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Construction and Validation of EFL Teachers' Professional Identity Perception Inventory of Technology-Enhanced Instructions during the COVID-19 Pandemic

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Abstract: The first objective of the present study was to develop an inventory assessing EFL teachers' professional identity perception (PIP) of technology-enhanced instructions (TEIs) during the COVID-19 pandemic. Based on the findings of a semi-structured interview administered with three teachers following their actual implementation of TEIs, a 55-item EFL teachers' PIP inventory of TEIs was developed. The second objective was to investigate the construct validity and reliability of teachers' PIP inventory of TEIs by gathering data from 157 Iranian EFL teachers. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity verified the suitability of the data for factor analysis. The results of Exploratory Factor Analysis indicated a nine-factor solution for the inventory items. Moreover, the PIP inventory of TEIs enjoyed a reliability of 0.77 suggesting a high reliability. Regarding teachers' perceptions, various personal, professional, situational, and contextual aspects of professional identity were specified in relation to the implementation of TEIs in Iranian higher education. Some distinctive findings of this study comprised the society's perception toward TEIs and the role of teachers' pedagogical beliefs in the implementation of TEIs. This study has some implications for stakeholders to devote due attention to all aspects of teachers' professional identity in the implementation of TEIs during and after the COVID-19 pandemic.

Keywords: EFL Teachers' Perception, Exploratory Factor Analysis, Professional Identity Perception Inventory Of Technology-Enhanced Instruction, Technology-Enhanced Instruction.

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1. Introduction

Technology in education has opened up new doors toward effective instruction since it offers numerous means and facilities. However, technological means are warmly welcomed in the educational systems of developed countries, and developing countries are suspected of uprooting technological means from developed countries and transplanting them into their educational settings without considering their existing conditions (Unwin, 2005). As COVID-19 initiated the highest-scale pandemic over the last century and became a global threat, the traditional system of education underwent enormous changes in almost all countries. The sporadic and then prolonged closure of universities to restrict the transmission of this disease suddenly faced teachers with an emergency shift to technology-enhanced instructions (TEIs). However, some studies have indicated that Iran as a developing country still lags behind the successful implementation of TEIs in the majority of classes (Saeedi et al., 2022). According to Huang, Teo, and Zhou (2019), the successful application of TEIs is highly dependent on teachers that turn promises into reality as they structure classroom practices. In addition, learners as digital natives do not translate their daily technology use in non-academic settings into academic settings (Corrin, Lockyer, & Bennett, 2010), which can be related to not only the effect of teachers' perception (Nordlöf, Hallström, & Höst, 2019) but also the necessity of teacher guidance and support in this respect (Nelson, Voithofer, & Cheng, 2019). Similarly, some researchers believe that learners' tendency to use educational technologies would be increased by eliminating barriers specified by their teachers (Uslu, 2018). Therefore, as teachers are the most crucial individuals in what happens in the process of instruction, research suggests focusing on teachers that utilize technology (Malekolkalami, 2020).

In fact, instructional contexts, especially EFL classrooms are intricate settings that require addressing the role of their key component, i.e., teachers, who specify the ongoing dynamics of the classroom and regulate the outcomes of applying various TEIs. However, according to Kumar and Alvarado (2013), teachers have various social and cultural identities that are co-constructed in their negotiation with their working context. Hence, it can be concluded that teachers are not neutral characters in the classrooms, yet their identities, especially professional identity can affect their classroom practices. The notion of 'immediate context' is of great value in the post-modernist perspective of identity as it accentuates the shifting nature of identity as a result of the individual or group's interactions with the surrounding context (Liu & Turner, 2018). The

mentioned perspective reveals that identity is tightly related to cultural, social, and political contexts and emerges as a result of interactions taking place in a specific context (Anheier, 2020).

In the same vein, teacher professional identity is not shaped by an individual teacher's perception but arises as a result of considering the role of themselves and others in a specific context. The mentioned perspective reveals that some landscapes affect teachers' professional identity (Beijaard, 1995). According to Beijaard, Meijer, and Verloop (2004), the metaphoric use of the concept of landscape in studies on teacher professional identity aims at highlighting the internal and external contexts where teachers work. The landscapes of teacher professional identity have been classified by Varghese, Morgan, Johnston, and Johnson (2005) into personal, professional, situational, and contextual landscapes. Personal and professional landscapes consider a teacher as an individual and concentrate on their personal and professional characteristics including gender, age, personal beliefs, etc. The situational landscape addresses the aspects of the internal setting where the teacher works. For instance, the type of learners and the available resources can be presented as some aspects of this landscape. Contextual landscape addresses a wider context with which teachers deal and is directly affected by the cultural and socio-economic conditions at the national level. In this regard, views about what constitutes an acceptable teaching method are one of the aspects of this landscape (Varghese et al., 2005).

Among the landscapes of teachers' professional identity, some aspects of personal and professional landscapes in relation to the application of TEIs in educational settings have received due attention in the literature. For instance, teachers' age (Rahayu & Wirza, 2020), teachers' skills (Alea, Fabrea, Roldan, & Farooqi, 2020), teachers' previous experience in employing TEIs (Nelson et al., 2019; Trust & Whalen, 2020), teachers' gender (Makawawa et al., 2021), teachers' confidence (Rasmitadila et al., 2020), and teachers' knowledge and teaching experience (Ifinedo, Rikala, & Hämäläinen, 2020; Nelson et al., 2019; Rasmitadila et al., 2020) were some aspects of the mentioned landscapes that have been investigated in previous studies.

In one study focusing on the professional landscape in the Iranian educational context, Malekolkalami (2020) performed a survey study involving 214 teachers. The results of an online questionnaire indicated that the teachers' lower level of technological competence was the main challenge in the incorporation of TEIs in the Iranian context.

Regarding the situational landscape, a recent study by Winter, Costello, O'Brien, and Hickey (2021) surveyed 38 teachers in Ireland and specified three main sets of challenges experienced by teachers in employing technology in education. The availability of technological devices and facilities in educational settings, the technology integration experience of other

working staff including peer colleagues, and the availability of professional training were the main identified factors affecting teachers' integration of TEIs into education.

Examining professional development programs and the role of other stakeholders in teachers' integration of TEIs into their classes as other aspects of the situational landscape, the relationships of teachers' technology integration and principals' technology leadership, as well as the effect of professional development as a mediator on the stated relationship in a Malaysian context, were investigated in a study by Thannimalai and Raman (2018). The results of a cross-sectional survey involving 645 teachers and 90 principals indicated not only the significant relationship between teachers' technology integration and principals' technology leadership but also the significant effect of professional development on the mentioned relationship.

As far as the researchers are concerned, the contextual landscape has been rarely touched upon in previous studies. In this respect, Aksyah, Muslem, and Marhaban (2021) conducted a mixed-methods study to examine teachers' perceptions of the obstacles in the process of implementing TEIs. The results of interviews and questionnaires revealed the determinant role of parents in learners' performance. In another insightful study, Ramij and Sultana (2020) reported the shortage of infrastructure, economic poverty, and low-speed and costly Internet as the problems faced by Bangladeshi teachers.

Although a number of studies have been devoted to addressing the landscapes of teachers' professional identity in isolation, according to Sato and Kleinsasser (2004), four landscapes of teacher professional identity are interconnected and establish a multifaceted web, which needs to be considered as a whole to avoid any misunderstandings and ambiguities about teachers and their classroom behaviors and practices. In other words, the ignorance of teachers' PIP of TEIs as a whole would provide less illuminative information about teachers' classroom practices regarding the implementation of TEIs. Therefore, as research has indicated that addressing teachers' professional identity can be a key to the realization of the instructional processes (Varghese et al., 2005), an in-depth study focusing on personal, professional, situational, and contextual landscapes of EFL teachers' professional identity may shed more light on the implementation of TEIs in EFL classrooms, which is an obligation during the closure of universities. In other words, the present study can provide valuable information about the behind the scene issues in the employment of TEIs in the higher educational system of developing countries including Iran during the COVID-19 pandemic. Additionally, the stakeholders can reflect on teachers' professional identity perception (PIP) of TEIs that affects their classroom practices and make the requisite changes by responding to situational and contextual factors in

this respect during and after the COVID-19 pandemic. Therefore, this study aimed at providing answers to the following research question to construct and validate a PIP inventory of TEIs during the COVID-19 pandemic:

What are the psychometric qualities (specified as construct validity and reliability) of the PIP inventory of TEIs during the COVID-19 pandemic?

2. Materials and Methods

2.1. Design of the Study

To provide a comprehensive conceptualization of the PIP of TEIs in the Iranian educational system, the instrument development model variant of the exploratory sequential design was used to develop and validate the PIP inventory of TEIs during the COVID-19 pandemic. The qualitative findings obtained by collecting data from intentionally selected individuals guided the development of items for a quantitative survey instrument. Then, the researchers implemented and validated the developed inventory quantitatively.

2.2. Vocabulary Learning Strategies

The current study involved the following groups of teachers.

2.2.1. Interview participants

A purposive sampling method was used to select teacher participants to attend semi-structured interviews. Considering the time-consuming and effortful nature of the study, purposive sampling was applied to permit the researchers to carefully select highly cooperative, enthusiastic, and informative participants. Therefore, three female teachers that were either Ph.D. holders or Ph.D. candidates in Teaching English as a Foreign Language (TEFL) with a mean age of 32 participated in the study. The description of the teacher participants in greater detail is provided.

Sara was 31 years old and at the time of conducting the study was a Ph.D. candidate in TEFL at Al-Zahra University. She got her BA in English Language and Literature and MA in English Language Teaching from Urmia University. She had taught English in different language schools in Urmia and Tehran and had the experience of teaching English to different age ranges for more than eight years. At the time of conducting the study, she was pursuing her Ph.D. studies in Tehran and simultaneously teaching different courses including academic

writing at English departments in Tehran. Moreover, she was interested in conducting studies on computer-assisted language learning (CALL).

Zahra was 32 years old. She studied for a Master's degree at Trabiat Modares University. While doing her MA, she was teaching in a private high school and a language school. Although she had a teaching experience of more than nine years, she had no experience of teaching EFL at university till 2015 when she started her Ph.D. studies in Tehran. Her research interests were mostly teaching, testing, and assessment in EFL using novel technology-enhanced instructions.

Maryam was 34 years old and had taught English for six years. She graduated from Ardabil University in English Language Teaching. Then, she completed her Master's degree at Urmia University. In 2017, she got her Ph.D. in English Language Teaching from Tabriz University and since then she started teaching different English courses at the university level. She was always fascinated by reading the latest papers regarding innovations in EFL classrooms.

2.2.2 PIP inventory of TEIs development participants

To validate the PIP Inventory of TEIs, the developed inventory was electronically directed to as many EFL teachers as possible following the random sampling procedures from December 2021 to January 2022. Google Forms was used in this study, and the researchers shared the inventory in target social groups via social media such as WhatsApp, Telegram, and Soroush, as the local social medium, using a hyperlink. The target EFL teachers participated in this phase of the study without any geographical constraints as they had installed smartphone or tablet applications that connected them to national social networking sites. In this phase, 157 teachers including 94 female and 63 male participants as M.A. holders (21%), Ph.D. holders (34%), or Ph.D. candidates (45%) within the age range of 25-35 (13%), 35-45 (34%), 45-55 (38%), and more than 55 (15%) years filled out and submitted the developed inventory electronically. All the participants had at least two years of teaching experience at State University (21%), Islamic Azad University (33%), Non-Profit Higher Education Institutions (20%), and Payam-e-Noor University (26%) that were located at metropolises (41%), capitals of the province (28%), and towns (31%). In addition, the majority of participants (64%) mentioned that the average size of their EFL classes was mostly 40-50. Furthermore, 78% of the participants declared non-participation in any pre-service or in-service professional development programs promoting their technology skills to pursue professional purposes.

Besides, most participants (64%) had no information regarding the existence of any definite university policy that guides and encourages teachers to employ TEIs in EFL teaching and learning settings.

2.3. Instruments

The following main instruments were used in this study.

2.3.1. Adobe Connect software

Adobe Connect software as a learning management system was employed to hold online classes.

2.3.2. Teacher participants' semi-structured interview guide

One of the key data collection tools that can be used in the qualitative phase of mixed methods research is the interview as it paves the way to access participants' thoughts, beliefs, feelings, and intentions that cannot be directly observed (Punch, 2005). In the present study, semi-structured interviews were used as they allowed the participants to not only answer a set of pre-determined questions but also add additional useful information to the gathered data. The framework of teacher professional identity presented by Varghese et al. (2005) was used as the base to develop the interview questions. The mentioned framework included the following four domains: personal aspects, professional aspects, situational aspects, and contextual aspects. Considering the presented framework, the ultimate teacher participants' interview guide included five sections. The first section aimed at easing the teachers to approach the main discussion by asking relatively straightforward questions that provided teachers' initial reflections and opinions on the TEIs. The second, third, and fourth sections included the main questions as they addressed aspects associated with the domains of professional identity, i.e. personal, professional, situational, and contextual aspects, which were supposed to affect teachers' PIP of TEIs. The mentioned sections could be considered the most productive part of the interview guide as the researcher could achieve a greater depth of insights regarding the underlying aspects in this respect. The closing section provided an opportunity for the teachers to express the issues that were not tackled by the researcher and were still worth mentioning from the teachers' vantage points. The developed interview guide was reviewed and verified by an EFL teacher with respect to the degree to which it reflected the framework of teacher professional identity presented by Varghese et al.

(2005) and could extract the required information to develop the teachers' PIP of TEIs (Appendix A).

2.4. Procedure

Prior to the administration of semi-structured interviews, the researchers attempted to expose teachers to TEIs to gain deeper and more insightful information on their PIP of TEIs. Therefore, web-enhanced learning instruction (WELI), enriched virtual blended learning instruction (EVBLI), and purely online learning instruction (POLI) were selected as three types of TEI. The first teacher implementing the WELI attended all the sessions at pre-specified times physically. It is worth mentioning that this class was conducted before the COVID-19 outbreak in Iran. The second teacher followed the EVBLI, which included three in-class and two online sessions using Adobe Connect as the virtual learning platform. With the initial traces of COVID-19 in Iran, tentative perspectives regarding the current situation allowed the second teacher to hold the EVBLI class, which only required a few in-class sessions. The third teacher implemented the POLI taking advantage of the Adobe Connect platform to mediate all five sessions online during the obligatory closure of universities.

Finally, after teachers' concrete experience of implementing TEIs, semi-structured interviews were administered using the designed semi-structured interview guide that included three sections. The first section aimed at easing the teachers to approach the main discussion by asking relatively straightforward questions that sought teachers' initial reflections on the PIP of TEIs. The second section included the main questions addressing personal, professional, situational, and contextual aspects of the PIP of TEIs. This section was the most productive part of the interview as the researchers could achieve a greater depth of teachers' insights in this respect. The closing section provided an opportunity for teachers to express the issues that were not tackled by the researcher and were still worth mentioning from teachers' vantage points. To manifest the ethical considerations of the study, the participants were reminded about the issues of anonymity and confidentiality. The researchers explained that participants' identities would be protected using pseudonyms while coding the interview data and reporting the findings. Furthermore, the participants were ensured that the recorded interviews would be used for the purpose of the present research only. Finally, teachers' permission to audio-record the interviews was obtained. Each interview lasted about 90 minutes and was audio-recorded. The interviews were conducted in the teachers' mother tongue, i.e., Farsi, and then translated into English.

2.5. Data Analysis

A thematic approach was employed to analyze the qualitative data collected from the participants' interviews. To perform thematic analysis, the present study followed Braun and Clarke's (2006) six-step framework including becoming familiar with the data, generating initial codes, searching for themes, reviewing themes, defining themes, and writing up. Subsequently, the researcher emailed all the interview findings to the teachers and requested them to perform member-checking by determining the accuracy of obtained findings to decrease the incidence of incorrect data and inappropriate interpretation of data. The participants affirmed that the presented findings reflected their views, feelings, and experiences. Consequently, the study can be claimed to have credibility following member-checking.

Then, researchers developed a PIP inventory of TEIs taking advantage of the information obtained from the literature review and the interviews administered following the actual implementation of TEIs. As there was no inclusive inventory focusing on teachers' PIP of TEIs, the researchers employed a number of relevant dissertations and scholarly papers (for instance Aksyah et al., 2021; Trust & Whalen, 2020; Winter et al., 2021, etc.). Then, the piloting phase was performed online over eight days and involved 13 teachers from the target sample. Six male and seven female EFL teachers participated in the pilot phase. Valuable feedback provided by the participants led to the improvement of the initial version of the inventory. The final version of the PIP inventory of TEIs included three main sections (Appendix B). The first section consisting of items 1-9 aimed at gathering demographic information. The second section comprised items 10-19, for which a five-point Likert scale was used to specify the levels of agreement with a statement, from low to high with one neutral option. The third section entailed items 20-55, for which a five-point Likert scale was used to determine the levels of agreement with a statement, from disagree to agree with one neutral option.

To evaluate the content validity of the PIP inventory of TEIs, the expert judgment method was used. According to Rubio (2005), a minimum of three expert reviewers in the process of content validation seem to be the standard. The reviewers' experience, research output, and field-related qualifications were taken into account in the selection of reviewers. Thus, two doctoral candidates in TEFL from Al-Zahra University and one TEFL instructor from Ardabil University provided their recommendations regarding any required changes as well as their feedback on ambiguities, repetitions, errors, etc. The reviewers' responses were

received within seven days. As no concerns were raised in this process, all three reviewers, overall, acknowledged the content validity of the PIP inventory of TEIs. Considering the subjective nature of the content validity assessment process, an exploratory factor analysis was performed to address the construct validity of the PIP inventory of TEIs.

The PIP inventory of TEIs was filled out by 157 teachers to determine its construct validity. It is worth mentioning that the main items of this inventory included 36 items (items 20-55). Items 1-9 are basic and demographic ones, and items 10-19 are single ones that are not dimensioned and only surveyed participants about the degree of technology access in the society and EFL classes, technology use in personal and professional life, etc. In other words, the first 19 items gathered some demographic and general information about teachers, their teaching context, learners, colleagues, etc., and were not considered in the Principal components analysis (PCA). Therefore, 36 items of the inventory were subjected to PCA using SPSS Version 26. Prior to performing PCA, the suitability of data for factor analysis was assessed by running the Kaiser-Meyer-Olkin (KMO) test of Sampling Adequacy and Bartlett's Test of Sphericity. In addition, Principal Axis Factoring was used to extract the factors by calculating the eigenvalues greater than 1.0. Scree plot and Kaiser's criterion were employed to specify the number of factors to extract. Factor rotation was done using Varimax (orthogonal rotation) with Kaiser Normalization as it attempts to minimize the number of variables that have high loadings on each factor. PCA revealed the presence of nine components that will be discussed in detail in the findings section. Furthermore, Cronbach's Alpha test was used to confirm the reliability of the inventory.

3. Results

3.1. Findings from Teacher Participants' Interviews

3.1.1 Personal aspects of teachers' PIP of TEIs

In the present study, both pertinent literature and the findings of interviews accentuated the role of personal aspects of teachers' PIP of TEIs. The ensuing sub-sections provide evidence to showcase each of the recognized personal aspects in the interview. Pseudonyms were used to ensure participants' anonymity.

3.1.1.1. Gender

Analyses of the interviews indicated that gender was one of the main personal aspects of teachers' PIP of TEIs. For instance, Zahra stated:

Both female and male teachers use new technologies in their classes regardless of their gender. It would be unreasonable to think that one specific gender uses educational technologies more than the other.

3.1.1.2. Age

Given the findings obtained from the analyses, all three teacher participants provided consistent perspectives indicating the role of teachers' age as a personal aspect of the PIP of TEIs. For instance, one of the teachers expressed that:

In my opinion, age seems to be associated with teachers' use of technologies in classes.

3.1.1.3. Personal use of technological facilities

The teachers acknowledged that the use of any technology devices outside the classrooms to pursue personal goals should be taken into consideration as a personal aspect of the PIP of TEIs. In this regard, Sara admitted that:

In other words, I can say the presence of technology, computer, and Internet [sic.] in my and any other teachers' personal life may affect their utilization in teachers' professional life, as well.

3.1.1.4. Technology-related skills to pursue personal interests

Another personal aspect of teachers' PIP of TEIs was their skill in the use of technologies in their personal life. The mentioned aspect was exemplified in Zahra's words who stated that:

I think teachers' higher skill in the use of technologies to follow personal affairs such as communicating with friends, searching areas of interest, and making videos may affect their use of new TEIs in their teaching.

3.1.1.5. Confidence in the use of technological facilities in personal life

Confidence in the use of technologies to meet personal objectives was another sub-aspect specified under the personal aspect. The mentioned point was captured in the expression of one of the teachers:

As far as I think, higher technology-related confidence provides adequate [sic.] incentive to implement TEIs. The higher degree of personal uses of technology may be associated with higher [sic.] degree of confidence.

3.1.2. Professional aspects of teachers' PIP of TEIs

This section presents the recognized underlying professional aspects of teachers' PIP of TEIs with sample instances of teachers' statements supporting each aspect.

3.1.2.1. Years of teaching experience

Participant teachers in their interview indicated that years of experience may affect teachers' PIP of TEIs. For instance, Maryam put her perspective as follows:

> *Novice or experienced teachers' tendency to employ novel educational technologies in their classes may vary to a great degree; however, I cannot definitely tell you which group (experienced or novice teachers) employs technology-based instruction more and better.*

3.1.2.2. Academic degree

Another aspect that emerged from the data was the significant role of the academic degree in teachers' PIP of TEIs. For instance, Zahra explained that:

> *Teachers with higher academic degrees might employ more TEIs as they might have conducted some studies in this respect as part of their educational programs in higher degrees.*

3.1.2.3. Experience of using technological facilities to pursue professional interests

The teacher participants also mentioned the role of any previous experiences in the implementation of TEIs. According to one of the teachers:

> *I believe if opportunities were provided for teachers to integrate some novel technologies into their classes and if they had a successful experience in this regard, they would be more enthusiastic to pursue such efforts in future [sic.].*

3.1.2.4. Confidence in the use of technological facilities in professional life

In the interview sessions, the participants were quite clear in their perspectives on how a lack of confidence can affect their use of TEIs. A comment by Zahra suggested that:

> *In my opinion, teachers having enough backbone to try new technologies in their classes may be more successful integrators of these technologies. Some of us as teachers are really unconfident and afraid of using technologies in our classes.*

3.1.2.5. Technology-related skills to pursue professional interests

Skill in the use of technology in professional settings, broadly, was believed to be another aspect. Zahra, for instance, remarked that:

> *EFL teachers' lack of technology-related skill may negatively affect their use of technology in classes. Maybe, not being technology, computer, and Internet smart discourages some teachers from using new educational technologies.*

3.1.2.6. Perceptions on the efficacy of TEIs

In line with the evidence provided in the literature addressing the role of attitudes in the diffusion and success of TEIs, the participants also referred to this issue. Zahra provided her viewpoint as follows:

> *Sometimes, teachers think that TEIs in their classes waste the time of their class [sic.]. On the other hand, some teachers really like to experience TEIs and pedagogical innovations.*

3.1.2.7. Pedagogical beliefs on teaching

Captivatingly, the data revealed that teachers' pedagogical beliefs on teaching may be a significant aspect in affecting their classroom practices in general and integration of TEIs in particular. Participant teachers stated that two main approaches can be followed in the teaching process, namely traditional and constructive-oriented teaching approaches. In Mayram's words:

> *I always do my best to integrate any new materials to follow the principles of constructive-oriented teaching approach in my EFL classes. Two main tenets of this approach, in my view, are utilization [sic.] of authentic materials and improvement of learners' autonomous learning, which could be easily obtained by integration [sic.] of more novel technology-based materials.*

3.1.2.8. Perception of the role and responsibility of teachers in EFL classes

Teachers' perception of their role and responsibility was mentioned by all three teachers. For instance, Zahra mentioned that:

> *Technology-based instructions, as far as I think, may lead to a change in teachers' role. I absolutely believe that TEIs follows [sic.] teaching processes that assigns [sic.] a facilitator role to teachers.*

3.1.3. Situational aspects of teachers' PIP of TEIs

In this section, the situational aspects that are supposed to affect teachers' PIP of TEIs are dealt with. The analysis of interview data revealed 11 sub-aspects, which are more than the sub-aspects of the other three main aspects.

3.1.3.1. The type of the TEFL university

The participants declared that the type of universities should be treated as an influential aspect of the present discussion. They categorized universities as public and private and stated the effect of the type of university on teachers' implementation of TEIs. One of the teachers noted that:

> *As far as I am familiar with the types of universities, i.e. either public or private, I think that either type of universities not only equip their classes with facilities such as projectors but also have a computer lab and internet connectivity. However, the degree to which these facilities are dynamically employed to pursue teaching objectives is dubious from my point of view.*

3.1.3.2. The location of the TEFL university

Another sub-aspect was the location of the TEFL universities. In this respect, teacher participants stated that facilities provided in universities in different cities differ significantly. Sara expressed her idea as follows:

> *I strongly believe that the location of the university can be regarded as a determinant factor in the integration of new technologies into EFL classes. Certainly, the type of facilities provided in well-known universities, which are mostly located in metropolises, cannot be compared with that of a small city.*

3.1.3.3. The current level of access to technological facilities

The main concern discussed by the participants in this regard was the inadequate infrastructure for implementing TEIs. According to Sara:

> *If teachers have a high level of access to a wide variety of educational technologies, such abundance would provide some kind of inspiration for teachers to integrate new technology-based instructions into their classes.*

3.1.3.4. Class size

All three teachers accentuated that the application of TEIs in large-size classes is very burdensome. Zahra expressed that:

> *The large number of learners on the one hand requires more technology-based teaching tools in the classroom and on the other hand requires allocation of further time to perform technology-based activities in the classroom. I think frustration and bewilderment will be the ultimate outcomes of integrating educational technologies into large-size classes.*

3.1.3.5. Professional development programs addressing the implementation of TEIs in EFL classes.

Teacher participants highlighted the role of in-service or pre-service educational technology training programs in the application of TEIs. Maryam clarified her opinion on this issue by noting:

> *I think holding technology-based professional development programs for teachers can pave the way for productive incorporation of technologies into EFL classes. Some of us as teachers are really afraid of using technologies in our classes that may originate from the lack of any professional development program in this regard.*

3.1.3.6. The policy conditions regarding TEIs implementation in the EFL teaching context

The other sub-aspect was the lack of any national and institutional policy in this respect. In Sara's words:

> *Well, it seems that as university administrators in Iran cannot provide technology-rich classes and do not oblige teachers to follow any specific large-scale technology integration policy in the educational settings, we can conclude that the university policy does not play any significant role in the utilization of new technologies in our EFL classes.*

3.1.3.7. Other teachers' pedagogical views and interpretations of EFL teaching

The interview data also indicated that participant teachers take into consideration other teachers' interpretation of EFL teaching as an aspect influencing their use of TEIs. Maryam said:

> *Fortunately, TEFL teachers, in my opinion, always strive to enrich their teaching environment. In this regard, utilization of novel materials in teaching English has*

always been attended to by EFL teachers. There is a chain reaction in this respect, I think. Observing other teachers following constructive-oriented teaching approach and consequently TEIs in their classes affects the way I hold my own classes.

3.1.3.8. Teachers' perception of the efficacy of TEIs in TEFL settings

In line with numerous studies provided in the pertinent literature, the teacher participants in the present study also addressed the role of attitudes toward the effectiveness of TEIs on the teaching process. Sara, for instance, accentuated the central role of teachers' attitudes in this respect.

Attitudes toward the integration of technologies seem to play a significant role in their success or failure in teaching environments. Some see the necessity of non-technology instructions while others disagree with them and state that integration of technologies into education is the need of hour.

3.1.3.9. Learners' perception of the efficacy of TEIs in TEFL settings

The role of learners' attitudes toward TEIs in teachers' integration of such technologies was another sub-aspect identified by teachers. Maryam believed in learners' neutral attitudes toward educational technologies as she said:

Without any real exposure to educational technologies, it can be conjectured that learners may hold mixed attitudes about the effectiveness of these technologies in improving their learning.

However, Sara and Zahra expressed that learners have positive and negative opinions in this regard, respectively. Sara mentioned that:

As it is apparent, the present generation of EFL learners is mostly acquainted with various kinds of technologies. This familiarity will have a positive effect on their attitude toward the efficacy of technology in education.

In contrast, Zahra said:

Recently, I notice that some learners complain about the inappropriate use of some technology-based instructions by their teachers.

3.1.3.10. Learners' skills to use technological facilities

Teacher participants identified learners' high knowledge of novel technologies as an aspect of the integration of TEIs into educational settings. In this respect, Sara stated that:

As it is apparent, the present generation of EFL learners is mostly acquainted with various kinds of technologies. I can claim that our EFL learners are knowledgeable and skilled in the use of new technologies that can affect teachers' use of TEIs.

3.1.3.11. Other teachers' skills to use technological facilities

The final contextual sub-aspect was the other teachers' skill to use technology-based sources. The interview findings revealed that teacher participants considered the presence of teachers with a high level of skill in the utilization of technological tools can act as an incentive for others to improve their technology-related skills. One of the teachers expressed that:

The widespread use of technological facilities by my colleagues is indicative of their good degree of skill in this regard. As a teacher, when I notice that they take advantage of more novel materials in their classes, I do my best not to lag behind them.

3.1.4. Contextual aspects of teachers' PIP of TEIs

The final main aspect aimed at presenting the contextual sub-aspects that may affect teachers' PIP of TEIs.

3.1.4.1. The current level of access to technological facilities in society

One of the contextual aspects was the lack of public technology-based infrastructures in Iran. In this respect, Sara mentioned:

It seems we have serious concerns with respect to technology-based infrastructures in Iran and sometimes we confront serious problems regarding broadband internet access, WIFI services, and unavailability of some specific web links that are blocked.

3.1.4.2. Perception of the society toward the efficacy of TEIs

The analyses of the interview data revealed the perception of the society toward TEIs as another contextual sub-aspect explained by Maryam as follows:

In the discussion of attitudes toward technology use, two divergent categories of views can be mentioned. The first category is the young generations' perspective that always appreciates the presence of technological devices in their personal life. I think although this generation may have very limited experience of technological

tools in educational settings, they may be more enthusiastic about the presence of technological devices in the educational settings. The second category is the older generations' perspective. Although this group in our society can also be considered as active users of some technological devices such as smart phones, they may believe in traditional methods of teaching without the presence of any technological devices in educational settings.

3.1.4.3. The expectations of society from TEFL teachers

The participant teachers mentioned that the way the society defines the responsibility of TEFL teachers affects teachers' use of new technologies in their classes; however, expectations from TEFL teachers cannot be definitely determined. The role of the expectations of society from TEFL teachers in affecting EFL teachers' classroom practices including their use of TEIs was the final contextual sub-aspect. Sara said:

As far as I as an EFL teacher have experienced, a good EFL teacher is a teacher with native-like accent and fluency. Moreover, I regret to say that sometimes the society thinks that teacher's main duty in class in transition of knowledge. When our target population expects us to be a fluent speaker and a knowledge-transmitter [sic.], we have to respond to their expectation; otherwise, we would be considered as an illiterate EFL teacher. In contrast, I think that an EFL teacher should be a facilitator who guides the learners to obtain their needs.

3.2. Psychometric Qualities of the Inventory

3.2.1. Construct validation

The 36 items of the inventory were subjected to PCA using SPSS Version 26. Prior to performing PCA, the suitability of data was assessed. Evaluation of the correlation matrix indicated the presence of many coefficients of 0.3 and above. As Table 1 indicates, the KMO value was more than 0.6 (i.e., 0.74) (Kaiser, 1974). In addition, the significance level for Bartlett's Test of Sphericity was less than 0.05 (i.e., 0.00) (Bartlett, 1954). The mentioned results indicated that the data were qualified for factor analysis.

Table 1. *KMO and Bartlett's Test for Teachers' Inventory*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.74
Bartlett's Test of Sphericity	Approx. Chi-Squared	4821.53
	Df	36
	Sig.	.00

Subsequently, PCA revealed the presence of nine components with eigenvalues exceeding 1, explaining 18.58, 13.45, 12.09, 8.76, 7.64, 6.02, 5.69, 3.36, and 3.20 % of the variance, respectively (See Table 2).

Table 2. *Total Variance Explained for Teachers' PIP Inventory of TEIs*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.69	18.58	18.58	6.69	18.58	18.58	5.08
2	4.84	13.45	32.04	4.84	13.45	32.04	3.59
3	4.35	12.09	44.14	4.35	12.09	44.14	3.47
4	3.15	8.76	52.90	3.15	8.76	52.90	3.70
5	2.75	7.64	60.55	2.75	7.64	60.55	3.92
6	2.16	6.02	66.57	2.16	6.02	66.57	3.20
7	2.04	5.69	72.26	2.04	5.69	72.26	3.49
8	1.21	3.36	75.63	1.21	3.36	75.63	3.61
9	1.15	3.20	78.83	1.15	3.20	78.83	3.78
10	.85	2.37	81.21				
11	.73	2.05	83.26				
12	.65	1.81	85.08				
13	.60	1.69	86.77				
14	.50	1.40	88.17				
15	.44	1.22	89.39				
16	.41	1.15	90.55				
17	.38	1.05	91.60				
18	.36	1.00	92.61				
19	.31	.87	93.48				
20	.27	.76	94.24				
21	.23	.65	94.90				
22	.21	.60	95.51				
23	.20	.56	96.07				
24	.17	.48	96.56				
25	.16	.45	97.01				
26	.14	.40	97.41				
27	.14	.39	97.80				
28	.13	.36	98.17				
29	.11	.32	98.49				
30	.11	.31	98.80				
31	.09	.26	99.07				
32	.09	.25	99.32				
33	.08	.22	99.55				
34	.05	.15	99.71				
35	.05	.15	99.86				
36	.04	.13	100.00				

Extraction Method: Principal Component Analysis.

When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

To show that the nine extracted components did not correlate strongly, the data related to the component correlation matrix is provided as well. Table 3 shows the correlation among the nine factors. The minimum correlation was between F8 and F2 (r=0.28), and the maximum correlation was between F9 and F4 (r=0.63).

Table 3. *Correlation Matrix*

	F1	F2	F3	F4	F5	F6	F7	F8	F9
F1	**0.766**								
F2	0.330	**0.485**							
F3	0.310	0.400	**0.689**						
F4	0.480	0.560	0.120	**0.845**					
F5	0.570	0.370	0.360	0.310	**0.742**				
F6	0.460	0.330	0.300	0.420	0.440	**0.564**			
F7	0.600	0.430	0.440	0.380	0.450	0.290	**0.673**		
F8	0.390	0.280	0.280	0.450	0.370	0.440	0.410	**0.495**	
F9	0.360	0.360	0.350	0.630	0.510	0.450	0.390	0.380	**0.454**

It should be noted that the extracted variance of each factor is greater than the correlation of that factor with other factors. Moreover, according to Table 4, the findings of the discriminant validity revealed that the average variance extracted (0.635) is greater than the total correlation square (0.632). Therefore, discriminant validity is established.

Table 4. *Discriminant Validity Assessment*

	F1	F2	F3	F4	F5	F6	F7	F8	F9	AVERAGE
AVERAGE LOADING	0.875	0.697	0.830	0.919	0.862	0.751	0.821	0.704	0.674	0.792
VARIANCE EXTRACTED	0.766	0.485	0.689	0.845	0.742	0.564	0.673	0.495	0.454	0.635
CORRELATION SQUARE	0.632									

Similarly, an inspection of the scree plot revealed a clear break after the ninth component, which indicated the presence of nine components (Fig. 1).

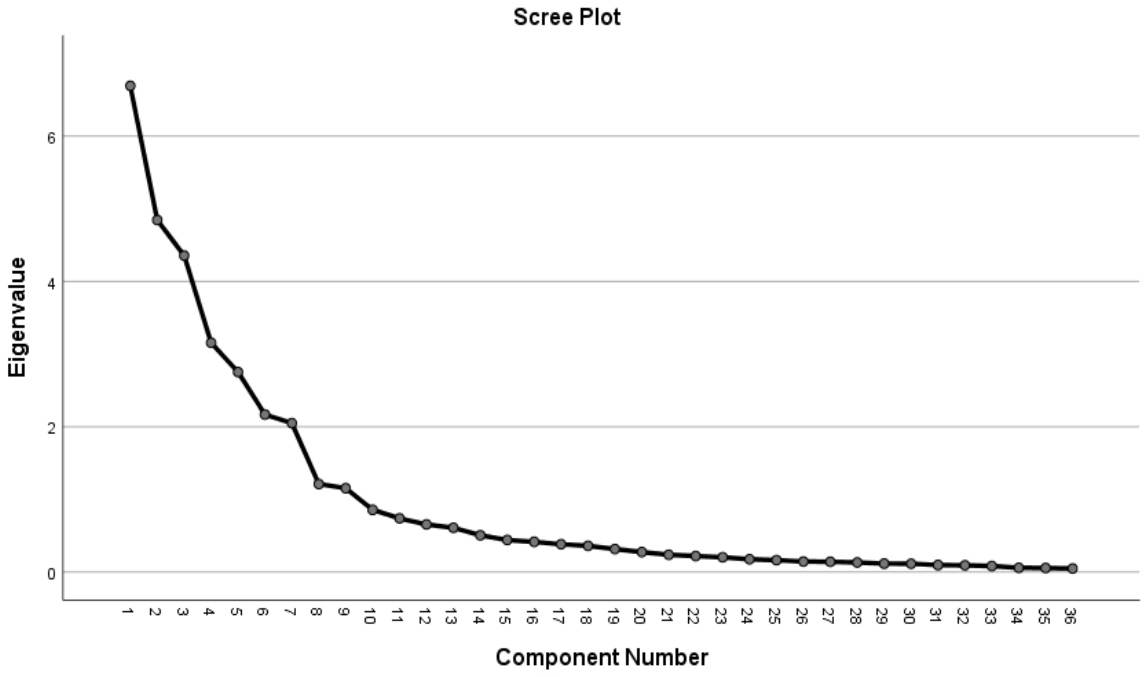

Figure 1. *The Scree Plot of the PCA for Teachers' PIP Inventory of TEIs.*

Moreover, the actual eigenvalues from the PCA and criterion ones from the parallel analysis program were compared to come up with the exact number of the underlying factors (See Table 5).

Table 5. Very Simple Structure (Number of Factors)

		Very Simple Structure (VSS)				
	Rotation	Factoring method	Max VSS complexity 1	N factors complexity 1	Max VSS complexity 2	N factors complexity 2
Values	Varimax	pc	.918	9	.988	12

The nine-factor solution explained a total of 78.83% of the variance. Oblimin with Kaiser Normalization was then run to provide information about the degree of correlation between the factors and facilitate the interpretation of the obtained nine factors. A number of strong loadings were indicated by the rotated solution. According to the results, items 44, 45, 46, and 47 were loaded on the first factor or component, i.e., the efficacy of TEIs from the perspective of the society. Items 24, 25, 26, and 27 were loaded on the second factor, i.e., teachers' pedagogical beliefs on teaching. Items 36, 37, 38, and 39 were loaded on the third component, i.e., the efficacy of TEIs from colleagues' perspectives. Items 40, 41, 42, and 43

were loaded on the fourth component, i.e., the efficacy of TEIs from learners' perspectives. Items 32, 33, 34, and 35 were loaded on the fifth component, i.e., colleagues' pedagogical beliefs on teaching. Items 28, 29, 30, and 31 were loaded on the sixth component, i.e., teachers' role and responsibility in EFL classes. Items 52, 53, 54, and 55 were loaded on the seventh component, i.e., the policy conditions regarding TEIs in EFL teaching contexts. Items 20, 21, 22, and 23 were loaded on the eighth component, i.e., the efficacy of TEIs from the perspective of teachers themselves. Items 48, 49, 50, and 51 were loaded on the ninth component, i.e., the expectations of society from EFL teachers. It must be mentioned that items 49 and 53 were cross-loaded on two components, and items 23 and 51 were cross-loaded on three components. First, these items were modified in terms of wording and then upon careful logical consideration and based on the researchers' initial decision regarding the factor to which each item belonged, it was considered appropriate to count item 23 with factor 8, items 49 and 51 with factor 9, and item 53 with factor 5. Hence, regarding the cross-loaded items, each item was considered to load on the factor that was already theorized (Table 6).

Table 6. *Pattern Matrix[a] for Teachers' PIP Inventory of TEIs*

	Component								
	1	2	3	4	5	6	7	8	9
Item 20								.865	
Item 21								-.876	
Item 22								.663	
Item 23		.466	-.317					.411	
Item 24		.856							
Item 25		-.845							
Item 26		-.730							
Item 27		.586							
Item 28						-.794			
Item 29						.665			
Item 30						-.706			
Item 31						.840			
Item 32							.752		
Item 33							-.866		
Item 34							-.808		
Item 35							.856		
Item 36			-.814						
Item 37			.830						
Item 38			-.868						
Item 39			.809						
Item 40				-.876					
Item 41				.956					
Item 42				-.949					
Item 43				.896					
Item 44	-.814								
Item 45	.931								
Item 46	-.880								
Item 47	.875								
Item 48									.798
Item 49	.308								.705
Item 50									.784
Item 51	-.355				.319				.408
Item 52					-.895				
Item 53					.772				.317
Item 54					.876				
Item 55					-.903				

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization[a].

a. Rotation converged in 11 iterations.

Figure 2. *demonstrates the measurement model and the relationships between factors and variables.*

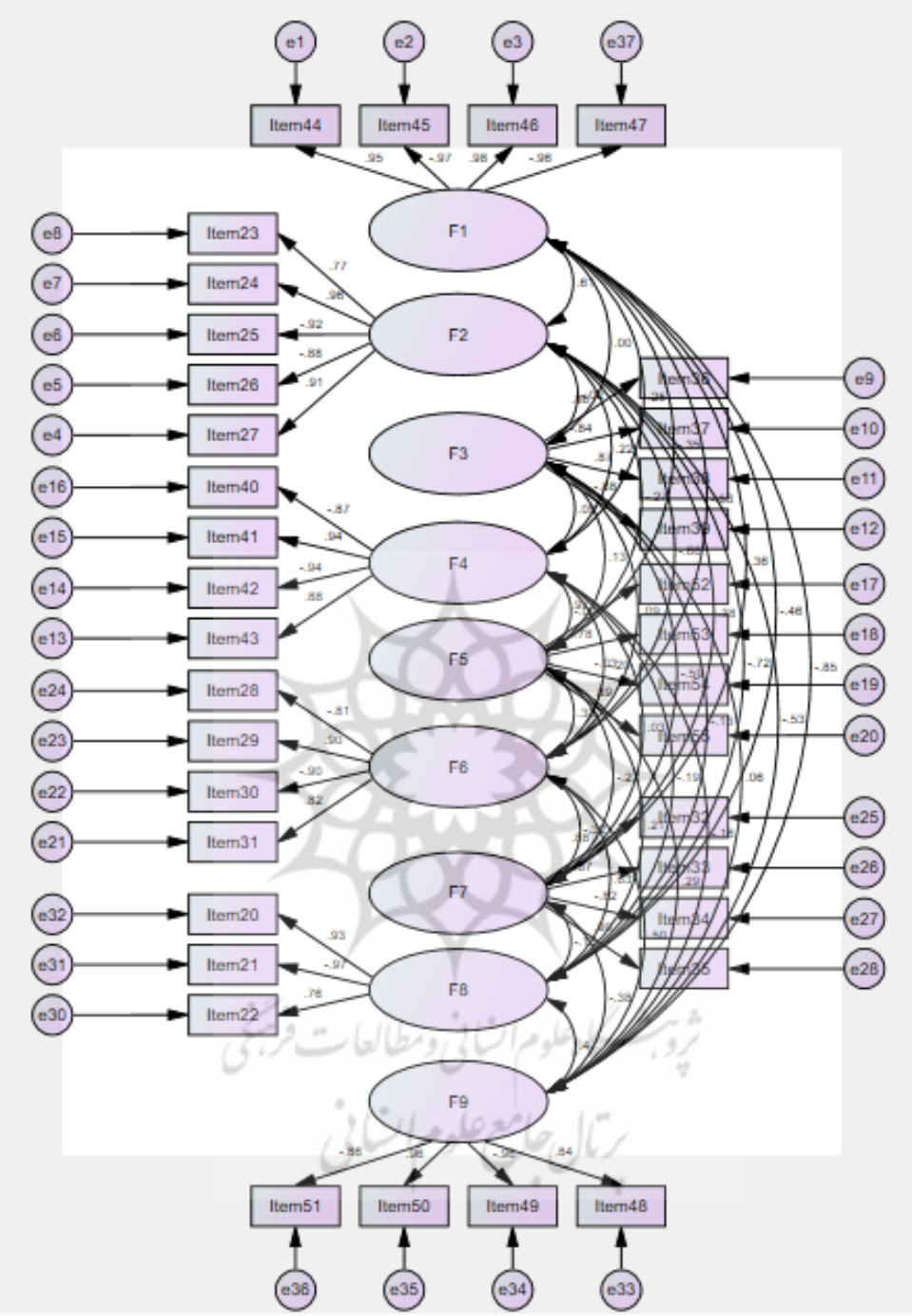

Figure 2. *The Measurement Model and the Relationships between Factors and Variables*

Confirmatory factor analysis (CFA) as a statistical technique was used to verify the factor structure of the observed variables. CFA allowed the researchers to test the hypothesis that the relationship between observed variables and their underlying latent constructs

existed. The results of CFA indicated that the internal correlation of each of the items in the desired dimensions was significant (P-value < 0.05) (Table 7).

Table 7. *Regression Weights: (Group Number 1 - Default Model)*

			Estimate	S.E.	C.R.	P-value
Item 44	<---	F1	1.000			
Item 45	<---	F1	-1.086	.029	-37.444	***
Item 46	<---	F1	1.099	.028	39.864	***
Item 27	<---	F2	1.000			
Item 26	<---	F2	-.857	.039	-22.035	***
Item 25	<---	F2	-.889	.036	-24.748	***
Item 24	<---	F2	1.013	.035	29.082	***
Item 23	<---	F2	.709	.043	16.470	***
Item 36	<---	F3	1.000			
Item 37	<---	F3	-1.128	.068	-16.589	***
Item 38	<---	F3	1.116	.063	17.637	***
Item 39	<---	F3	-1.129	.063	-17.921	***
Item 43	<---	F4	1.000			
Item 42	<---	F4	-1.107	.049	-22.712	***
Item 41	<---	F4	1.007	.043	23.169	***
Item 40	<---	F4	-1.009	.052	-19.319	***
Item 52	<---	F5	1.000			
Item 53	<---	F5	-.648	.038	-16.969	***
Item 54	<---	F5	-.826	.055	-15.018	***
Item 55	<---	F5	.804	.037	21.971	***
Item 31	<---	F6	1.000			
Item 30	<---	F6	-1.158	.066	-17.513	***
Item 29	<---	F6	1.092	.063	17.307	***
Item 28	<---	F6	-.896	.060	-14.870	***
Item 32	<---	F7	1.000			
Item 33	<---	F7	-.950	.051	-18.613	***
Item 34	<---	F7	-1.015	.060	-16.855	***
Item 35	<---	F7	1.026	.051	19.964	***
Item 22	<---	F8	.774	.048	16.141	***
Item 21	<---	F8	-1.187	.040	-29.327	***
Item 20	<---	F8	1.000			
Item 48	<---	F9	1.000			
Item 49	<---	F9	-1.557	.073	-21.465	***
Item 50	<---	F9	1.477	.070	21.158	***
Item 51	<---	F9	-1.062	.061	-17.537	***
Item 47	<---	F1	-1.025	.029	-35.665	***

The results of the goodness of fit revealed that almost all indicators were within the specified range, thereby confirming the model fit (X2/df= 2.64) (See Table 8).

Table 8. *Goodness of Fit*

GFI	RFI	IFI	TLI	RMSRA	NFI	CFI	X^2/df
0.865	0.906	0.986	0.970	0.066	0.929	0.985	2.64
>0.9	>0.9	>0.9	>0.9	<0.08	>0.9	>0.9	<3

Measurement invariance as a statistical property of measurement was used to study whether the given construct was interpreted in a conceptually similar manner by respondents representing different groups. Measurement invariance existed because of the non-significance metric invariance test (p=0.523). Thus, the meaning of our constructs was the same across groups (Table 9-11).

Table 9. *Nested Model Comparisons Assuming Model Unconstrained to Be Correct*

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	27	25.915	.523	.003	.003	-.003	-.004
Structural covariance	72	77.201	.316	.008	.009	-.007	-.008
Measurement residuals	111	122.008	.224	.013	.015	-.010	-.012

Table 10. *Nested Model Comparisons Assuming Model Measurement Weights to Be Correct*

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural covariance	45	51.286	.241	.006	.006	-.004	-.005
Measurement residuals	84	96.093	.173	.010	.012	-.007	-.008

Table 11. *Nested Model Comparisons Assuming Model Structural Covariance to Be Correct*

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement residuals	39	44.807	.241	.005	.006	-.003	-.004

The findings of the measurement invariance testing showed that there was no significant difference between female and male participants, thereby being invariant (p-value>0.05) (Table 12).

Table 12. *Measurement Invariance Testing*

	Chi-squared	df	p-value	Invariant?
Overall Model				
Unconstrained	2583.5	1110		
Fully constrained	2666.4	1178		
Number of groups		2		
Difference	82.9	68	0.105	YES

3.2.2. Internal consistency. Internal reliability addresses the consistency of a given measure within itself. Cronbach's coefficient, represented as alpha (α), was used in this study. Considering the cut-off points presented by Hinton, Brownlow, McMurray, and Cozens (2004), the reliability of 0.77 obtained in this study indicated a high reliability level (Table 13).

Table 13. *Reliability of the PIP Inventory of TEIs*

Item	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Total	0.77	0.76	36
Factor 1	0.80	0.81	4
Factor 2	0.83	0.84	4
Factor 3	0.72	0.76	4
Factor 4	0.78	0.80	4
Factor 5	0.70	0.72	4
Factor 6	0.75	0.76	4
Factor 7	0.81	0.82	4
Factor 8	0.76	0.77	4
Factor 9	0.71	0.73	4

4. Discussion

It is worth mentioning that the items in the inventory were categorized according to the type of responses they were supposed to elicit to facilitate the process of answering the items. However, as the present study aimed at following the framework of professional identity, it

seems more logical to exploit the same framework addressing the personal, professional, situational, and contextual landscapes.

4.1. The Personal Landscape

The first category addressing the personal landscape comprised teachers' gender, age, the degree of technology-related skills and confidence to pursue personal interests, and the degree of personal use of technological devices and facilities. The findings with respect to the personal landscape were in line with findings reported in a number of studies including Alea et al. (2020), Garzón Artacho et al. (2020), Makawawa et al. (2021), Rahayu and Wirza (2020), and Rasmitadila et al. (2020).

With respect to the gender aspect, it can be expressed that the implementation of TEIs in EFL classes can be either gender-neutral or gender-biased. The distinction between psychological and biological gender is illuminative in this respect. The former is related to an individual's level of femininity or masculinity regardless of their biological gender (Banaszkiewicz, 2022). There is the possibility of existing power relations in Iranian society in favor of men (Davoodi, Fatehizade, Ahmadi, & Jazayeri, 2019), as a result of which Iranian culture and consequently educational settings might consider the application of new technological facilities as gender-dependent.

In addition, a number of items in the inventory addressed teachers' age as well as their degree of use, skill, and confidence in using technological facilities to pursue personal interests. These findings can be justified considering the terms 'digital natives' and 'digital immigrants'. According to Prensky (2001), digital natives belong to a generation that is born into and grown up in the digital world, is surrounded by technological tools, and spends their entire time using technological devices. Younger teachers can be regarded as digital natives grown up and immersed in technologically-rich settings. In contrast, teachers who are middle-aged or above as digital immigrants are not born into the digital world but have, sooner or later, implemented many of the novel technological devices in their lives. To put it in a nutshell, being digital natives or immigrants is associated with teachers' age and consequently seems to affect the degree of their use, skill, and confidence in using technological devices and facilities to pursue personal interests.

4.2. The Professional Landscape

The second category focusing on the professional landscape included teachers' teaching experience, their academic degree, teachers' perception toward the efficacy of TEIs as well as their skill, experience, and confidence in using technological devices and facilities to pursue professional interests, some of which are echoed in studies conducted by Aksyah et al. (2021), Alea et al. (2020), Garzón Artacho et al. (2020), Rasmitadila et al. (2020), and Trust and Whalen (2020). However, teachers' pedagogical beliefs on teaching and their perception of the role of teachers in EFL classes were less attended to in the literature. According to the researchers' knowledge, only Li, Garza, Keicher, and Popov (2019) surveyed 928 teachers regarding their pedagogical beliefs and some other variables to identify the predictors contributing to their technology implementation. This study found teachers' instructional approach as a more salient predictor of their technology use in class. Although the literature indicates endeavors in these areas, all the presented claims require further investigations to be supported by valid and generalizable findings, and it seems that the developed inventory can be employed to shed more light on the role and significance of the mentioned aspects in EFL teachers' implementation of TEIs.

Teachers' perception of the efficacy of TEIs was another aspect of this landscape. It is unquestionable that positive or negative attitudes toward TEIs can facilitate or hinder their implementation, respectively. The mentioned finding can be attributed to the role of teachers in EFL classes in the Iranian context. In spite of the noticeable participation of learners in classes, which promises the tendency toward more learner-centered classes, teachers are still the dominant characters in Iranian EFL classes. In line with this claim, Rahimi and Asadollahi (2012) rightly referred to the authoritative figure of teachers in Iran. Hence, teachers' attitudes should be accentuated as a vital component of TEIs application in the Iranian EFL context (Mustafina, 2016).

Teachers' pedagogical beliefs on teaching as well as their perception of the role of teachers can be discussed as two closely-related aspects. The unceasing struggle of Iranian teachers with various aspects of the EFL curriculum including unsuitable teaching materials has been documented in the literature (Rahimi & Nabilou, 2011). Teachers have to follow the traditional content of the EFL curriculum, which is in contrast with the requirements of technology use, and their pedagogical beliefs and roles are, to some extent, dictated by the governing curriculum (Gilakjani, Lai-Mei, & Ismail, 2013). However, despite the undeniable role of the curriculum in the specification of teachers' classroom practices, teachers believing

in the constructive-oriented teaching approaches and the more facilitative role of a teacher should make efforts to employ more TEIs. Therefore, to be able to integrate TEIs, first, a paradigm shift from behaviorism to constructivism, which will also change teachers' roles and responsibilities (Rezaeian, 2022), should be performed in Iranian EFL education; thereby teachers will have more freedom to reflect on their pedagogical beliefs and roles and can employ TEIs that are more in line with their personal pedagogical beliefs (Hosseini, 2016).

4.3. The Situational Landscape

Aspects of the situational landscape consisted of the type and location of the university, current level of access to various technological devices and facilities, class size, professional development programs, university policy conditions, other colleagues' interpretation of EFL teaching, colleagues and learners' perception on the efficacy of TEIs, and colleagues and learners' skills to use technological devices and facilities. Some aspects of the situational landscape including access to technological devices and facilities (Ramij & Sultana, 2020), class size (Ifinedo et al., 2020), professional development programs (Schlichter, 2020), university policy conditions (Mercader & Gairín, 2020), learners' skill and perception on the efficacy of TEIs (Namaziandost & Çakmak, 2020; Ozaydın Ozkara & Cakir, 2018) were investigated in the pertinent literature. It is worth mentioning that as aspects of the type and location of the university, colleagues' interpretation of EFL teaching, and colleagues' skill and perception of the efficacy of TEIs were particular findings of the current study, no study could be presented in this respect as far as the researchers are concerned.

The type and location of universities as well as the current level of access to technological facilities in universities are closely interwoven. Iran has a large network of public- and private-affiliated universities, each of which is funded by distinct resources. Unquestionably the type of university, which specifies its source of funding, can affect the equipment of universities with the required infrastructure to employ TEIs. Regarding the location of universities, it should be considered that cities in which the universities are located are distinct from one another in terms of the availability of technological facilities. For instance, the average speed of 26.16 Mbps has been reported for Tehran; however, dreadfully poor connection speeds can be a challenge in many other major cities such as Zanjan (7.70 Mbps) (Speedtest, 2022), which demonstrates that the location of universities must be regarded as an influential aspect.

With respect to class size, the official website of the *Ministry of Science Research and Technology* (MSRT) has reported the population of university students in 2019 to be approximately 3,375,000. As it is crystal clear, any increase in the university student population results in a higher student-teacher ratio with an increased learner-to-computer ratio.

As professional development programs seem to reflect the policy conditions in this respect, these two aspects appear to be closely associated. The government has initiated Iran's National Information and Communication Technology (ICT) Agenda, which has reported an ICT development program in higher education as one of its main goals (Kian, 2019). However, Fathi Vajargah and Azadmanesh (2007) stated that academic staff including teachers receives no organized ICT training programs that can advance their literacy to improve their performance in employing TEIs.

Another aspect addressed EFL teachers' perception regarding their colleagues' interpretation of EFL teaching, their technological skills, and perceptions of the efficacy of TEIs. Teachers working within a teaching context can be regarded as a community of practice (Yang, 2009). Social Cognitive Theory advanced by Bandura (2009) can be exploited within EFL teachers' community of practice as this theory states that learning is directly associated with the observation of other individuals participating within the target context. It seems that the beliefs, skills, and perceptions of teachers' counterparts can reinforce the implementation of TEIs in EFL classes.

Learners' technological skills and perception of the efficacy of TEIs were the other aspects of the situational landscape. One of the significant theories in ICT integration is the theory of diffusion of innovations (Rogers, 2003). In this theory, the persuasion stage is directly related to ICT users' attitudes. According to Albirini (2004), as new technologies are recently introduced to educational systems in most developing countries, studies should mainly address the persuasion stage. Moreover, regarding learners' skills in this respect, some studies have reported learners' lack of skills (Conti-Ramsden, Durkin, & Walker, 2010); however, it seems that learners are much more competent at present. Learners' higher levels of skills resulting from their immersion in a technologically-rich environment could be regarded as a facilitative aspect in the implementation of TEIs.

4.4. The Contextual Landscape

The contextual landscape included the availability of technological facilities in the society, the perception of the society toward TEIs, and the expectations of the society from EFL teachers. According to the literature review, few studies have addressed the first two aspects but not the last one. For instance, the availability of technological infrastructures in the society has been examined by Ramij and Sultana (2020). Moreover, members of the society, patents' support, and perception toward TEIs have been addressed by Aksyah et al. (2021). Hence, the aspects of the contextual landscape should be thoroughly examined in relation to the Iranian context.

Regarding the availability of technological infrastructure in the society, the 20-Year National Vision of Iran for 2025 presented by the website of the Ministry of Cooperatives Labour and Social Welfare accentuates the achievement of the first place in the area of technology in the Western South Asia region (Ministry of Cooperatives Labour and Social Welfare, 2020). In spite of the outstanding advances in the field of technology to meet the objectives of the mentioned vision, the average speed of Iranian Internet in 2021 has been reported to be 9.27 Mbps as compared to 52.60 Mbps reported for the global rate in this regard (Speedtest, 2021). Therefore, it can be conjectured that the poor infrastructure with the rank of 91 in regards to infrastructure (Akhondzadeh, 2017) can result in less implementation of TEIs in developing countries such as Iran.

With respect to the perception of the society toward the efficacy of TEIs as the second aspect of the contextual landscape, it can be claimed that the perception of the groups, i.e., teachers, learners, parents, administrators, policymakers, and even the entire society is a determinant factor in the successful implementation of TEIs in the Iranian education. One of the theories that can be presented in the discussion of the role of the society in affecting teachers' classroom practices is the Theory of Reasoned Action (TRA), which aims at illuminating the underlying fundamental motivation of an individual in performing an action. According to TRA, the central predictor of whether an individual performs the behavior or not is their intention to perform that behavior, which precedes the actual behavior (Montaño & Kasprzyk, 2015). In this regard, Fishbein (1967) has stated that one of the chief determining factors with respect to behavioral intentions is "subjective norms", which refers to the way the perception of pertinent groups including friends, colleagues, and family members can affect a person's intentions and behaviors. For instance, if EFL teachers believe that the application of TEIs is deemed acceptable from the society's perspective, their willingness to perform that behavior, i.e., the implementation of TEIs will increase.

The final aspect of the contextual landscape was the expectation of the society from EFL teachers. A transmission-oriented and positivistic approach is dominant in higher education programs in Iran (Farhady, Sajadi Hezaveh, & Hedayati, 2010). The mentioned approach marginalizes teachers' autonomy and creativity by following a mechanical framework (Richards & Rodgers, 2014). Therefore, it can be accentuated that the vision of the society in general and university stakeholders, in particular, should be changed, modified, and detached from the notion of transmission-oriented, method-based pedagogy at the university level to open the doors for the implementation of TEIs in the Iranian higher education setting.

5. Conclusion

The aim of the present study was to develop an inventory addressing EFL teachers' PIP of TEIs during the COVID-19 pandemic. In view of this, the 55-item PIP inventory of TEIs was developed. In addition, the study made an attempt to examine the reliability and construct validity of the PIP inventory of TEIs by collecting data from 157 teachers. The results of EFA indicated a nine-factor solution. Furthermore, the developed inventory enjoyed a high level of internal consistency ($\alpha = 0.77$). Regarding teachers' perceptions, various personal, professional, situational, and contextual aspects of professional identity were specified in relation to the implementation of TEIs, which could be addressed during and after the current pandemic. In this connection, the study provided a more holistic and realistic perspective that emerged from teachers' genuine and tangible statements following a practical implementation of TEIs. The reported findings on teachers' PIP of TEIs seem to be interconnected and establish a multifaceted web, which needs to be considered as a whole to avoid any ambiguities about the implementation of TEIs in the higher education system of Iran as a developing country. Although the obtained findings in the Iranian context could be generalized to any developing countries with comparable cultural and contextual characteristics during and even after the pandemic, it is recommended to conduct further studies in different contexts to validate this inventory.

Some limitations and caveats are worth mentioning with respect to this study. First, the effortful nature of the study obliged the researchers to involve three female EFL teachers selected using a purposive/non-probability sampling method. The limited number of participants and the participation of merely female teachers might affect the findings of the study. In addition, these teachers' characteristics might have had some effect on their answers

in the interview session, thereby influencing the items selected. Therefore, it seems that the participation of more teachers from both genders with specific attention devoted to their characteristics can provide more in-depth perspectives on the issue under investigation. Second, although the present study aimed at performing in-depth interviews to provide a more extensive and inclusive framework of aspects, it is still possible that some aspects of the professional identity regarding TEIs have been overlooked. Third, this study merely aimed at exposing the three teachers to some kind of TEI and then addressing their professional identity. Although the focus of this study was not on comparing the possible effect of different TEI contexts on teachers' PIP of TEIs, it will be more illuminative to perform studies addressing each of these different teaching contexts to confirm the obtained findings.

The implications of the study for teachers, administrators, and policymakers can be appealing during and after the COVID-19 pandemic. In this sense, EFL teachers' PIP of TEIs can provide valuable hints for syllabus designers and curriculum developers in teacher development programs to set the scene for familiarizing teachers with TEIs, augmenting their literacy and skill, and developing positive attitudes in this respect.

Furthermore, administrators should think about reforming the EFL higher education contexts in the post-COVID period as it seems that TEIs are going to keep on their indispensable presence in educational settings. Equipping the universities with a well-enhanced computer lab with high-speed Internet connectivity seems to provide more opportunities for teachers to offer TEIs. In addition, the EFL learners can move there to first gain some experience in the utilization of technological devices in their learning process. In case of obtaining remarkable achievements in various aspects of learning, the administrators will be convinced to make further attempts to equip all university classes with educational technologies.

Moreover, the findings of this study can inform university policymakers to offer more specific and detailed plans regarding the implementation of TEIs in Iranian higher in the post-COVID period.

In addition, the findings revealed the central role of a community of practice and society in teachers' implementation of TEIs in the EFL context during the pandemic. Hence, the MSRT is supposed to sensitize, educate, and raise the awareness of all stakeholders including the head of universities, the staff of universities, EFL learners, families, and the general public about the benefits and compulsion of adopting new TEIs in all educational settings in similar crises.

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The authors have no competing interests to declare that are relevant to the content of this article.

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Appendix A: Teacher Participants' Interview Guide

Section 1: Introductory question

a. Could you please introduce yourself (age, major, background, education)?
b. Could you please tell me your overall opinion on the role and effectiveness of TEIs in your English teaching?
c. Do you plan to use TEIs again in the future?

Section 2: Interview questions addressing personal and professional aspects

a. What personal aspects do you think affect your implementation of TEIs in your EFL classes?
b. What professional aspects do you think affect your implementation of TEIs in your EFL classes?
c. Do you think that your personal view and interpretation of EFL teaching and learning have any role in your implementation of TEIs in your EFL classes?

Section 3: Interview questions addressing situational aspects

a. Do you think that the situational aspects within the context in which you work has any role in your implementation of TEIs in your EFL classes?
b. Could you specify the situational aspects that affect your implementation of TEIs in your EFL classes?
c. What would be other teachers, management members, and students' roles in your implementation of TEIs in your EFL classes?

Section 4: Interview questions addressing external context aspects

a. Do you think that the contextual aspects (i.e. society including its cultural and socio-economic conditions) of the society within which you work has any role in your implementation of TEIs in your EFL classes?
b. Could you specify the contextual aspects of the society that affect your implementation of TEIs in your EFL classes?

Section 5: Closing question

Would you like to add anything else to this interview?

Appendix B: Final version of the PIP inventory of TEIs

Dear EFL instructor,

The present inventory addresses EFL teachers' professional identity perception (PIP) of technology-enhanced instruction (TEIs).

TEFL instructors holding a course in higher education will be surveyed in the present study. The inventory should take 20-25 minutes to complete. You are kindly required to put (□) in the box opposite to the statement that most suits your personal opinion. Participation in this study is voluntary and confidential.

Thank you for your cooperation.

A. This section of the survey aims at gathering demographic information. Read the items and select your response.

1. Age

Between 25 – 35 years ☐

Between 35 – 45 years ☐

Between 45 – 55 years ☐

Over 55 years ☐

2. Gender

Male ☐

Female ☐

3. Years of teaching experience at the university

Between 1 – 2 years ☐

Between 2 – 5 years ☐

Between 5 – 10 years ☐

More than 10 years ☐

4. The highest academic degree

Master's ☐

Ph.D. Candidate ☐

Ph.D. ☐

5. Please, choose only one type of TEFL institute in the higher educational system of Iran in which you have mostly been teaching.

State University ☐
Islamic Azad University ☐
Non-Profit Higher Education Institution ☐
Payam-e-Noor University ☐
Others ☐

6. Could you please specify the location of the university in which you have been mostly teaching?

Metropolis ☐
Capital of the province ☐
Town ☐

7. Please specify the average size of your EFL classes.

Less than 10 ☐
10-20 ☐
20-31 ☐
30-40 ☐
40-50 ☐
More than 50 ☐

8. A. Have you ever been engaged in pre-service or in-service professional development programs promoting your technology skills to pursue professional purposes?

Yes ☐ No ☐

B. If yes, please mention the duration of the program.

A few hours ☐
A single week ☐
A few weeks ☐

9. Is there **a definite university policy** that guides and encourages teachers to employ TEIs in EFL teaching and learning settings?

Yes ☐ No ☐ Do not know ☐

B. Please read and select your response.

10. How would you rate the availability of technology-based infrastructures in your society?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

11. How would you rate your current level of access to technological facilities in your EFL classes?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

12. How would you rate your **personal** use of technological facilities?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

13. How would you describe your technology-related skill in pursuing **personal** interests?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

14. How would you rate your confidence in the use of technological facilities in your **personal** life?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

15. How would you rate the degree of your previous experience in using technological facilities to pursue **professional** interests?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

16. How would you describe your technology-related skill in pursuing **professional** interests?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

17. How would you rate your confidence in the use of technological facilities in your **professional** life?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

18. How would you rate your **learners'** skill in using technological facilities?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

19. How would you rate your **colleagues'** skills in using technological facilities?

Low☐ Low-medium☐ Medium☐ High-medium☐ High☐

C. Please read and rate the following statements.

Items	**(Disagree) 1**	**2**	**3**	**4**	**(Agree) 5**
20. Learners' language learning is promoted using TEIs.					
21. Learning a foreign language through TEIs seems to be less productive.					
22. I value the use of TEIs considering their higher efficacy in EFL learning.					
23. TEIs can never be as good as traditional instructions in EFL classrooms.					
24. As teaching is about the presentation and transmission of accurate knowledge to learners, TEIs cannot be integrated into EFL classes.					
25. As teaching is helping learners to construct knowledge from their learning experience, we can employ TEIs in EFL classes.					
26. As teaching is about providing opportunities for learners to discover knowledge for themselves, TEIs can be integrated into EFL classes.					
27. As teaching is simply the explanation of the subject matter via teacher talk and the assignment of drills, TEIs cannot be employed in EFL classes.					
28. As teachers' major task is to give students knowledge, assign drills, and test their recall, there is no value in the implementation of TEIs.					
29. As teachers' main task is to encourage the learners to ask questions, test their ideas, and draw conclusions, TEIs can be integrated into EFL classes.					
30. As teachers' main task is to provide learners with					

accurate knowledge, TEIs would not be of great significance in EFL classes.					
31. As teachers' main task is to promote learner-initiated questions, independent thought, or interaction between learners, TEIs can be integrated into EFL classes.					
32. **My colleagues** believe that as teaching is about the transmission of complete knowledge to learners, TEIs cannot be integrated into EFL classes.					
33. **My colleagues** believe that as teaching is helping learners to construct knowledge from their learning experience, we can employ TEIs in EFL classes.					
34. **My colleagues** believe that as teaching is about providing opportunities for learners to discover knowledge for themselves, TEIs can be implemented in EFL classes.					
35. **My colleagues** believe that as teaching is simply an explanation of the subject matter and covering more information via teacher talk, TEIs cannot be employed in EFL classes.					
36. **My colleagues** believe that learners' language learning is promoted using TEIs.					
37. **My colleagues** believe that learning with the implementation of TEIs seems to be less productive.					
38. **My colleagues** value the use of TEIs in their English teaching considering its higher efficacy in EFL learning.					
39. **My colleagues** believe that TEIs can never be as good as traditional instructions in TEFL classrooms.					
40. **My learners** believe that their language learning is promoted using TEIs.					
41. **My learners** believe that learning with the implementation of TEIs seems to be less productive.					
42. **My learners** value TEIs in English teaching considering its higher efficacy in EFL learning.					
43. **My learners** believe that TEIs can never be as good as traditional instructions in TEFL classrooms.					
44. **The society** believes that learners' language learning					

is promoted by employing TEIs.					
45. **The society** believes that learning a foreign language with the implementation of TEIs seems to be less productive.					
46. **The society** value TEIs in EFL teaching considering their higher efficacy in EFL learning.					
47. **The society** believes that TEIs can never be as good as traditional instructions in EFL classrooms.					
48. As the **society** believes that teachers' major task is to give students knowledge, assign drills, and test their recall, there is no value in the implementation of TEIs in EFL classes.					
49. As the society believes that teachers' main task is to encourage the learners to ask questions, formulate and test their ideas, and draw conclusions, TEIs can be employed in EFL classes.					
50. As the society believes that teachers' main task is to provide learners with accurate knowledge, TEIs would not be of great significance in EFL classes.					
51. As the society believes that teachers' main task is to promote learner-initiated questions, independent thought, or interaction between learners, TEIs can be integrated into EFL classes.					
52. The university policymakers believe that **teachers** should employ TEIs in EFL classes.					
53. The university policymakers believe that **learners** should use TEIs in EFL classes.					
54. The university policymakers believe that **both teachers and learners** should use TEIs in EFL classes.					
55. The university policymakers believe that it is up to individual teachers whether to use and how to integrate TEIs into their classes.					