction and practical assessment. They need to learn and apply various methods for interacting with language learners in systematic, practical and progressive technology-based ways that focus on both language-reception and language-production competencies.

This study therefore examines graduating Iranian French Language Teaching students' perceived TPACK at the end of their M.A. coursework in two Iranian universities in Tehran, and explores the relationship between these students' perceived TPACK and type of teacher training received (face to face or virtual)[1], and prior teaching experience[2]. Our goal is to gain an insight into the degree to which the graduating students feel competent, in terms of TPACK, for starting their professional career, and understand whether, alongside the theoretical university coursework, complementary on-the-field teaching experiences could enhance their level of TPACK.

2. Literature Review and Significance of the Study

In recent years, there has been extensive research on language students and instructors' TPACK in English language speaking/teaching contexts, most of which have discovered that students/future instructors' perceived CK, PK, and PCK receive higher scores than their technology-related TPACK sub-components. In their research on Indonesian preservice English teachers, Prasojo et al. (2020) discovered that participants generally lack the sufficient technological knowledge (TK, TCK, TPK, TPACK), whereas they have satisfactory levels of CK, PK, and PCK, which indicates that the technology component of instructors' knowledge was not developed in depth to enable them to

integrate it adequately in their teaching. Similar results were presented by Inpeng & Nomnian (2020), who proposed an online teaching of English in Thailand and measured preservice instructors' TPACK while teaching online courses; in this context, also, preservice instructors' TK, TCK, TPK and TPACK received lower scores compared to their CK, PK, and PCK. Likewise, Köse (2016) and Eghtesad & Mehrabi (2021) discovered that preservice instructors and/or graduating students felt rather competent in their subject matter—language (CK)—and practical implementation of various pedagogical approaches (PK), whereas they did not feel competence in integrating technology in language teaching (TK, TCK, TPK and TPACK).

Concerning the effects of exterior factors such as prior teaching experience on participants' perceived TPACK, in a study conducted by Turgut (2017), the researcher revealed that prior teaching experience resulted in higher TK, TPK, and PK. In contrast, Cheng (2017)'s research confirmed that prior teaching experience had positive effects on English instructors' CK, PK and PCK, whereas it did not influence their integration of technology in the teaching of English. Similarly, Sarıçoban et al. (2019) indicated that teachers with prior teaching experience manifested higher degrees of CK and PCK, indicating that prior teaching experience resulted in a higher command of content and teaching ability.

In the French language context, most studies focus on the presentation of the TPACK framework (Foueko and Ortega, 2019; Bachy, 2014; Bachy, 2019), as well as a measure of students' overall perceived TPACK (Ghany, 2019;). Few studies have been conducted on the effects of external factors, such type of teacher training program (virtual or face to face) or prior teaching experience, on language teaching students' perceived TPACK.

According to recent studies, a well-established TPACK could have a considerable impact on instructors' perception of technology, as well as a practical implementation of technology-based instruction (Koehler & Mishra, 2009; Nazari et al, 2019; Taopan et al, 2020; Prasojo et al, 2020). This study therefore attempts to 1) gain a general insight into the TPACK level of the Iranian graduating M.A. French Language Teaching students, and 2) investigate the influences of external variables, such as type of the M.A. program (virtual or face to face) and students' prior teaching experience on their perceived TPACK to understand the efficiency of the face-to-face versus virtual M.A. program coursework with respect to TPACK's sub-components, and examine the need for enriching students' teaching training with on-the-field teaching practicum/internships in a world where future instructors' complete knowledge of content, pedagogy and technologies are perceived as necessities for successful and effective teaching (Comb, 2021; Olivier, 2018; Gudmundsdottir & Hatlevik, 2018). The research's main questions are therefore as follow:

1. **What is the graduating Iranian French Language Teaching M.A. students' perception of their TPACK?**
2. **Are there differences in Iranian French Language Teaching students' perception of their TPACK in terms of type of teaching training received and prior teaching experience?**

3. Conceptual Framework

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Technological Pedagogical Content Knowledge Framework

Historically, teachers' qualification resided in their Content Knowledge (CK) (Nazari et al, 2019, p. 3), that is, the knowledge of the subject matter that they teach. Pedagogical knowledge (PK) was later added to CK with the assumption that appropriate teaching methodologies and approaches improve the successful transmission of the content. In 1986, Shulman proposed a framework called Pedagogical Content Knowledge (PCK), which suggested that for successful teaching, instructors need to implement at the same time their specialized subject matter (content or C), as well as appropriate pedagogical approaches and practices (Pedagogy or P). At the intersection of PK and CK, or PCK, one found "the most powerful analogies, illustrations, examples, explanations, and demonstrations…that make [the subject] most comprehensible to others" (Shulman, 1986, p. 9).

Building on Shulman's PCK, in 2006, Mishra and Koehler proposed a framework, in which technology knowledge was added as "one of the foundational components that 21st century teachers should have to effectively integrate into teaching and learning" along with CK and PK (Köse, 2016, p. 13). This new framework, named Technological Pedagogical Content Knowledge (TPACK), described the way in which "teachers' understanding of educational technologies and PCK interact with one another to produce effective teaching with technology" (Koehler and Mishra, 2009, p. 63). Composed of three main components of knowledge, content (C), pedagogy (P) and technology (T), TPACK "emphasizes the importance of the interactions and the complexities among all three basic knowledge domains" (Köse, 2016, p. 13), which include Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), and Technological Pedagogical Knowledge (TPK). Teaching, according to Mishra and Koehler (2006), is composed of complex and dynamic interrelationships among TPACK's components. The most efficient form of knowledge that is transmitted to learners is therefore located at the central intersection of the three components of the framework.

1. Technology Knowledge (TK)

Technology knowledge refers to the knowledge and practical integration of various forms of modern technology, such as computers, internet, multimedia resources, smartphones, video projectors and interactive boards in educational contexts. This component of TPACK is a dynamic component, given the constant advancements in technology; it therefore has to be regularly updated and refined for an optimal and productive integration of technological tools and resources in teaching (Koehler & Mishra, 2009, p. 64).

2. *Pedagogical Knowledge (PK)*

Pedagogical Knowledge consists of instructors' theoretical and practical knowledge about the processes, practices and methods of teaching and learning. It helps instructors to understand the "cognitive, social and developmental theories of learning and how they apply to teaching and learning in classroom" (Mishra & Koehler, 2008, p. 6), and includes the integration of context-appropriate resources and teaching methodologies, classroom management skills, curriculum and activity design, lesson planning, student assessment strategies, and approaches to productive knowledge construction and transmission.

3. *Content Knowledge (CK)*

Content Knowledge refers to instructors' knowledge about the subject matter to be taught, that is, the "concepts, theories, ideas, organizational frameworks, evidence and proof, as well as established practices and approaches toward developing such knowledge" (Shulman, 1986, p. 10). In language teaching, content knowledge refers to a complete knowledge of the linguistic features of the target language, methodical and functional comprehension and production skills in the language, as well as practical usages of the language in different social, academic and professional situations of communication and interaction.

4. Pedagogical Content Knowledge (PCK)

Pedagogical Content Knowledge, as the first overlapping section of Shulman's (1986) PCK framework and Koehler and Mishra's (2006) TPACK framework (Figure 1), consists of the relationship between content and pedagogy. It comprises "the transformation of the subject matter for teaching" (Koehler and Mishra, 2009, p. 64), which occurs "as the teacher interprets the subject matter, finds multiple ways to represent it, and adapts and tailors the instructional materials to alternative conceptions and students' prior knowledge" (Shulman, 1986, p. 10). Pedagogical Content Knowledge explains the "core business of teaching, learning, curriculum, assessment and reporting, such as the conditions that promote learning, and the links among curriculum, assessment, and pedagogy (Koehler and Mishra, 2009, p. 64).

5. Technological Content Knowledge (TCK)

TCK refers to the way in which content can be transmitted and understood more effectively through specific technologies. In language learning, Technological Content Knowledge refers to the way in which specific technologies may be used for addressing the four language skills, and designates the most authentic virtual language resources and instruments for transferring content to students.

6. Technological Pedagogical Knowledge (TPK)

Technological Pedagogical Knowledge is the way in which teaching and learning can change through a specific technology. It "includes knowing the pedagogical affordances and constraints of a range of technological tools, as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies (Koehler and Mishra, 2009, p. 65). Technological Pedagogical Knowledge helps language instructors in structuring, adapting, and orienting their teaching practices by using technological instruments that promote group activities/ research, online interactive tasks and interpersonal communication with speakers of the target language, especially in various outside of class activities.

7. *Technological Pedagogical Content Knowledge (TPACK)*

Technological Pedagogical Content Knowledge (TPACK) is the intersection of the three components of Technology, Pedagogy and Content Knowledge (Figure 1). It is "the basis of effective teaching with technology, […and] consists of pedagogical techniques that use technologies in constructive ways to teach content" (Koehler and Mishra, 2009, p. 66).

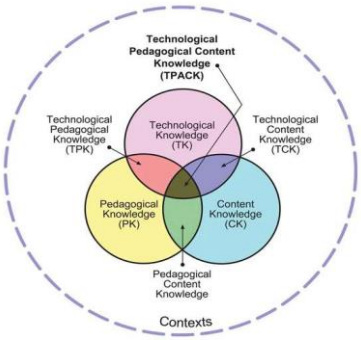

Figure 1: Mishra and Koheler (2006): TPACK Framework; Source: tpack.org

An expert teacher is not just skilled in TPACK's three key domains, but "the manner in which these domains and contextual parameters interrelate, so that they can construct effective solutions" (Koehler and Mishra, 2009, p. 67). TPACK reflects a "deep, flexible, pragmatic, and nuanced understanding of teaching content with technology" (Koehler and Mishra, 2009, p. 67) and seeks to assist the development of effective and contextualized techniques for discovering and describing the way in which "technology-related professional knowledge is implemented and instantiated in practice" (Koehler and Mishra, 2009, p. 69). This framework suggests a new form of literacy that trains students and instructors to use, adapt, manipulate, create, or interpret different teaching and learning practices through technological instruments with respect to the contextual and situational necessities and conditions.

4. Research Method

4.1. Participants

Participants in this study included 48 Iranian graduating French Language Teaching M.A. students from two universities in Tehran, Iran. The participants were 95.8% female and 4.2% male; their ages ranged from 23 to 74 years old, with an average age of 32.8 years old. 37.5% of the participants were trained through virtual M.A. French Language Teaching courses and seminars, while 62.5% were trained in face-to-face courses and seminars. Among the participants, 29% had no teaching experiences, while 71% had prior formal (school, university or language institute) or informal (one-on-one tutoring) teaching experiences. These experiences ranged from more than 10 years (4.2%), to 8-10 years (8.3%), 4-7 years (20.8%), and 1-3 years (41.7%). In addition, 45.8% of the participants had experiences in teaching virtual courses, although they were not officially trained for virtual language teaching; 54.2% had only taught face-to-face language courses. 45% of the participants taught private courses (one-on-one tutoring), while others had teaching experience in universities (5%), schools (14%), or language institutions (35%).

4.2. Data Collection Procedure and Analysis

The data for this research was collected through the TPACK questionnaire (Baser et al., 2016), which was developed to "assess preservice teachers' perceptions of their TPACK within the context of teaching languages" (idem, p. 752). The questionnaire was sent to pre-service teachers via a Google Docs© link. The TPACK questionnaire consists of 39 questions divided into 7 sub-dimensions corresponding to TK (9 questions), CK (5 questions), PK (6 questions), PCK (5 questions), TCK (3 questions), TPK (7 questions), and TPACK (4 questions). The questionnaire is a 5-point Likert questionnaire, in which answers range from strongly disagree to strongly agree. The reliability of the questionnaire has already been tested by Baser et al. (2016). However, since the questionnaire was translated into French to ensure students'

complete comprehension of the questions, the reliability was measured again, which was 0.91 for the 39 questions. The internal consistency of items within the subscales is reported in Table 1.

Component	Questions	Cronbach's Alpha
Technological knowledge	Q1-Q9	0.818
Content Knowledge	Q10-Q14	0.758
Pedagogy Knowledge	Q15-Q20	0.738
Pedagogical Content Knowledge	Q21-Q25	0.848
Technological Content Knowledge	Q26-Q28	0.704
Technological Pedagogical Knowledge	Q29-Q35	0.848
Technological Pedagogical Content Knowledge	Q36-Q39	0.775
Total	Q1-Q39	0.91

Table 1: Internal Consistency of Questionnaire in French

4.3. Data Analysis Procedure

The results obtained from the questionnaires were analyzed using descriptive statistics. In the first place, to answer the first research question, participants' average score in each of the seven sub-components of TPACK were reported and analyzed to examine their perception of the individual sub-components, as well as their overall TPACK score. As the questionnaire was based on a 5-point Likert scale, students' responses were numbered 1-5, where 1 refers to strongly disagree and 5 refers to strongly agree. The average student scores in each sub-component were compared to the average Likert score (3) to investigate students' overall TPACK scores. Average student scores above 3 were considered as positive perception, while average student scores below 3 were considered as negative perception regarding TPACK's sub-components.

The second research question, that is, the relationship between participants' perceived TPACK and the type of teacher-training received and prior teaching experience was analyzed through One-Way Anova Tests and T-Tests. Finally, since significant differences were observed between the levels of the independent variables, Duncan post-hoc tests were performed to understand at which levels of the independent variable these differences have occurred.

5. Findings

In this section, the participants' responses for the seven TPACK sub-components will be revealed and explained, followed by statistical analysis regarding the relationship between students' TPACK, and their type of teacher-training and prior teaching experiences.

5.1. Students' Overall Perception of TPACK

Technology Knowledge Items (TK)	Min	Max	Mean	Std.
1. I can use basic technological terms (e.g., operating system, wireless connection, virtual memory, etc.) appropriately.	2.00	5.00	3.95	0.88

2. I can adjust computer settings such as installing software and establishing an Internet connection	1.00	5.00	4.27	0.99
3. I can use computer peripherals such as a printer, a headphone, and a scanner	2.00	5.00	4.25	0.94
4. I can troubleshoot common computer problems (e.g., printer problems, Internet connection problems, etc.) independently.	1.00	5.00	3.73	1.13
5. I can use digital classroom equipment such as projectors and Smartboards	1.00	5.00	4.18	0.90
6. I can use Office programs (i.e., Word, PowerPoint, etc.) with a high level of proficiency.	2.00	5.00	4.35	0.87
7. I can create multimedia (e.g., video, web pages, etc.) using text, pictures, sound, video, and animation	1.00	5.00	3.68	1.22
8. I can use collaboration tools (wiki, Edmodo, 3D virtual environments, etc.) in accordance with my objectives	1.00	5.00	3.16	1.04
9. I can learn software that helps me complete a variety of tasks more efficiently.	1.00	5.00	3.90	0.98
Total			**3.94**	

Table 2: Technological Knowledge (TK)

Table 2 presents the descriptive statistics regarding students' perceived technological knowledge (TK). The participants' TK average (M=3.94) is above the average Likert score (3), which indicates that in general, they seem to have an overall positive perception of their Technology Knowledge. More specifically, students' elementary practical technology knowledge such as installing printers or software (M=4.27), and using computer peripherals (M=4.25) is relatively high, while technical computer knowledge such as troubleshooting computer problems (M=3.72), as well as creating (M=3.63), or using more complex applications such as 3D virtual environments (M=3.16) seem to be less familiar to certain participants.

Content Knowledge Items (CK)	Min	Max	Mean	Std.
1. I can express my ideas and feelings by speaking in French.	2.00	5.00	3.8	0.85
2. I can express my ideas and feelings by writing in French.	2.00	5.00	3.95	0.88
3. I can read texts written in French with the correct pronunciation.	3.00	5.00	4.54	0.67
4. I can understand texts written in French.	200	5.00	4.02	0.82
5. I can understand the speech of a native French speaker easily.	2.00	5.00	3.75	0.87
Total			**4.01**	

Table 3: Content Knowledge (CK)

Table 3 presents students' perceived Content Knowledge (CK), that is, their knowledge of the four skills in the French language. Participants' overall (CK) average is 4.01, which is above the average Likert score, and therefore indicates an overall positive perception of their CK.

Pedagogical Knowledge Items (PK)	Min	Max	Mean	Std.
1. I can use teaching methods and techniques that are appropriate for a learning environment.	3.00	5.00	4.10	0.71
2. I can design a learning experience that is appropriate for the level of students.	2.00	5.00	4.12	0.75
3. I can support students' learning in accordance with their physical, mental, emotional, social, and cultural differences.	2.00	5.00	3.91	0.90
4. I can collaborate with school stakeholders (students, parents, teachers, etc.) to support students' learning.	2.00	5.00	4.10	0.82
5. I can reflect the experiences that I gain from professional development programs to my teaching process.	2.00	5.00	4.43	0.83
6. I can support students' out-of-class work to facilitate their self-regulated learning.	2.00	5.00	4.16	0.85
Total			**4.13**	

Table 4: Pedagogical Knowledge (PK)

Table 4 presents students' Pedagogical Knowledge (PK). The PK average (M=4.13) suggests an overall positive perception of students' PK, since the average score is above the average Likert score.

Pedagogical Content Knowledge Items (PCK)	Min	Max	Mean	Std.
1. I can manage a classroom learning environment.	2.00	5.00	4.37	0.85
2. I can evaluate students' learning processes.	3.00	5.00	3.50	0.67
3. I can use appropriate teaching methods and techniques to support students in developing their language skills.	3.00	5.00	4.43	0.70
4. I can prepare curricular activities that develop students' language skills.	3.00	5.00	4.39	0.69
5. I can adapt a lesson plan in accordance with students' language skill levels	3.00	5.00	4.27	0.80
Total			**4.20**	

Table 5: Pedagogical Content Knowledge (PCK)

Table 5 presents participants' Pedagogical Content Knowledge (PCK). The overall average (M=4.20) indicates a positive perception of students' PCK level. In general, all participants, having finished their M.A. coursework, seem to have a positive assessment of their knowledge in using language-appropriate planning, teaching and assessment capacities.

Technological Content Knowledge Items (TCK)	Min	Max	Mean	Std.
1. I can take advantage of multimedia (e.g., video, slideshow, etc.) to express my ideas about various topics in French	2.00	5.00	4.29	0.84
2. I can benefit from using technology (e.g., web conferencing and discussion forums) to contribute at a distance to multilingual communities.	2.00	5.00	3.70	0.90

3. I can use collaboration tools to work collaboratively with foreign persons (e.g., Second Life, wiki, etc.)	1.00	5.00	3.54	1.07
Total			**3.84**	

Table 6: Technological Content Knowledge (TCK)

Table 6 presents participants' Technological Content Knowledge (TCK). The average score (M=3.84) indicates an overall positive perception of students' self-reported TCK (3.84> 3.00).

Technological Pedagogical Knowledge Items (TPK)	Min	Max	Mean	Std.
1. I can meet students' individualized needs by using information technologies.	1.00	5.00	3.70	0.99
2. I can lead students to use information technologies legally, ethically, safely, and with respect to copyrights.	1.00	5.00	3.54	1.09
3. I can support students as they use technology such as virtual discussion platforms to develop their higher order thinking abilities.	2.00	5.00	3.85	0.81
4. I can manage the classroom learning environment while using technology in the class.	2.00	5.00	3.04	0.84
5. I can decide when technology would benefit my teaching of specific French curricular standards.	3.00	5.00	4.06	0.84
6. I can design learning materials by using technology that supports students' language learning	2.00	5.00	3.90	0.94
7. I can use multimedia such as videos and websites to support students' language learning	2.00	5.00	4.2	0.97
Total			**3.75**	

Table 7: Technological Pedagogical Knowledge (TPK)

Table 7 presents participants' Technological Pedagogical Knowledge (TPK). The mean score in this sub-component seems to be lower than the other sub-components (M=3.75), although it is still above the average Likert average (3), and therefore suggest an overall positive perception of TPK among students.

Technological Pedagogical Content Knowledge Items	Min	Max	Mean	Std.
1. I can use collaboration tools (e.g., wiki, 3D virtual environments, etc.) to support students' language learning.	2.00	5.00	3.88	0.7
2. I can support students as they use technology to support their development of language skills in an independent manner.	2.00	5.00	4.12	0.97
3. I can use Web 2.0 tools (animation tools, digital story tools, etc.) to develop students' language skills	1.00	4.00	3.43	0.99

4. I can support my professional development by using technological tools and resources to continuously improve the language teaching process	2.00	5.00	4.03	0.77
Total			**3.86**	

Table 8: Technological Pedagogical Content Knowledge (TPACK)

Table 8 presents students' overall perception of their TPACK. The average score of 3.86 indicates an overall positive perception of students' TPACK level. While the use of advanced technology-enhanced language teaching tools such as Web 2.0 (M=3.43/M=1.00) or 3D virtual environments (Min=1.00/M=3.88) seem to be a somehow complex activity, in general, most participants claim to be able to use technology for teaching and supporting language learning (M=4.12) and enhancing their professional development (M=4.03).

5.2. Students' Perception of TPACK and the Study's Variables

In this section, TPACK sub-components will be presented with respect to the study's variables, that is the type of M.A. teaching training received (face to face or virtual), and prior teaching experience.

Type of M.A. program		TK	CK	PK	PCK	TCK	TPK	TPACK
Face-to Face	**Mean**	3.83	4	4.2	4.57	3.81	4.01	3.9
	Std. Deviation	0.75	.55	0.50	0.48	0.74	0.64	0.57
Virtual	**Mean**	4.01	4.02	4.11	4.29	3.87	3.82	3.82
	Std. Deviation	0.57	0.63	0.57	0.63	0.81	0.70	.74
Total	**Mean**	3.94	4.016	4.14	4.39	3.84	3.89	3.85
	Std. Deviation	0.64	0.59	0.54	0.59	0.77	0.68	0.67

T- Test Results

Variable	T- value	p-value
Technological knowledge	-0.92	0.36
Content Knowledge	-0.145	0.88
Pedagogy Knowledge	0.60	0.55
Pedagogical Content Knowledge	1.67	0.10
Technological Content Knowledge	-0.22	0.82
Technological Pedagogical Knowledge	-0.97	0.33
Technological Pedagogical - Content Knowledge	0.38	0.71

Table 9: Descriptive Analysis of Type of Teaching Training Received

According to the T-Test results, presented in the above tables, no significant difference was observed among the seven components of TPACK with respect to the students' type of M.A. program (p-values > 0.05).

Descriptive Analysis								
Prior Teaching Experience		**TK**	**CK**	**PK**	**PCK**	**TCK**	**TPK**	**TPACK**
Yes	**Mean**	3.99	4.18	4.26	4.43	3.91	3.95	3.89
	Std. Deviation	0.62	0.57	0.44	0.58	0.81	0.64	0.67
No	**Mean**	3.82	3.61	3.84	4.3	3.69	3.73	3.75
	Std. Deviation	0.71	0.45	0.66	0.64	0.69	0.75	0.69
Total	**Mean**	3.94	4.01	4.14	4.39	3.84	3.89	3.85
	Std. Deviation	0.65	0.59	0.54	0.59	0.77	0.68	0.67

T-Test Results

Variable	T- value	p-value
Technological knowledge	0.86	0.39
Content Knowledge	3.29	0.02
Pedagogy Knowledge	2.57	0.013
Pedagogical Content Knowledge	0.71	0.48
Technological Content Knowledge	0.89	0.37
Technological Pedagogical Knowledge	1.03	0.31
Technological Pedagogical - Content Knowledge	0.68	0.5

Table 10: Descriptive Analysis of Prior Teaching Experience

According to T-Test results, presented in the above tables, significant differences were observed in Content Knowledge (CK) and Pedagogical Knowledge (PK) among students with respect to prior teaching experience (p-value < 0.05). For the other five sub-components of TPACK, however, no significant difference was observed with respect to prior teaching experience (p-values > 0.05). Based on these results, students' previous teaching experience results in higher values in Pedagogical Knowledge and Content Knowledge.

Descriptive Analysis								
Prior Virtual Teaching Experience		**TK**	**CK**	**PK**	**PCK**	**TCK**	**TPK**	**TPACK**
Yes	**Mean**	4.11	4.07	4.28	4.33	3.95	3.91	3.92
	Std. Deviation	0.58	0.57	0.42	0.66	0.81	0.64	0.65
No	**Mean**	3.79	3.9692	4.0192	4.4462	3.7564	3.8736	3.7981
	Std. Deviation	0.67	0.63	0.61	0.54	0 .75	0.73	0.71
Total	**Mean**	3.94	4.02	4.14	4.3958	3.84	3.89	3.85
	Std. Deviation	0.65	0.59	0.54	0.59	0.77	0.68	0.67

T-Test Results

Variable	T- value	p-value
Technological knowledge	1.72	0.09
Content Knowledge	0.59	0.55
Pedagogy Knowledge	1.74	0.09
Pedagogical Content Knowledge	-0.63	0.53
Technological Content Knowledge	0.87	0.38
Technological Pedagogical Knowledge	0.21	0.83
Technological Pedagogical - Content Knowledge	0.62	0.539

Table 11: Descriptive Analysis of Participants' Prior Teaching Experience

According to the T-test results, presented in the above table, no significant difference was observed among students' perception of TPACK with respect to prior experience in virtual teaching (p-values> 0.05).

Descriptive Statistics								
Years of Teaching Experience		**TK**	**CK**	**PK**	**PCK**	**TCK**	**TPK**	**TPACK**
Without	**Mean**	3.75	3.56	3.73	4.2	3.66	3.64	3.66
	Std. Deviation	0.75	0.45	0.64	0.64	0.75	0.76	0.71
1-3	**Mean**	4.02	4.07	4.19	4.29	4.06	4.02	3.88
	Std. Deviation	0.62	0.61	0.49	0.59	0.68	0.54	0.69
4-7	**Mean**	3.66	4.28	4.30	4.74	3.30	3.61	3.77
	Std. Deviation	0.48	0.50	0.36	0.34	0.57	0.69	0.49
8-10	**Mean**	4.50	4.15	4.45	4.40	4.66	4.46	4.37
	Std. Deviation	0.49	0.52	0.25	0.81	.47	0.55	0.63
>10	**Mean**	4.66	4.60	4.66	4.90	3.83	4.35	4.00
	Std. Deviation	0.16	0.56	0.47	0.14	1.64	0.91	1.41
Total	**Mean**	3.94	4.02	4.14	4.39	3.84	3.89	3.85
	Std. Deviation	0.64	0.59	0.54	0.59	0.77	0.68	0.67

One-Way Anova Test Results

Variable	T- value	p-value
Technological knowledge	2.39	0.065
Content Knowledge	3.28	0.02
Pedagogy Knowledge	3.25	0.02
Pedagogical Content Knowledge	1.78	0.15
Technological Content Knowledge	3.53	0.01
Technological Pedagogical Knowledge	2.13	0.09
Technological Pedagogical - Content Knowledge	0.88	0.48

Table 12: Descriptive Analysis of Years of Teaching Experience

According to the One-Way Anova test results presented in the table above, there is a significant difference in the variables CK, PK, TCK in terms of teaching years (p-value values < 0.05); for the other 4 TPACK sub-components (TK, TPK, PCK, and TPACK), no significant differences were observed (p-value values > 0.05).

In One-Way Anova tests, when there is a significant difference between the levels of the independent variable, post-hoc tests need to be performed to understand at which levels of the independent variable these differences have

occurred. For this purpose, Duncan Post Hoc Tests were performed for the sub-components in which significant differences were observed among participants with respect to prior teaching experience.

Years of Teaching Experience	N	Subset for alpha = 0.05	
		1	2
.00	12	3.5667	
1.00	20	4.0700	4.0700
3.00	4	4.1500	4.1500
2.00	10	4.2800	4.2800
4.00	2		4.6000
Sig.		.062	.166

Table 13: Duncan Post Hoc Test for CK

The results of Duncan test, presented in the above table, indicate that the mean CK for students with more than ten years of teaching experience (group 4) is significantly different from students with no prior teaching experience. According to the average values of the groups, instructors with more experience have a higher average score in Content Knowledge (CK).

Years of Teaching Experience	N	Subset for alpha = 0.05	
		1	2
.00	12	3.7361	
1.00	20	4.1917	4.1917
2.00	10	4.3000	4.3000
3.00	4		4.4583
4.00	2		4.6667
Sig.		.094	.173

Table 14: Duncan Post Hoc Test for PK

The results of Duncan's test, presented in table 14, indicate that the average PK for students with teaching experience in groups 3 (between 8 and 10 years) and group 4 (more than 10 years) is significantly different from students with no prior teaching experience. According to the mean values of the groups, students with prior teaching experience have higher PK average scores.

Years of Teaching Experience	N	Subset for alpha = 0.05	
		1	2
2.00	10	3.3000	
Without	12	3.6667	
4.00	2	3.8333	3.8333
1.00	20	4.0667	4.0667
3.00	4		4.6667
Sig.		.120	.081

Table 15: Duncan Post Hoc Test for TCK

The results of Duncan test, presented in the above table, indicate significant difference in the average TCK for students with teaching experience in group 3 (between 8 and 10 years), with students who have no experience or their experience is between 4-8 years.

Test Statistics[a]	
N	48
Chi-Square	38.351
p-value	.000

Table 16: Friedman Test Results

According to Friedman test results, presented in the table above, indicators are significantly different in terms of ranking (p-value <0.05). In addition, according to the results presented in the table below, the highest average rank in terms of scores is related to Pedagogical Content Knowledge (PCK index), followed by Pedagogical Knowledge (PK index). The rest of the indicators are in lower ranks: Content knowledge (CK), Technological Knowledge (TK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical Content Knowledge (TPACK) and Technological Content Knowledge (TCK) respectively.

Ranks	
	Mean Rank
TK	3.65
CK	3.98
PK	4.51
PCK	5.52
TCK	3.38
TPK	3.49
TPACK	3.48

Table 17: TPACK Average Ranks

6. Discussion

The analysis of TPACK's sub-components suggests that in general, participants' perceived knowledge in all seven sub-components are above the Likert average (3), which indicates that they have a positive perception of their knowledge with respect to the teaching of French through technology. In the sub-components with technology, however, slightly lower scores (compared to the non-technology sub-components) are noted, which could imply that students feel slightly less competent when technology is used for teaching languages. These results comply with Tseng (2014), Fathi & Yousefifard (2019), Prasojo et al. (2020), as well as Inpeng & Nomnian (2020)'s research, in which

technology-related TPACK sub-components received lower scores among the participants compared to the other TPACK sub-components.

As illustrated in Tables 2-8, concerning CK (M=4.01), students' perception of their French language knowledge is above the Likert average in both receptive and productive language skills, which indicates that they see themselves competent in the subject matter to be taught. As for PK (M=4.13) and PCK (M=4.20), students' average scores are above the Likert average, as they have received two years of formal theoretical and practical instruction in the teaching of the French language and therefore see themselves competent in selecting, creating and applying various language teaching instruments and methodologies for teaching the French language effectively.

In the TK sub-component (M=3.94), students feel marginally more competent in the integration of basic technological devices and software in their teaching, compared to creating advanced technological instruments such as 3D virtual environments or multimedia resources. As for TCK (3.84), participants feel slightly more competent in using technology for one-way expression (TCK item 1), compared to two-way interactions and online collaboration through web conferencing or discussion forums with the speakers of the target language (TCK items 2 and 3). Participants' TPK (M=3.75) is the sub-component in which students feel least component, compared to the other six TPACK sub-components, although no specific pattern is observed regarding the specific skills within this sub-component. Finally, regarding participants' overall TPACK, the overall average score of 3.86 seems to suggest that students feel competent in using technology in the teaching of the French language (M=3.86> 3), although they see themselves more prepared for individual use/integration of technology in their classes (TPACK items 2 and 4), compared to collaborative use of technology for interaction with students and/or colleagues (TPACK items 1 and 3).

In general, students' average scores in the technology-related TPACK sub-components seem to suggest that in certain areas, their competencies in technology integration in language teaching could be further developed. More precisely, according to students' self-reported TPACK scores, technology seems to be more easily accepted/used as a tool for multimedia resource-based, individual presentations (TK items 5, 6; TCK items 1; TPK items 5, 7), rather than multidimensional collaboration and interactive teaching of the French language (TK item 8; TCK items 2 and 3; TPK items 3, 4,; TPACK items 1 and 3). These results are in line with Sanchez-Cruzado et al.'s (2021) study, in which instructors' collaborative digital competencies were lower than their other digital competencies. Iranian graduating French Language Teaching students' perceived TPACK in collaborative and interactive technology-based teaching and training could therefore be improved to help them develop more practical competencies in designing and implementing interactive language teaching activities and approaches through various technological tools and platforms.

This study also investigated the relationship between the type of teaching training received and students' prior teaching experience, with their perceived TPACK. Concerning the type of teaching training received, as indicated in the previous section, no specific relationships were

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documented, which reveals that students' TPACK, gained through virtual M.A. seminars in the Teaching of the French Language was similar to that of students enrolled in face-to-face seminars. These results could indicate that the content of the M.A. coursework, as well as professors' teaching approaches and activities have a more significant influence on the development of students' TPACK, compared to the platform and setting (virtual or face-to-face) in which classes are held, which could be a positive observation regarding the mandatory implementation of virtual classes due to the Covid-19 pandemic.

Concerning the relationship between students' perceived TPACK and their prior teaching experiences, the PK and the CK of students with prior teaching experience in this research were higher than those with no prior teaching experience, regardless of the type of teaching experience (virtual or face-to-face), according to table 10. These results comply with previous research (Cheng, 2017; Sariçoban et al, 2019; Nazari et al., 2019), and could imply that the knowledge that students learn in classroom settings is not always automatically transformed into teaching competencies (Yan & Yuhang, 2012; Tondeur et al., 2012). In training future language instructors, along with theoretical and practical graduate coursework in language teaching, formal and informal language teaching internships and practicums such as on-the-field teaching, peer teaching/tutoring and study groups could be implemented to bridge the gap between theory and practice, and facilitate students' transfer of theoretical teaching principles into practical teaching competencies (PK) and practical French language knowledge (CK). Partnership programs with schools and language institutes, in which students initiate their teaching career as tutors, teaching assistants or instructors could promote mutual advantages for both graduating French Language Teaching students, as well as the schools/language institutes, and of course students, who benefit from theoretically-founded instruction and academically-trained teachers for learning the French language.

7. Conclusion

Language teaching is an entirely dynamic, interactive and collaborative activity—that is, languages must be learned through/for communication and interaction, which, in today's world mainly happen through technology (online chats, social network-based interactions, weblogs, etc.). Technology is therefore an omnipresent part of every educational setting; current/future language teachers must therefore possess and use the necessary knowledge and competencies in practical integration of technology in their teaching. Since a well-established TPACK could have a considerable impact on a practical implementation of a technology-enhanced instruction (Koehler & Mishra, 2009; Nazari et al, 2019; Taopan et al, 2020; Prasojo et al, 2020), and given the current obligation to embrace virtual teaching and learning in all educational settings, graduating Language Teaching students' TPACK should be further developed to prepare them for the challenges and opportunities of technology-based and/or technology-enhanced teaching. Such developments could be encouraged through a more pedagogical and practical use of online synchronous (Galanti et al., 2020; Cheng & Wei, 2020) and asynchronous (Papanikolaou et al, 2017) teaching and learning platforms, online discussion boards/forums (Sariçoban, 2019; Goradia, 2018; Bustanmante, 2020), online

collaborative content sharing and peer editing tools (Tai et al., 2015; Papanikolaou et al, 2017; Zheng et al., 2019), and online social media (Inpeng & Nomnian, 2020) and messengers (Habibi et al., 2018; Prasojo et al., 2020; Aisyah & Munier, 2021) to encourage student-teacher and student-student interaction through content-adequate and context-appropriate Web 2.0 and Web 3.0-based platforms that focus on collaborative co-creation and co-development of knowledge (Nelson et al., 2009).

Activities such as group teachings/ presentations using interactive whiteboards, round table discussions, group debates, and synchronous teaching practicums and demos could enhance students' interactions in their teaching training seminars, while a systematic use of peer editing instruments, discussion forums, chatrooms, social media and messengers could be used as complementary activities outside of class to engage students in a combination of presentational and interactive activities on various technology-based platforms and settings.

As the world is rapidly moving toward inevitable integration of technology in the various aspects of (language) teaching, and since even after the current pandemic, it is likely for educational establishments to endorse virtual and blended learning more seriously, productive (self) reflection regarding students and instructors' TPACK could help in assessing students' technology-enhanced/technology-based teaching knowledge and competences, recognizing their strengths and weaknesses, and proposing/implementing useful improvements. Various TPACK assessment instruments such as portfolios, individual TPACK profiles (Benson & Ward, 2013), self and peer assessments, and professional meetings analyzing language teaching students/pre-service instructors' TPACK could be regularly implemented in university teacher-training programs to discuss fundamental issues regarding the teaching of languages with advanced technologies with the main objective of meeting students/future teachers' situational needs and demands in an everyday-evolving world with emerging language teaching/learning goals and objectives, needs and demands, teaching approaches and methodologies, and of course, challenges and opportunities.

Endnotes:

[1]The coursework and professors are identical for both face to face and virtual M.A. seminars: i.e., one professor teaches the same seminar both in face-to-face classes and virtual classes with similar course syllabus and course goals.

[2] In Iran, it is possible for students holding a B.A. degree to teach in private language institutes because of their advanced language level, even though their professional and academic teaching training is not yet completed. As a result, certain students enrolled in the M.A. program in French Language Teaching are already teaching French or have taught French in the past, while others finish their M.A. having never formally taught.

References

Aisyah, R. N., & Munir, A. (2021). Technological Pedagogical Content Knowledge (TPACK) in Action: Unraveling Indonesian English as a Foreign Language Teachers' TPACK by Implementing Telegram. *Computer*

Assisted Language Learning, *22*(3), 17-32.

Atabek, O. (2020). Alternative Certification Candidates' Attitudes towards Using Technology in Education and Use of Social Networking Services: A Comparison of Sports Sciences and Foreign Language Graduates. *World Journal on Educational Technology: Current Issues*, *12*(1), 1-13.

Azis, Y. A. (2020). Collaborative Digital Storytelling-based Task for EFL Writing Instruction: Outcomes and Perceptions. *Journal of Asia TEFL*, *17*(2), 562-579.

Bachy, S. (2014). Un modèle-outil pour représenter le savoir technopédagogique disciplinaire des enseignants. *Revue internationale de pédagogie de l'enseignement supérieur*, *30*(2), 1-29.

Bachy, S. (2019). Comment se développe le savoir technopédagogique discipliniaire? *Spirale-Revue de recherches en education*, (*1*), 125-137.

Bagheri, M. (2020). Validation of Iranian EFL Teachers' Technological Pedagogical Content Knowledge (TPACK) Scale. ESL-EJ, 24(2).

Baser, D., Kopcha, T. & Ozden, Y. (2016). Developing a technological pedagogical content knowledge (TPACK) assessment for preservice teachers learning to teach English as a foreign language, *Computer Assisted Language Learning*, 29(4), 749-764.

Benson S. N. K.,& Ward, C.L.(2013). Teaching with technology: Using TPACK to understand teaching expertise in online higher education. *Educational Computer Research 48*(2):153-172.

Borthwick, A. C., & Hansen, R. (2017). Digital literacy in teacher education: Are teacher educators competent?. *Journal of Digital Learning in Teacher Education*, *33*(2), 46-48.

Bustamante, C. (2020). TPACK-based professional development on web 2.0 for Spanish teachers: A case study. *Computer Assisted Language Learning*, *33*(4), 327-352.

Chang, L. Y. W., & Wei, J. C. V. (2020, June). Pre-Service Chinese Teachers Implementing a TPACK Framework in an Online Teaching Context. In *Program Booklet of the 3rd Pan-Pacific Technology-Enhanced Language Learning & Critical Thinking Meeting (PPTELL 2020)* (p. 73).

Cheng, K. H. (2017). A survey of native language teachers' technological pedagogical and content knowledge (TPACK) in Taiwan. *Computer Assisted Language Learning*, *30*(7), 692-708.

Dabove Foueko, G. M., & Ortega, R. B. (2020). Maîtrise des connaissances professionnelles TPACK d'enseignants: le cas de l'intégration de la simulation informatique dans l'enseignement technique camerounais en électronique/Teachers' TPACK

Professional Knowledge Mastering: The case of computer simulation integration in Cameroonian technical education in electronics programs. *Canadian Journal of Learning & Technology*, *46*(3).

Eghtesad, S., & Mehrabi, M. (2021). Investigating Iranian Virtual Language Instructors' Technological Pedagogical Content Knowledge: The Case of English and French Language Instructors. *Foreign Language Research Journal*, *11*(3), 355-374.

Esfandiari, R., & Sokhanvar, F. (2020). Modified Unified Theory of Acceptance and Use of Technology in Investigating Iranian Language Learners' Attitudes toward Mobile Assisted Language Learning (MALL). *Interdisciplinary Journal of Virtual Learning in Medical Sciences*, *6*(4), 93-105.

Fathi, J., & Yousefifard, S. (2019). Assessing Language Teachers' Technological Pedagogical Content Knowledge (TPACK): EFL Students' Perspectives. *Research in English Language Pedagogy*, *7*(2), 255-282.

Flanigan, A. E., & Babchuk, W. A. (2020). Digital distraction in the classroom: exploring instructor perceptions and reactions. *Teaching in Higher Education*, 1-19.

Galanti, T. M., Baker, C. K., Morrow-Leong, K., & Kraft, T. (2020). Enriching TPACK in mathematics education: using digital interactive notebooks in synchronous online learning environments. *Interactive Technology and Smart Education*.

Ghany, S. A. (2019). Étude analytique de la formation initiale des enseignants de FLE selon le modèle TPACK. *مجلة البحث العلمى فى التربية*, 20(الجزء الثالث عشر), ٦١٢-٦٣٩.

Goradia, T. (2018). Role of Educational Technologies Utilizing the TPACK Framework and 21st Century Pedagogies: Academics' Perspectives. *IAFOR Journal of Education*, *6*(3), 43-61.

Gudmundsdottir, G. B., & Hatlevik, O. E. (2018). Newly qualified teachers' professional digital competence: implications for teacher education. *European Journal of Teacher Education*, *41*(2), 214-231.

Habibi, A., Mukinin, A., Riyanto, Y., Prasohjo, L. D., Sulistiyo, U., Sofwan, M., & Saudagar, F. (2018). Building an online community: student teachers' perceptions on the advantages of using social networking services in a teacher education program. Turkish Online Journal of Distance Education, 19(1), 46-61.

Inpeng, S., & Nomnian, S. (2020). The use of Facebook in a TEFL program based on the TPACK framework. *LEARN Journal: Language Education and Acquisition Research Network*, *13*(2), 369-393.

Khatoony, S., & Nezhadmehr, M. (2020). EFL teachers' challenges in integration of technology for online classrooms during

Coronavirus (COVID-19) pandemic in Iran. *AJELP: Asian Journal of English Language and Pedagogy*, *8*, 1-16.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary issues in technology and teacher education*, *9*(1), 60-70.

Köse, N. K. (2016). Technological Pedagogical Content Knowledge (TPACK) of English Language Instructors. *Journal of Educational & Instructional Studies in the World*, *6*(2), 12-19

Liu, H., Wang, L., & Koehler, M. J. (2019). Exploring the intention-behavior gap in the technology acceptance model: A mixed-methods study in the context of foreign-language teaching in China. *British Journal of Educational Technology*, *50*(5), 2536-2556.

Mahbub, M. A. (2020). Learning English mediated by Kahoot: Insights from the Indonesian EFL instructors. *Journal on English as a Foreign Language*, *10*(2), 246-267.

Manegre, M., & Sabiri, K. A. (2020). Online language learning using virtual classrooms: an analysis of teacher perceptions. *Computer Assisted Language Learning*, 1-16.

Miller, T., MacLaren, K., & Xu, H. (2020). Online learning: Practices, perceptions, and technology. *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*, *46*(1).

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

Mishra, P., & Koehler, M. J. (2008). Introducing technological pedagogical content knowledge. In *annual meeting of the American Educational Research Association*, 1-16.

Nazari, N., Nafissi, Z., Estaji, M, & Marandi, S.S (2019). Evaluating Novice and Experienced EFL Teachers' Perceived TPACK for their Professional Development, *Cogent Education*, *6*(1), 1632010.

Nelson, J., Christopher, A., & Mims, C. (2009). TPACK and Web 2.0: Transformation of teaching and learning. *TechTrends*, *53*(5), 80.

Papanikolaou, K., Makri, K., & Roussos, P. (2017). Learning design as a vehicle for developing TPACK in blended teacher training on technology enhanced learning. *International Journal of Educational Technology in Higher Education*, *14*(1), 1-14.

Prasojo, L. D., Habibi, A., Mukminin, A., & Yaakob, M. F. M. (2020). Domains of Technological Pedagogical and Content Knowledge: Factor Analysis of Indonesian In-Service EFL Teachers.

International Journal of Instruction, *13*(4), 593-608.

Sánchez-Cruzado, C., Santiago Campión, R., & Sánchez-Compaña, M. (2021). Teacher Digital Literacy: The Indisputable Challenge after COVID-19. *Sustainability*, *13*(4), 1858.

Sariçoban, A., Tosuncuoğlu, İ., & Kirmizi, Ö. (2019). A technological pedagogical content knowledge (TPACK) sssessment of preservice EFL teachers learning to teach English as a foreign language. *Dil ve Dilbilimi Çalışmaları Dergisi*, *15*(3), 1122-1138.

Scott, K. C., & Nimon, K. (2020). Construct validity of data from a TPACK self-assessment instrument in 2-year public college faculty in the United States. *Journal of Research on Technology in Education*, 1-19.

Serhat, K. (2019). TPACK: Technological Pedagogical Content Knowledge Framework. Article retrieved on Nov, 10, 2010 at https://educationaltechnology.net/technological-pedagogical-content-knowledge-tpack-framework/.

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

Taghizadeh, M., & Hasani Yourdshahi, Z. (2019). Integrating technology into young learners' classes: language teachers' perceptions. *Computer Assisted Language Learning*, 1-25.

Tai, H. C., Pan, M. Y., & Lee, B. O. (2015). Applying Technological Pedagogical and Content Knowledge (TPACK) model to develop an online English writing course for nursing students. *Nurse education today*, *35*(6), 782-788.

Taopan, L. L., & Drajati, N. A. (2020). TPACK Framework: Challenges and Opportunities in EFL Classrooms. *Research and Innovation in Language Learning*, *3*(1), 1-22.

Tseng, J. J. (2014). Developing an instrument for assessing technological pedagogical content knowledge as perceived by EFL students. *Computer Assisted Language Learning*, *29*(2), 302–315.

Turgut, Y. (2017). A Comparison of Preservice, In-Service and Formation Program for Teachers' Perceptions of Technological Pedagogical Content Knowledge (TPACK) in English Language Teaching (ELT). *Educational Research and Reviews*, *12*(22), 1091-1106.

Wen, H. & Wen, W. (2020). The Impact of Digital Project-based Learning on Teacher Candidates' Disciplinary Learning and Perceptions toward Technology Use in Classrooms. In Proceedings of EdMedia + Innovate Learning (pp. 444-454). Online, The Netherlands: Association for the Advancement of Computing in Education (AACE). Retrieved October 25, 2020 from

https://www.learntechlib.org/primary/p/217336/.

Yan, C, Yuhong, J (2012). Integration of ICTs into Subject Teaching in Preservice English Teacher Education. Proceedings of 2012 International Conference on Information Technology Based Higher Education and Training (ITHET). Istanbul, Turkey: IEEE.pp.1-5