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Review Paper

Barriers to Integrating Information Communications Technology into English for Specific Purposes: A Review of Current Studies

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Abstract

This study aims to report on the literature related to the barriers to ICT (Information Communications Technology) integration into ESP (English for Specific Purposes) instruction that hinder promoting ESP instruction through this integration. The literature review has also shed light upon ways of addressing these barriers. To meet this end, the paper begins with discussing a review of some of the important Iranian and international studies on barriers to ICT integration in ESP instruction and then the paper highlights several first-order, and second-order barriers, and ways of addressing them to help in promoting and changing traditional ESP instruction and materials. It is suggested that this review could be useful for those who make decisions about the ESP courses, for ESP material developers, and for ESP teachers to change from traditional ESP instruction, which is teacher-centered and text-based, to a new ESP instruction through ICT integration. This review has also implications for practice. Change is mostly challenging; reporting a review of previous studies on barriers to ICT integration at the tertiary level and proposing ways of addressing them may help defeat the barriers and may enhance acceptance of new ESP teaching and learning methods.

Keywords: *First-order barriers, English for Specific Purposes (ESP), Information Communications Technology (ICT), Second-order barriers*

موانع ادغام فناوری اطلاعات و ارتباطات در زبان انگلیسی برای اهداف خاص: مروری بر پژوهش های کنونی

این مطالعه گزارش می دهد که پژوهش های مرتبط با موانع ادغام فناوری اطلاعات و ارتباطات در آموزش انگلیسی با اهداف ویژه به مانع ارتقا آموزش زبان انگلیسی از طریق این ادغام هستند. این مطالعه به بررسی پیشینه پژوهش راه های رفع این موانع را روشن کرده است. به منظور دل به این هدف، مقاله با بررسی برخی از پژوهش های مهم ایرانی، بین المللی در مورد موانع ادغام فناوری اطلاعات و ارتباطات در آموزش انگلیسی با اهداف ویژه آغاز می شود. سپس تلاش می شود تا موانع اولیه، ثانویه و لایه های رسیدگی آنها برای کمک به ارتقا تغییرات و اصلاحات سنتی انگلیسی با اهداف ویژه برجسته می شود. این پژوهش می تواند برای افرادی که در مورد درس های انگلیسی با اهداف ویژه تصمیم گیری می کنند، برای توسعه دهندگان مطالب آموزشی انگلیسی با اهداف ویژه و برای اساتید انگلیسی با اهداف ویژه مفید باشد که آموزش انگلیسی با اهداف ویژه از آموزش سنتی که از محور و مبتنی بر متن است به آموزش مبتنی بر اهداف و تغییرات از طریق ادغام فناوری اطلاعات و ارتباطات تغییر پیدا کند. این مقاله مروری دارای فواید عملی نیز می باشد. در بیشتر مواقع، تغییر چرخش برانگیز است. این گزارش مروری درباره پژوهش های قبلی مرتبط با موانع ادغام فناوری اطلاعات و ارتباطات در سطح آموزش عالی و پیشنهاد راه هایی برای رسیدگی به آنها ممکن است به رفع موانع کمک کند و ممکن است پذیرش روش های جدید آموزش و یادگیری آموزش زبان انگلیسی با اهداف ویژه را افزایش دهد.

واژگان کلیدی: فناوری اطلاعات و ارتباطات، موانع اولیه، انگلیسی برای اهداف ویژه، موانع ثانویه، آموزش

Introduction

A growing body of studies continues to demonstrate integrating ICT in English language educational settings could promote English teaching and learning. This crucial role of integrating ICT in ESP at the tertiary level has been declared and indicated well in previous studies (e.g., Yu, Chang, & Wu, 2015; Marsden, 2017; Rezaei & Meshkatian, 2017; Song, 2017; Yang & Kwo, 2017; Asal, 2017; Dashtestani, 2017; Serke, 2017; Heidari, 2017; Constantinou, Papadima-Sophocleous, 2020; Lawrence, Ahmed, Cole, & Johnston, 2020).

Although ICT integration in ESP has a crucial role in promoting ESP instruction, different barriers can impact ICT integration. Finding these barriers in various institutes is necessary to eliminate them (Chalak & Rassouli, 2014). AmmaAmmaad, Jabu, and Tahir Tahir expressed that this improvement in employing technology for educational programs requires a longer time as it is not an automatic process. This could be because persuading most faculty to use technology in teaching was never free of obstacles (Zhu, 2008). In addition, the following factors influence this process: curriculum and education, institution preparation, the competence of teachers, financial issues, and many other factors that need to be considered (Ammade, 2018).

It is, therefore, of great interest for language scholars and language curriculum planners to consider the challenges and key factors in employing technology-mediated approaches such as ICT integration in the ESP context at the tertiary level (Fathi Vajargah, Jahani, & Azadmanesh, 2010; Shaabi, 2010; Atai & Dashtestani, 2013; Soleimani & Khanjani, 2013; Zalpour, 2013; Chaaban, 2014;). This study focuses on reviewing empirical and review studies on barriers to ICT integration in ESP in international and Iranian papers. In addition, the study also scrutinizes the lesser-researched issue of addressing these barriers to ICT integration at the tertiary level in Iran. Most of the previous research on instructional technology has focused on the effect of technology instruction on varietyvariousof such as motivation and learning processes; however, less research investigated the barriers to technology instruction (Abdelrahman et al., 2019; Sabiri, 2020; Shabii, 2010). This is while ingesting barriers to technology instruction will contribute to implementing strategies for possible solutions (Zirra, 2019).

Additionally, even though ESP researchers have been recommended to explore the barriers to different technology in different contexts and cultures (Chalak & Rassouli, 2014; Dashtestani & Stojkovic, 2015), the barriers to ICT in ESP at the tertiary level in the Iranian context have not been extensively investigated. A look into the literature review makes it clear that only a few studies associated with barriers to ICT use in ESP at the tertiary level in Iran were conducted (Fathi Vajargah et al., 2010; Soleimani & Khanjani, 2013; Zalpour, 2013). In addition, even though a plethora of studies examine the technology integration in EFL instruction contexts and school levels (Park & Ertmer, 2008; Zhu, 2008; Timothy, 2011; Timothy Rosa, 2016; Thoma, Hutchison, Johnson, Johnson, & Stromer, 2017), there is a dearth of review study to examine integrating technology in ESP instruction in the tertiary level (Dashtestani & Stojkovic, 2015).

Taking into account that the integration of technology in ESP contexts may bring about challenges and opportunities which might differ from the ones in English as a foreign language context (Dashtestani & Stojkovic, 2015); therefore, what is left underexplored, particularly in the Iranian context, is exploring the barriers to ICT incorporation in the ESP context in the tertiary level in Iranian context (Fathi Vajargah et al., 2010; Zalpour, 2013), which is addressed in this research.

Scope of This Review Study

The present study aims to review empirical studies on barriers to ICT integration and ways of addressing them in different studies at the tertiary level. This review study is extracted based on

an extensive review of the literature on ICT use in ESP at the tertiary level. It is a part of a Ph.D. dissertation that scrutinized this area. The scopes of this study are (a) empirical studies published in peer review journals, and theses relevant to ICT use in ESP instruction from 2010 to 2020 were used in the literature review section to fulfill the objective of this study; (b) the research provides different studies from diversity countries; (c) the context is at tertiary level in the area of English for specific purposes. Ertmer's (1998) classification for barriers to ICT use was used for the aim of this study to focus on finding the barriers to ICT integration.

The Article Reviews

One of the most significant recent changes in higher education is ICTs use. These fast changes have not influenced all societies equally. Indeed, the history of utilizing modern ICT tools in higher education is short but expanding at different rates in different situations (Zaree, 2011). More specifically, despite the significant powers of ICT for education, real development and reform are slow (Chalak & Rassouli, 2014). Because many barriers could influence and hinder this integration process. Therefore, the following now examines different international and Iranian studies on the barriers to ICT integration at the tertiary level that affect reforming and promoting education by ICT, followed by discussing and scrutinizing first-order and second barriers to ICT use in ESP.

Fathi Vajargah et al. (2010) investigated the obstacles, facilitators, and risks of employing technologies in higher education. The research was conducted at Shahid Beheshti University in Tehran. The researchers selected the population of university academics and students. A questionnaire was used for data collection. The results revealed the obstacles to ICT integration in curriculum development at the tertiary level. In addition, facilitating factors and crucial supports required for employing ICT in higher education curriculum development were also reported. Moreover, the advantages and disadvantages of using ICT for curricular activities at the tertiary level were examined.

Shaabi (2010) discussed the barriers to ICT integration based on five factors. This study used an observant and semi-structured teacher and administrators. The study reported that sufficient ICT tools, teacher development, adequate technical support, funding, and design could be important for successful ICT integration in ESP instruction. The study also reported the sociocultural factor as a significant factor in employing ICT in ESP in public tertiary institutions in Saudi Arabia.

Atai and Dashtestani (2013) conducted a study to examine undergraduate students, English for academic Purposes (EAP) instructors, and instructors' attitudes toward the Internet in EAP courses of civil engineering in Iran. The data were collected through a questionnaire, semi-structured interviews, and non-participant observation. The results demonstrated that most participants had positive attitudes toward the Internet. However, the results revealed that EAP instructors did not employ Internet-based activities in their classes. In addition, most constraints in employing the Internet in EAP courses were found. It was concluded that there was a need for training in different Internet-based skills for undergraduate students of civil engineering. Their findings presented implications for renewing the EAP programs.

Zalpour (2013) reported that several are on the way to using ICT tools in Iranian ESP classes. The results showed that factors such as lack of technical support, lack of access, lack of knowledge and skill, lack of time, lack of application (software), and lack of methodology were barriers to ICT use in the class. This study collected the data through a questionnaire, semi-structured interviews, and observations. The study's results indicated that Iranian ESP teachers held positive attitudes toward employing ICT tools in ESP classes. Moreover, the participants perceived that the ICT integration made ESP interesting. In addition, utilizing ICT positively and significantly was related to ESP teachers' IT competence and teaching methods. Besides, ICT

integration in ESP teaching was not related to teachers' experience in ESP teaching. Finally, he concluded that employing ICT was explored to be correlated inversely with ESP teachers' age. This study suggested that effective IT training, ICT resources, ESP software, adequate time, and new curriculum should be provided for incorporating ICT tools more effectively in Iranian ESP classes.

Chaaban (2014) carried out an in-depth study through mixed-methods in a banese context. The study focused on factors within the wider cultural, economic, and, most importantly, political contexts. The study showed that lack of government funding, shortage in technological equipment and other resources, little follow-up and support, incomplete integration of ICT within the existing curriculum, exclusion of ICTs from the formal assessment of learners, inconsistencies among policymakers, exclusion of the private sector from the plan, problems with professional development, and problems with teacher preparation are barriers to ICT use.

Mirriahi, Vaid, and Burns (2015) examined the resistance of academic staff to integrating technology with on-campus foreign language teaching. The qualitative case study was used in a large research-intensive North American higher education institution. They explored perceived usefulness and ease of use that influence teachers in employing technology. In addition, they found a lack of attention to the pedagogical affordances of technology when instructors make adoption decisions. They also emphasized the need for higher education leaders to establish strategies for developing awareness of the advantages of technology-enabled teaching and learning.

Dastjerdi (2016) investigated the factors impacting ICT adoption among distance education students based on the Technology Acceptance Model in Isfahan, Iran. A researcher-made questionnaire was employed as a data collection tool. The results revealed that perceived usefulness directly impacts the decision to employ technologies. In other words, technology will be regarded to be part of teaching if it is easy-to-use and useful for teachers.

Aslan and Zhu (2017) examined variables that predict Turkish pre-service teachers' ICT integration into their teaching practices. The data were collected through two questionnaires. The variables were ICT competence, perceived competence in ICT integration, attitudes toward ICT, anxiety about employing ICT, external barriers to ICT integration, ICT-related courses, pedagogical knowledge, and prior experience in utilizing ICT. A total number of 599 pre-service teachers, in their fourth year of training programs, from the subject areas of Turkish language, social sciences, elementary mathematics, and science participated in the study. The results revealed that pedagogical knowledge, ICT-related courses, and perceived ICT competence were critical in predicting ICT integration into teaching practice. The findings of this study also indicated that pre-service teacher-training programs, particularly pedagogical knowledge and ICT-related courses, have a significant impact on enabling pre-service teachers to employ ICT in their teaching.

Isiyaku, Ayub, and AbdulKadi (2018) examined the antecedents to Nigerian business education teachers' perceptions of the usefulness of technology in their teaching. The study investigated whether computer self-efficacy, perceived enjoyment, and subjective norm were antecedents to teachers' perceived use of ICTs in business education classrooms at the Nigerian tertiary level. The study employed a structured questionnaire, which used items adapted from previously validated studies, for collecting data. The sample was selected from 212 teachers from the business education faculties of 13 tertiary colleges in Northwestern Nigeria, sub-Saharan Africa. Teachers' computer self-efficacy and perceived enjoyment of ICTs were explored to considerably impact teachers' perceived use of ICTs. The study suggested that

Nigerian teachers should be trained to incorporate ICTs into the curriculum and be supported with ICT services to contribute to ICT problems in their classroom.

classrooms019) investigated the role of ICT in the Ethiopian higher education system. The researcher reviewed the literature and interviewed professionals from the Ministry of Education and the Ministry of Science and Technology to investigate the role of ICT in the higher education system of Ethiopia. Limited infrastructure, users' attitudes towards ICT, management support, skilled human resources, and policy issues supporting ICT integration were investigated, which impact the implementation of ICT in Ethiopian higher education.

Ubogu and Orighofori (2020) investigated ICT as a strategic tool in the internationalization of higher education. The study employed the descriptive survey research design. The sample was selected from 171 from 123 female lecturers. They were chosen from six tertiary institutions in Delta State, Nigeria. Data analysis was conducted with mean, standard deviation, and z-test. Results revealed that ICT played an essential role in the internationalization of higher education by promoting the interchange of information and collaboration among divergent higher institutions and decreasing the processing of admission into higher education. In addition, ICT leads to more accessible teaching and learning in higher education, increasing the status of higher institutions worldwide and decreasing the workloads of staff in higher institutions. The results also showed the challenges of facing the internationalization of higher education through ICT. These challenges were poor budgets and ill-equipped ICT facilities in tertiary institutions. This study recommended that government increase access to ICT facilities by establishing ICT centers in all higher education institutions.

These studies are explained were explained based upon the the investigations of ICT integration in ESP. The review indicated a dearth of research on the barriers to ICT integration in ESP, especially in the Iranian context. The previous studies on ICT incorporation in ESP showed that more studies are needed to enrich the gap in the literature. There is, particularly, a relative paucity of studies investigating barriers to ICT integration in ESP in the Iranian context and examining ways of addressing these barriers. Therefore, to address the gap in the relevant literature in this area, this study specifically reviewed barriers to ICT use at the tertiary level. Because finding these barriers is the initial step toward defeating them and converting them into enablers (Goktas, Yildirim, & Yildirim, 2009), the following section discusses and explores different barriers to ICT integration in ESP instruction and examines how to address these barriers.

Barriers to ICT Integration in Tertiary Level

First-order Barriers

In this study, to focus on finding the barriers to defeat them, defeating are categorized into two groups based on Ertmer's (1999) classification. According to Ertmer's classification (1999), external barriers to ICT integration refer to first-order barriers. They consist of the following issues: lack of access to computers and software, lack of sufficient time to plan instructions, and insufficient technical and administrative support (Ertmer, 1999). Commonly, first-order barriers are defined in terms of the following resources: equipment, time, training, and support that is missing or inadequately presented in teachers' implementation contexts (Means & Olson, 1996). Indeed, external barriers to ICT integration are mainly related to ICT infrastructure (Aslan & Zhu, 2017).

Lack of ICT training was emphasized in the previous studies on ICT integration in higher education and ESP (Shaabi, 2010; Atai & Dashtestani, 2013; Aslan & Zhu, 2017; Isiyaku et al., 2018; Ergado, 2019). According to Soleimani and Khanjani (2013), most EAP practitioners know little about different pedagogical software and e-tools. It seems unavoidable that teacher training programs in Iran contribute to teachers obtaining such literacy. Together, these studies

suggested teacher training to increase teachers' competence in ICT use and to address the barrier of lack of training in ICT use at the tertiary level,

Lack of ICT funding and access to ICT is frequently cited as another barrier to ICT integration at the tertiary level in previous studies (Fathi Vjargah et al., 2010; Shaabi, 2010; Zalpour, 2013; Chaaban, 2014). Am made Etam made2018) reported that the accessibility of technology was one factor in technology integration for teaching in some countries including Iran and Saudi Arabia. Similarly, Shekari (2010) found that the relatively low integration of ICT facilities (46%) in teaching and learning in higher education colleges by teachers and students is influenced by inadequate ICT tools in higher education.

Lack of technical support for ICT integration in higher education was also noted as an important barrier by fewer researchers (Shaabi, 2010). Different technologies are not commonly run and directed by teachers themselves. Thus, technical support is necessary to deal with technical breakdowns that can decrease success in learning (Braul, 2006). This barrier, lack of technical support, was also asserted by Shekari (2010), a low level of institutional collaboration with professional units for technical help is one of the barriers perceived by teachers to effectively employing an ICT for teaching and learning in tertiary education. A collaborative approach to technology made faculty more competent to enjoy constant and coordinated technology integration for their projects and classroom use (Zhu, 2008).

Time limitation is frequently referred to in previous studies as the main barrier to ICT use at the tertiary level. Regularly, non-technology-using teachers are frustrated with a lack of time to generate additional lessons for integrating technology; they also expressed that for incorporating technology into the lesson, they had to recreate all of the lessons (Keengwe, Onchwari, & Wachira, 2008). Frequently, teachers express that they have no time to add more or new activities to their current curriculum since they are overwhelmed with meeting standardized test demands (Biancarosa & Griffiths, 2012).

Similarly, Zhu (2008) expressed that time was the biggest barrier to faculty learning technology and using it in their teaching. The solution to this first-order barrier (i.e., time limitation) to ICT integration is through training that concentrates on technology as a tool rather than an isolated curriculum (Morgan, 2011; Franciosi, 2012; Kurt, 2013). For example, Hixon and Buckenmeyer (2009) stated that instructors were capable to learn technology skills focused on technology as a tool, then going back to their classrooms to utilize these skills. This type of focused pedagogical training has equipped instructors to incorporate technology into their current curriculum rather than isolate them from the curriculum or add to the workload of teachers or students (Boud & Hager, 2011; Kopcha, 2012).

Considering the abovementioned evidence, it seems that first-order barriers can be addressed by providing strong infrastructure to give everyone equal access to ICT, taking precautions to facilitate ease of use, and employing technical staff to assist users. Reducing these external barriers to ICT integration or the improvement of a strong ICT infrastructure would appear to be one of the crucial factors in empowering teachers to incorporate ICT into their lessons (Akbulut, Odabas, & Kuzu, 2011).

Another important barrier to ICT integration at the tertiary level asserted in previous studies is the sociocultural barrier (Shaabi, 2010; Zaree, 2011; Chaaban, 2014). Successful ICT integration in language instruction is closely related to the sociocultural environment (Shaabi, 2010; Gregory Lodge). Traditionally, providing a cultural change is an arduous and long-term process with academic strong resistance (Herrington et al., 2010). Indeed, many barriers exist to efficient practice for technology-enhancing by teaching tertiary-level staff. These barriers to technology use are a) cost; b) intellectual property matters; c) custom and

practice; and d) preconceptions and attitudes (Tynan, Ryan, Hinton, & Lamont Mills, 2012; Walker et al., 2014). Therefore, time, lack of academic staff knowledge, lack of funding, and university and department culture were the most important barriers which have continued (Walker, Voce, & Ahmed, 2012; Walker et al., 2014).

The cultural factor as a barrier to ICT integration in universities is also supported by Fathi Vajargah et al. (2010, p. 38) who expressed that there are several challenges concerning ICT use in Iran, such as “lack of National Policy for using ICT in Higher Education, lack of adequate investments, cultural obstacles, financial challenges, lack of continuity in ICT use, and lack of systematic training and development programs.” Therefore, the cultural barrier is essential to ICT integration at the Iranian tertiary level.

Second-order Barriers

Technology-related teacher characteristics (i.e., intrinsic barriers) are related to teachers' beliefs about employing technology and their knowledge and skills in utilizing technology (Graham, Culatta, Pratt, & West, 2004; Abbitt 2011a). Intrinsic barriers are the true gatekeepers to technology integration, and “little will be gained if second-order barriers are not addressed” (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012, p. 433).

The most common personal barriers or second-order barriers to ICT integration cited by researchers fell into three categories: perceived ICT competence (Aslan & Zhu, 2017), computer anxiety (Pamuk & Peker, 2009; Ahmad, Kamba, & Usman, 2012); and attitude toward technology (Egbert & Borysenko, 2018; Goodwin, Ling, Tee, Yeung, & Li, 2015; Miranda & Russell, 2012; Petko, 2012; Sang, Valcke, Van Braak, Tondeur, & Zhu, 2011; Van Braak, Tondeur, & Valcke, 2004) that are explained more in details in the below section.

Perceived ICT competence is closely associated with the issue of perceived ICT self-efficacy. Self-efficacy belief is referred to as an individual's abilities or skills. ICT self-efficacy can be defined as an individual's belief concerning their abilities to employ ICT (Aslan & Zhu, 2017). Perceived ICT competence seems to play a role in determining users' willingness to utilize ICT in their own lives, such as utilizing search engines to search for information on the Internet, employing presentation programs, utilizing the Internet to communicate, using a word processing program, and so on (Aslan & Zhu, 2017).

Perceived competence in ICT integration relates to how teachers can integrate ICT into their teaching practices. As opposed to perceived ICT competence, perceived competence in ICT incorporation is associated with incorporating ICT skills “(e. g, using simulated tasks to discover, experience and experiment, selecting and evaluating educational software, creating lesson plans through ICT, having the knowledge and skills necessary for ICT integration, etc.)” (Aslan & Zhu, 2017, p. 555).

Previous studies showed that anxiety or inner fear of technology, which is related to personal barriers, was also regarded as the barrierhinder hindersrs' perceptions of ICT use in the class. For instance, Pamuk and Peker (2009) claimed several teachers have computer anxiety, which will hinder them from effectively employing educational technologies. The study also showed that computer anxiety is a significant barrier to determining the extent of ICT integration in teachers' lessons.

Similarly, other studies revealed that the technophobia of practitioners (Wood et al., 2005) is an important issue to be taken into account as a barrier to ICT integration (Wood et al., 2005; Dashtestani, 2012; Maftoon & Shahini, 2012; Atai & Dashtestani, 2013). Thus, technophobia has been the crucial barrier impeding academic staff from effectively utilizing ICT for teaching and learning (Ahmad et al., 2012). This barrier related to personal barriers, technophobia, or fear of being incapable in front of their students can be addressed through training (Yemthy, 2015). Thus, one helpful suggestion could be that “prior experience and success with this innovation are

necessary for teachers to develop a sense of self-efficacy and a feeling of mastery before they are comfortable integrating this technology within their teaching” (Wood et al., 2015, p. 222).

Teachers’ attitude toward ICT use was also an important barrier to ICT integration associated with personal barriers. This personal barrier, teacher perceptions of ICT integration, was cited frequently in previous studies (Miranda & Russell, 2012; Petko, 2012; Goodwin et al., 2015). For example, Egbert and Borysenko (2018) stated that integrating technology depends on the teacher’s readiness to use and beliefs about the technology tools; that is, teachers who do not feel convenient with or have negative attitudes toward the technology are less disposed to integrate it in their classes. Thus, part of teacher preparation must be related to teacher beliefs and attitudes toward technology.

Teachers must recognize that technology will not replace them but that employing technology for language instruction can be challenging. Indeed, “T [t]eachers’ perception of the importance of ICT is also essential, as the valuing of ICT in teaching and learning is likely to make ICT applications more sustainable” (Goodwin et al., 2015, p. 222). In the same vein, Miranda and Russell (2012) stated that teachers’ experience with ICT application, teachers’ beliefs concerning ICT advantages, and perceived importance of ICT for teaching strongly predicted their ICT application in the classroom.

To address barriers to ICT integration related to personal (second-order barriers), at a tertiary level, pre-service programs providing technology incorporation courses and training opportunities are graduating competent teachers with significantly decreased personal barriers regarding technology incorporation (Williams, Foulger & Wetzel, 2009; Anthony, 2012; Uslu & Bumen, 2012). Other researchers in Iran also asserted teacher training programs to address second-order barriers (personal barriers). For example, according to Soleimani and Khanjani (2013), technical and pedagogical training is required in teacher education.

Discussion and Conclusion

This review of the literature set out to gain a better understanding of different barriers, first-order and second-order, to ICT integration in ESP instruction at tertiary level. The review has also set out to light some solutions to these barriers. Most of the barriers extrinsic to teachers that were cited frequently in the previous studies are included as follows:

Lack of ICT funding and access to ICT was frequently cited in the previous studies (Fathi et al., 2010; Shaabi, 2010; Shekari, 2010; Zalpour, 2013; Chaaban, 2014). The time limit barrier is also confirmed in the previous literature (Zhu, 2008). The solution to this barrier, time limitation to ICT integration, is through training that concentrates technology as a tool rather than an isolated curriculum (Morgan, 2011; Franciosi, 2012; Kurt, 2013).

The next barrier related to first-order barriers to ICT integration in higher education, which was frequently cited in the literature (Shekari, 2010), lacks technical support. The solution to the technical support barrier to ICT integration could be through dialogic collaborative teaching with technology making faculty more competent to enjoy constant and coordinated technology integration for their projects and technology uses in the classroom (Zhu, 2008). The lack of an ICT training barrier was also emphasized in the previous studies on ICT integration in higher education and ESP (Shaabi, 2010; Atai & Dashtestani, 2013; Aslan & Zhu, 2017; Isiyaku et al., 2018; Ergado, 2019). Considering all of the evidence in the literature, it seems that first-order barriers can be addressed by providing strong infrastructure to give everyone equal access to ICT, taking precautions to facilitate ease of use, and employing technical staff to assist users. Reducing these external barriers to ICT integration or the improvement of a strong ICT infrastructure would appear to be one of the crucial factors to empower teachers to incorporate ICT into their lessons (Akbulut, Odabas, & Kuzu, 2011).

On the second-order barriers, which are related to personal issues, there are many barriers teachers deal with in integrating ICT. The most common personal barriers or second-order barriers to ICT integration cited by researchers fell into three categories: perceived ICT competence (Aslan & Zhu, 2017); computer anxiety (Pamuk & Peker, 2009; Ahmad et al., 2012); and attitude toward technology (Van Braak, Tondeur, & Valcke, 2004; Sang, Valcke, Van Braak, Tondeur, & Zhu, 2011; Miranda & Russell, 2012; Petko, 2012; Goodwin, Ling, Tee, Yeung, & Li, 2015; Egbert & Borysenko, 2018).

To address barriers to ICT integration related to personal (second-order) barriers, at a tertiary level, pre-service programs providing technology incorporation courses and training opportunities are graduating competent teachers with significantly decreased personal barriers regarding technology incorporation (Williams, Foulger & Wetzel, 2009; Anthony, 2012; Uslu & Bumen, 2012). One helpful suggestion could be to provide prior experience for teachers to utilize technology in their teaching to address the technophobia barrier. As Wood et al. (2005) asserted that “prior experience and success with this innovation are necessary for teachers to develop a sense of self-efficacy and a feeling of mastery before they are comfortable integrating this technology within their teaching.” (.. 20))

Second-order barriers far out weight the first-order barriers. Indeed, intrinsic barriers are the true gatekeepers to technology integration. If second-order barriers are not addressed, little will be gained (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012, p. 433). We could not think that ICT integration in education will automatically promote through providing computers, setting up computer labs, and connecting educational institutions to the Internet. Indeed, understanding ICT use in education goes beyond providing these facilities. (Kousha & Abdoli, 2004)

In sum, the study adds to the growing body of research that indicates different barriers to ICT integration in ESP instruction that teachers and students deal with. Furthermore, this study has gone some ways towards enhancing our understanding of ICT use at the tertiary level in Iran by examining different barriers and ways of addressing them in different contexts to defeat these barriers, to promote ESP instruction and to change the traditional ESP instruction in Iran through ICT integration. However, further research is required to develop a deeper understanding of barriers to ICT use and ways of addressing them exploring more ignoring the diversity of stakeholders' perceptions.

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