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FROM THE EDITOR

by **Jarosław Krajka**
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The current issue of *Teaching English with Technology* adopts a truly global perspective, focusing to a great extent on the issues in the implementation of different aspects of Computer-Assisted Language Learning and Teaching in diverse parts of the world. As it inevitably turns out, the problems and challenges that teachers and researchers willing to apply technology to assist language instruction are very different across the globe, even though technology-wise the world has become a much smaller place than it used to be even in the early days of the Internet 1.0 era.

This issue of the Journal opens up with the article "Open Educational Resources, ICT and Virtual Communities for Content and Language Integrated Learning" by Letizia Cinganotto and Daniela Cuccurullo. The authors describe how Open Educational Resources and digital tools have reshaped the educational landscape and how the opportunities they have offered for CLIL teachers and trainers resulted in increased interaction among teachers, building up virtual communities of practice and enhanced sharing of ideas and good practices.

"Planning Future Instructional Programs through Computerized L2 Dynamic Assessment" by Saman Ebadi and Abdulbaset Saeedian proves how learners with different zones of proximal development (ZPDs) require customized instructional programs to reflect their individualized needs. This customization can be achieved in the area of assessment by exploiting the power of computers to deliver Computerized Dynamic Assessment (C-DA).

Fariba Haghighi Irani and Azizeh Chalak address the problem of target language interaction in asynchronous learning environment. The investigation of the form and sequence of the questions and answers from a non-interventionist point of view proves the absence of the Initiation, Response and Feedback/Inquiry (IRFI) pattern in asynchronous environments and calls for careful design of instructional patterns according to the needs of the new contexts.

Another article in this issue, "Blended E-Learning as a Requirement for Teaching EFL in a Thai Academic Context" by Noparat Tananuraksakul, evaluates the extent to which

blended e-learning as required by an institution can motivate learners extrinsically to learn EFL and can enhance their positive attitudes towards foreign language learning. As it appeared from the study, required blended e-learning may not be the best teaching tool for all groups of EFL learners, as some might identify themselves with social media, especially Facebook, better.

Finally, Seyed Mohammad Alavi, Davood Borzabadi and Reza Dashtestani in their paper "Computer Literacy in Learning Academic English: Iranian EAP Students' and Instructors' Attitudes and Perspectives" report upon the perceptions of Iranian English for Academic Purposes students on their computer literacy levels. The participants perceived students' computer literacy levels as low and insufficient for the efficient implementation of CALL in EAP. The study pinpoints several constraints and barriers which would discourage EAP students from promoting their computer literacy and using computers for learning EAP.

I wish you good reading!

OPEN EDUCATIONAL RESOURCES, ICT AND VIRTUAL COMMUNITIES FOR CONTENT AND LANGUAGE INTEGRATED LEARNING

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Abstract

The present contribution is aimed at describing one of the latest trends in the European school curricula: the teaching of subject content in a foreign language (CLIL), which is becoming more and more popular all over Europe, also bearing in mind the latest recommendations from the European Commission. Starting with a brief theoretical background on CLIL, the article focuses on OER (Open Educational Resources) and digital tools that have strongly changed and reshaped the educational landscape, offering a lot of opportunities for CLIL teachers and trainers. This scenario has also changed the interaction among teachers, building up virtual communities of practice aimed at sharing ideas and good practices for better quality teaching/learning. Some examples of these CLIL communities are provided.

Keywords*:* CLIL; OER; virtual communities; ICT; informal learning

1. Introduction

There has been an exponential growth in the use of technology for language learning and teaching purposes in the recent years. This may be due to the fact that 21st century learners are constantly exposed to ICT during their daily life. Mobile devices and social networks are the common way in which they interact with their peers and with the external world, constantly mixing formal and informal learning experiences. This is particularly effective for the development of language competences, as informal learning may have a key role in the progress made by students. It is even better when the focus of the learning is two-fold, concentrating both on language and on subject content, as it happens with CLIL (Content and Language Integrated Learning). OER (Open Educational Resources) and digital tools have created new learning and teaching scenarios also impacting teachers' continuous professional

development, which often interweaves formal, informal and non-formal pathways and is based on learning communities and networks connecting teachers and educators from all over the world.

2. CLIL potential

The term 'CLIL' (Content and Language Integrated Learning) was introduced by David Marsh in 1994. It refers to a "dual approach", considering both the development of language competences and the teaching of curricular subjects (Marsh, 2013). According to one of the latest reports from Eurydice, *Key Data on Teaching Languages in Europe* (2012)[1], this methodology is becoming more and more popular all over Europe, as it represents the added value for a better quality in education.

The integration of Content and Language does not refer to any particular foreign language, but may depend on national policies and on school choices. CLIL represents a real revolution, which impacts all the actors of the school system (headmasters, language teachers, subject teachers, language assistants, parents, students, etc. – Mehisto et al., 2008).

As the European Commission has recently pointed out (*Improving the Effectiveness of Language Learning: CLIL and Computer Assisted Language Learning*, June 2014[2]), CLIL methodology is one of the most innovative ways to improve the quality of education, the organization of the school setting and the students' participation, engagement and learning outcomes, especially if combined with the use of the new technologies in a new learning scenario (Coyle et al., 2010).

In Italy CLIL was introduced in 2010 as mandatory in all upper secondary schools (Langé & Cinganotto, 2014). There is no specific reference to a particular foreign language, although the majority of schools usually opt for English, except for "Licei Linguistici[3]", where CLIL in two foreign languages must be provided.

3. OER for CLIL

CLIL classes have been recently enriched and empowered by the introduction of OER (Open Educational Resources) into the teaching/learning process. At the heart of the movement towards Open Educational Resources is the idea that the world's knowledge is public and that technology in general and the Internet in particular provide an opportunity for everyone to

[1] http://eacea.ec.europa.eu/education/Eurydice/documents/key_data_series/143EN.pdf
[2] http://ec.europa.eu/languages/library/studies/clil-call_en.pdf
[3] "Licei Linguistici" are upper secondary schools with particular focus on foreign languages, cultures and literatures.

share, use, and reuse it (Smith and Casserly, 2006). According to UNESCO, "Open Educational Resources are any type of educational materials that are in the public domain or introduced with an open license. The nature of these open materials means that anyone can legally and freely copy, use, adapt and re-share them"[4].

The idea was born in 2001, when Massachusetts Institute of Technology (MIT) decided to release all its courses and make them free for online access. Since then, more and more universities and institutions have decided to follow this move and the phenomenon has become increasingly popular. In 2002 UNESCO organized the 1st Global OER Forum where the acronym 'OER' was born. The Paris OER Declaration by UNESCO adopted in June 2012 was the first step towards the development of policies supporting OER. In fact, it was aimed at encouraging policy makers to support the use of OER and their integration within the educational pathways. In 2013 the Communication from the European Commission *Opening up Education*[5] was issued with the aim of fostering the integration of OER at any school level and in adult learning and with the aim of promoting learning across the life-span.

In the last few years, a number of communities have been established based on the OER philosophy and aimed at supporting this culture. An example is LangOER[6], a three-year European network which was created to foster linguistic and cultural diversity in Europe. They organize webinars and online events aiming at sharing materials and resources about multilingualism and cultural diversity.

4. ICT for CLIL

Our 21st millennium learners are constantly exposed to digital tools, as these are the main code of communication and interaction in their daily lives. That is why it is essential to rethink and reshape the teaching process in order to make learning more relevant and more effective. While planning and implementing lessons, teachers should take into account not only the development of students' 'communicative competence' (Canale & Swain, 1980), but also 'electronic communicative competence' (Simpson, 2005) or 'ICT competence' (Walker, 2007). Educational Technology applications and blended learning can facilitate Content and English Language Integrated Learning and contribute to the realization of the pedagogical, educational and language learning goals of CLIL (Vlachos, 2009). A large number of benefits are attributed to educational technologies, according to the relevant literature. Among many

[4] http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/
[5] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0654
[6] http://langoer.eun.org/

others, students' active participation and self-expression and opportunities for authentic language use, using the target language in meaningful situations, student collaboration and socialization, working across the curriculum can be enumerated (Singhal, 1997, Warschauer & Whittaker, 1997).

Language teaching has recently seen an increasing interest in a new research area, TELL (Technology Enhanced Language Learning), which considers technology not as assisting language learning, but as a part of the environment in which language exists and is used. This is why there has been a shift from CALL (Computer Assisted Language Learning), which considers technological tools as merely instrumental to language learning, to TELL, which provides not only new tools, but also new educational contexts and settings (Walker & White, 2013).

The Web 2.0 offers many opportunities for students to use technology in an active way, becoming the real protagonists of their learning pathways, able not only to search and download information, but also to upload and share their own content, becoming authors, with their teachers acting as facilitators.

Thus, an important question is how to integrate the skills students develop through the Web 2.0 perspective (collaboration, communication, creativity and critical thinking) with the needed literacies (media, information, network, global literacies and digital citizenship). One answer comes through reconsideration of the concept of "fluencies": 21st Century Fluencies are not limited to technical prowess, but include critical thinking skills, essential to living in this multimedia world. We call them *fluencies for a reason*. Being literate means to have knowledge or competence. To be fluent is something more: it is to demonstrate mastery and to do so unconsciously and smoothly. The term 'fluencies' (Crockett et al., 2012) is significantly used within the 21st Century Fluency Project to include creativity, collaboration, knowledge of information, media fluencies and global citizenship[7]. As used in the language learning context, it refers to the development of 21st literacies and skills engendered through participation in a CLIL project.

5. Informal CLIL

Formal and informal learning have often been viewed as competing paradigms; however, students are increasingly adopting the tools and strategies for informal learning within formalized educational settings.

[7] https://globaldigitalcitizen.org/21st-century-fluencies

Nowadays, bridging the gap between formal and informal learning has become crucial. The importance of a skilled and knowledgeable citizenry for Europe extends beyond formal education to learning acquired in non-formal or informal ways. Citizens must be able to demonstrate what they have learned in order to use this learning in their career and for further education and training. To do so, they must have access to a system which identifies, documents, assesses and certifies (that is, validates) all forms of learning. This is what the Council Recommendation of December 2012 has called upon Member States to put in place by 2018.

The "affordances" of students' informal practices may be extraordinary, if we consider the ways in which e-tools such as personal digital devices, communication tools and social networking can be used and how they can enhance processes of content and language integrated learning.

In the UK a study of students' experiences of technologies (Nicol, 2008) reports how learners usually use technologies and what impact they may have on learning: technologies often build the bridge to the school content; technologies are used in a pervasive, social and interactive way, and general ICT tools and resources are mixed with official course or institutional tools and resources. The study has also determined that students are developing new forms of evaluation skills and strategies (searching, restructuring, validating), which enable them to think critically and make decisions about a variety of sources and content. The use of these tools is changing the way students gather, use and create knowledge, shifting from lower to higher regions of Bloom's taxonomy, to make sense of their complex technologically enriched learning environment, exactly in the same way CLIL teaching and learning experiences can be carried out. Thus, a shift in focus from 'finding, locating and evaluating information' to 'using information, adopting knowledge and sharing of ideas' has to be adopted.

6. CLIL virtual communities

There is an urgent need for specific materials, resources and guidelines for content and language learning. An adequate selection of virtual communities of teachers and experts with a wide-experience of how to create CLIL content and the issues around CLIL can provide support to current and future CLIL education programs all over Europe, disseminating high quality and already proven materials and resources.

Reference to some of these communities and resources will be made below.

- *E-CLIL*[8] is a European Union funded project to develop and build resources and a resource centre for the use of Content Language Integrated Learning. It focuses on language learning, learning strategies, multilingualism and multiculturalism. The partners have built an "ECLIL Resource Centre", designed to link two types of Web resources: CLIL resource sites that either have more information on the use of CLIL or further links to more CLIL resources; specific CLIL resources that can be used by teachers in the classroom.
- *Pools-t*[9] (Producing Open Online Learning System - Tools) is a European project to develop tools for CLIL methodology as well as a guide on how to apply the tools in CLIL contexts. The project results and outputs are used by individual language learners, subject teachers adopting CLIL and language teachers preparing online teaching materials.
- *Clilstore*[10] is a store of copyleft content and language integrated teaching materials. It is being developed as part of the European funded TOOLS project. It uses *Wordlink*, a WWW based facility which links arbitrary webpages automatically, word by word with online dictionaries. *Wordlink*, in turn, uses *Multidict*, a multiple dictionary lookup facility that makes use of freely available online dictionaries. Both *Wordlink* and *Multidict* were developed as part of the European funded POOLS-T project (2008-2010) and their development is continuing as part of the present TOOLS project.
- *Tools*[11] (Tools for CLIL teachers) is a community that has developed a free online tool which enables media-rich webpages to be created for language learning. One of the core outcomes of the TOOLS project is a *CLIL Guidebook* showing how to exploit the online service (CLILstore) in a CLIL context. The book is available in many languages.
- *CCL* (CLIL Cascade Network)[12] is an on-line community of CLIL practitioners and their professional partners who share ideas, experiences, and resources. The website has different sections:
  i) The *Networking* area contains a contact database with a multifunction search facility allowing users to find opportunities for collaboration among schools,

[8] http://e-clil.uws.ac.uk/
[9] http://www.efvet.org/index.php?option=com_content&task=view&id=150&Itemid=221
[10] http://multidict.net/
[11] http://www.languages.dk/tools/
[12] http://www.ccn-clil.eu/index.php?name=Content&nodeIDX=3488

teachers, researchers, teacher training providers or other stakeholders at national or transnational level.

ii) The *Materials and Resources* area allows users to share resources and good practices in CLIL and to explore the relationship between CLIL and the teaching of foreign, regional, minority or heritage languages.

iii) The *Professional Development* area involves setting up a CLIL teacher training community to design, develop and test teacher development frameworks, CLIL benchmarking tools and to foster the co-operation between teacher education providers aiming at joint CLIL competence building programs.

iv) *EVO – Electronic Village Online* is a TESOL international community that gathers teachers and educators from all over the world willing to share ideas and practices about the use of ICT in education in different issues, such as language teaching and CLIL (Cinganotto & Cuccurullo, 2016). Every year online training sessions are organized about different topics. They are free and attended by hundreds of teachers from all over the world.

Lifelong learning is essential to the promotion of 21st century fluencies. Learning communities, virtual environments and services that enable new forms of collaboration and knowledge sharing between users are critical features of educational programs. They enable communication among many people, can be used to give feedback and for peer evaluation, can support the personalizing learning agenda, can be used as a way of gathering and sharing teaching and learning resources or research data, and can provide new tools for the creation of knowledge in the CLIL perspective. Blended learning, which includes the Internet and the World Wide Web as integral components, has been shown to facilitate creative, higher order thinking skills and meaningful learning (Vlachos, 2006).

In the last few years, a number of ESL (English as a Second Language) and CLIL teachers' communities have appeared, using social networks and informal virtual environments to share ideas, best practices, and materials. These communities have engendered a new and informal professional development model whereby teachers discuss new ideas and share opinions in an informal way with colleagues from their own country and all over the world. These informal training opportunities provide an added value to the traditional and formal training pathways organized by universities or educational institutions.

7. Conclusions

The present paper was meant to provide insights about the use of technological tools and Open Educational Resources in the teaching/learning process, and to share the main features of the educational scenario in a CLIL class.

One aim of the paper was to describe the integration of formal and informal learning experiences, which is becoming popular among teachers. Open content, virtual learning environments, online training events, and virtual communities of practice are becoming increasingly important to teachers and educators who like to interact with their colleagues from all over the world, sharing and comparing ideas, materials, as well as best practices for language learning across the life-span. Some examples of communities were mentioned and briefly described in this paper, with the aim of highlighting how informal pathways may impact teachers' professional development.

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PLANNING FUTURE INSTRUCTIONAL PROGRAMS THROUGH COMPUTERIZED L2 DYNAMIC ASSESSMENT

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Abstract

Dynamic Assessment (DA) is a postmodern notion in testing which sees instruction and assessment as inextricably mingled contending that learners will progress if provided with dynamic interactions. The main purpose of the study is to see if the scores generated by the computerized dynamic assessment (C-DA) which is grounded in Vygotsky's theoretical framework in congruence with the concept of DA can lead to designing a syllabus which results in the participants' reading comprehension development. In the present study, a total of 32 Iranian EFL undergraduates from a university in Iran were selected on the availability basis. The study made use of the interventionist approach (the same mediation for all individual learners) to DA due to a two-fold aim: being more economically-supported and owing to its feasibility in focusing on larger cohorts of individuals. Investigating the learners' generated scoring profiles through CDA revealed that not only did the learners have varying problem areas but also they needed different amount of mediation for identical test items. These profiles reiterated the fact that learners with different zones of proximal development (ZPDs) require customized instructional programs to reflect their individualized needs.

Keywords*:* instructional program, dynamic assessment, computerized dynamic assessment, interventionist DA

1. Introduction

Dynamic Assessment (DA) is an emergenistic and postmodern notion in testing (Pishghadam & Barabadi, 2012) which sees instruction and assessment as inextricably mingled and not as separate processes (Haywood & Lidz, 2007; Haywood & Tzuriel, 2002; Lantolf, 2009; Lidz & Gindis, 2003). It is based on dynamic interaction between the examiner and the examinee (Birjandi & Ebadi, 2012), in which the former helps the latter achieve their best. DA, which is rooted in mediated teacher-learner interactions, has some advantages, including providing deeper insights into how individuals' abilities change and develop over time (Ableeva, 2010). Mardani and Tavakoli (2011, p. 695) remarked that another advantage of DA is its fairness,

stating that "DA is an integral part of the assessment but not its entirety, because no one approach can provide adequate answer to all questions."

In general, there are two approaches to DA:

1. in the interventionist approach to DA, the same mediation is used with every learner, therefore, it is easier to manage a larger number of participants (Poehner, 2008).
2. in the interactionist approach to DA, the mediator cooperates separately with each learner to co-construct ZPDs during different one-on-one sessions and the mediation provided for each student may be (is) different from the one provided for the others (Aljaafreh & Lantolf, 1994). In other words, as Poehner (2008, p. 20) stated, "proponents of interactionist DA follow a case study approach to research and validate their work on the basis of an accumulation of in-depth studies of individuals or groups of individuals."

This study utilized DA to explore EFL learners' reading comprehension which is "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (Snow, 2002, p.11). As students advance in school, researchers suggest reading instruction should become more disciplinary, reinforcing and supporting students' academic performance (Shanahan & Shanahan, 2008). Based on the results of a pre-test and in line with the students' needs or areas of problem, Beck, McKeown, and Kucan (2013) provided some reading strategies such as learning to identify and state the main idea by naming the who or what (the main person, animal, place, or thing the selection is about), telling the most important thing about the who or what, etc. Having analyzed the pretest results, Beck et al. (2013) provided the learners with reading comprehension strategies developed to meet the considerable instructional needs of the at-risk students participating in the study.

Since it is a challenging and unmanageable task for many EFL teachers to provide one-to-one mediation to individual students (Teo, 2012), computer software called Computerized Dynamic Reading Test (CDRT) was originally developed by Pishghadam and Barabadi (2012), which offered the learners pre-fabricated and standardized mediation in appropriate time, i.e., whenever it was requested by the learners. The software also provided the researchers with the learners' scoring file consisting of a DA score, a non-dynamic assessment (NDA) score, the total number of mediation used by each individual, and the amount of time spent on completing the test. The software developers sought to overcome the time-constraint challenge, which is one of the major problems many EFL teachers are

struggling with. Thus, technology was utilized in the study to check the role of the computerized dynamic assessment (C-DA) principles in unifying teaching and assessing in general in future teaching programs using the interventionist DA. Poehner (2008, p. 43) advised that in studies with large cohorts of participants the interventionist DA be used. Due to a relatively large number of participants in this study, the interventionist DA was employed because it "is more in line with Vygotsky's vision of how the ZPD can be used to reorient education to learner development and is therefore more relevant to the classroom."

This section has briefly sketched how teaching and learning have been modified in the digital age and how teachers need to take into due account problems that learners may encounter when reading and writing digital texts in English. Below, some possible barriers in digital literacy will be identified to propose possible solutions in terms of teaching and learning strategies. Next, the development of the needs analysis will be explained, followed by indicating the area of interest for Group 3 (learners of 15-18 age range), i.e. New Travel. Finally, the construction of a web corpus to develop a web browser from the specifications found through empirical data will be described, which emerged during the first stage of project. Some conclusions will be presented, indicating future developments.

2. Literature review

2.1. Dynamic Assessment

DA, which is a pedagogical approach and a development-based activity (Poehner, 2005), is theoretically framed within the works of Vygotsky and contends that, unlike traditional testing methods, instruction and assessment are dialectically integrated. Some key concepts lie at the heart of the notion of DA. The first important notion is mediation; the process by which other-regulated activities are transformed into self-regulated ones (Lantolf & Thorne, 2006). In the same vein, Aljaafreh and Lantolf (1994) proposed a model of mediation from other-regulation to self-regulation in learners, which included five transitional levels starting from the most implicit or indirect to the most explicit or direct. These levels are, in fact, indicative of three stages: object-regulation; other-regulation; and self-regulation. As the theoretical underpinnings of DA, mediation and regulation are of great importance to understand which type of mediation should be offered to whom, at what extent, and when. Practically, this is a tremendous task to do in educational contexts in cases where the interactionist DA is utilized, as "the levels [are] not determined in advance of the study" (Aljaafreh & Lantolf, 1994, p. 471).

According to Lantolf (2000), one of the forms of mediation is regulation. Frawley and Lantolf (1985) defined regulation as the way in which an individual sees a task and also their ability to successfully complete that task. It is one form of mediation that goes through three stages to complete its process. The stages, respectively, are as follows:

In the first stage of object-regulation, individuals use objects in their environment in order to think. That is, an object tells us to do something; a persuasive advertisement, for instance. In this regard, Poehner (2008, p.27) commented that "[a]t the level of object regulation, psychological functioning is controlled by the environment rather than by the individual, and so in response to hunger the individual eats what is immediately available or goes in search of food."

In the second stage of other-regulation, individuals' performance is primarily controlled by someone else (Lantolf & Poehner, 2011). That is, it includes implicit and explicit mediation by parents, peers, teachers, so forth. Here someone tells us to do something; for instance, a mother tells her child to do his/her homework.

In the third stage of self-regulation, minimal or no external assistance is required from the individuals' side to accomplish activities. In other words, individuals establish control over their own performance (Lantolf & Poehner, 2011). We tell ourselves to do something; for instance 'I need to finish my M.A. thesis before Ramadan.' In fact, self-regulation enables us to control our responses in order not to merely act instinctively but instead choose from among possible alternatives intentionally (Poehner, 2008). Preferring not to eat anything in an effort to lose weight while being invited by a friend of yours is an example of this kind.

In this regard, Vygotsky (1978) argued that moving from other- or object- regulation to self-regulation is the primary way in which humans develop higher-order thinking skills. In other words, a learner has to pass from being object-regulated to being self-regulated for development to occur (Summers, 2008). This movement is termed 'Internalization', a process through which higher mental functions are created.

The importance of the type of mediation or interaction which is provided for learners is reflected in Vygotsky's beliefs, who stated that learning occurs as the result of interaction, but not any kind of interaction, i.e. it only emerges as the result of interaction within the ZPD. The theoretical underpinning of DA (Kozulin & Gindis, 2007) implies that potential development differs from actual development (Poehner & Lantolf, 2005). That is to say, what the individual is able to do one day with assistance s/he is able to do tomorrow alone. This means that depending on an individual's ZPD, the mediator should match the provided interaction to that person's potential for better results. Out of what has just been stated, it can

be understood that people's ZPD is not fixed but instead it is a malleable and open-ended trait of them, which can become apparent through interaction and consequently develop the potential for learning, of course, if suitable opportunities are provided (Wells, 1998).

As it is clear from this discussion, not all ZPD-based studies can be conducted without relevant help or assistance. Any assistance from the mediator's side should have two important properties (mechanisms) to be effective: First, it should be gradual, second, it should be contingent. Different researchers have used different terms to refer to these two properties. Summers (2008) referred to these mechanisms as 'quality mediation', for instance. Any help which has these two properties is referred to as 'ZPD-based help' (Tajeddin & Tayebipour, 2012) or 'negotiated help' (Nassaji & Swain, 2000). If it does not have these mechanisms, it is called, according to the just-mentioned studies, 'random help'; that is there is no attempt to adjust the level of assistance to the learner's responsiveness. Aljaafreh and Lantolf (1994) defined the former, i.e., graduation, as help which moves from highly implicit level through more and more concrete levels until the appropriate level is reached. Of course, the assistance from the mediator's side should not be too explicit to let him/her take over more of the activity than is necessary. They also defined the latter, i.e., contingency, as help which "should be offered only when it is needed, and withdrawn as soon as the novice shows signs of self-control and ability to function independently" (p. 468). In another definition, Gibbons (2003, p. 267) stated that contingency consists of the "assistance required by the learner on the basis of moment-to-moment understanding." Tajeddin and Tayebipour (2012) called these two mechanisms as the building blocks of DA and claimed that many academic disciplines have utilized them.

2.2. Dynamic Assessment vs. Dynamic Testing

The difference between dynamic assessment and dynamic testing is reflected in Sternberg and Grigorenko (2002), who remarked that "[i]n essence the goal of dynamic assessment is to intervene and to change. The goal of dynamic testing, however, is much more modest - it is to see whether and how the participant will change if an opportunity is provided" (p. 30). According to Sternberg and Grigorenko (2002), dynamic testing occurs if two components, i.e., assessment and pedagogical intervention, are combined. Therefore, it can be concluded that dynamic testing provides prefabricated mediation for students to find out how much they will or will not change when offered pre-determined assistance.

Although Sternberg and Grigorenko were determined to highlight the differences between these two terms, "dynamic assessment and dynamic testing should not be thought of

as separate enterprises" (Poehner, 2008, p. 17). By the same token, and without considering the differences between these two terms, having chosen Vygotsky's discussion of microgenesis which deals "with the issue of development occurring very quickly (Poehner, 2008, p. 18)", the present researchers adopted C-DA to be used throughout this study to refer to those sessions which aim at unifying assessment–instruction as the basis of the DA procedures.

2.3. Computerized Dynamic Assessment (C-DA)

In congruence with the concept of DA, the computerized dynamic assessment (C-DA) is grounded in Vygotsky's theoretical framework (1978). Some studies have been conducted in the field of education on C-DA.

For instance, Tzuriel and Shamir (2002) conducted a study in the area of C-DA and tailored mediation to learners. They attempted to assess kindergarten children's seriational thinking abilities because they believed that these abilities were central to success in learning mathematics. The prompts have been prefabricated and arranged from implicit ('try again') to explicit (providing more relevant information about the item in question). As it is clear, it follows an interventionist approach to DA because the prompts are prefabricated but since teachers are also allowed to take part in the administration of the test actively, i.e. provide supplemental support for learners who fail to answer the questions correctly, just like interactionist DA. The authors stated that more in-depth diagnoses of learner abilities is provided through this procedure when teachers are present in comparison to the time when the mediation is only provided by computer.

Another study conducted within this domain was the one by Pishghadam and Barabadi (2012). Underscoring the increasing importance of DA in second language and reading comprehension, the researchers magnified the shortcomings of DA and paved their own way for introducing their own developed software called CDRT to examine L2 reading comprehension through C-DA. To justify what they have done, they cited some interactionist studies which based on the authors followed a sandwich format, though such a claim cannot be supported based on the seminal work done by Sternberg and Grigorenko (2002), Poehner or Lantolf. They claimed that the problem of interactionist studies is that the number of their participants is low, while in sandwich format studies the mediation phase and the assessment session are administered separately from each other. In other words, instruction and assessment are not fully integrated in interactionist studies which follow the sandwich format.

They also contended that in addition to these shortcomings, interactionist DA does not take the psychometric properties of testing into consideration.

To solve these problems, Pishghadam and Barabadi (2012) used C-DA which is interventionist and follows the cake format. Though not an unbreakable principle, the general consensus is that the interventionist studies tend to follow the sandwich format because of their assessment-instruction-assessment type. However, the reason why Pishghadam and Barabadi (2012) claimed C-DA, though being interventionist, follows the cake format is the mediation which the CDRT software provides for learners whenever problems arise during the administration of the assessment. Their study can also be regarded as a study in which sandwich format has been used because in addition to the mediation provided in the pre-test for any individual items of the reading comprehension questions, mediation was also provided to students based on their pre-test performance. This mediation was provided for students in a separate way from assessment. That is, while having no assessment session, the students were mediated to be more prepared for the post-test. The following advantages of C-DA were mentioned in Pishghadam and Barabadi (2012, p. 79) as well: "1) reliability and validity are taken into account; 2) many students can be assessed dynamically, and 3) mediation is given at the time of assessment not in a separate session."

The two most prominent figures of DA, i.e., Poehner and Lantolf, carried out a study on the domain of C-DA in 2013 to show its application to larger classes. Focusing on the significance of the instructional quality of mediation, they referred to a phenomenon called 'microgenesis', which Wertsch (1985) considered as a process that provided opportunities for development simultaneously even during a single session. While microgenesis primarily deals with a context in which learners and mediators have a moment-to-moment interaction (Lantolf & Poehner, 2011), their study explored the principles of mediation into a computerized approach to DA. In fact, their study explored microgenesis in the context of C-DA taking L2 Chinese, French, and Russian listening and reading comprehension into consideration. They designed some tests and aimed to differentiate between the learners' independent and mediated performance, to foresee the difference between their mediated and non-mediated performance (learning potential), and finally to reassure evidence of learning by applying the concept of transcendence into the tests. Similarly to Poehner (2005), the number of semesters the participants had spent studying in university (here intermediate level because they had studied four semesters) was taken as a way to determine the participants' proficiency level. In that study two skills (reading comprehension and listening comprehension) were taken into account for the learners of two languages (Chinese and French), with the gain score

or Learning Potential Score (LPS) for any one of these skills and also the reliability coefficient of the tests for the aforementioned skills calculated.

As it is clear, C-DA has several advantages including simultaneous administration to large numbers of learners; providing learners with the opportunity to reassess as many times as they would like; and informing the test takers of their performance in the test automatically after they respond the exam. This, however, does not mean that C-DA is flawless. Though it overcomes some of the shortcomings of other approaches to DA, it faces the same major challenge as all other interventionist approaches such as Group Dynamic Assessment (G-DA): we cannot claim and know how learners' performance would differ if they were provided with other forms of mediation.

3. Methodology

In concomitant with most DA studies (Ableeva, 2010; Lantolf & Poehner, 2013; Poehner, 2005; Teo, 2012), this research also uses qualitative methodology which best fits DA principles (Ableeva, 2010) but it can be regarded as quantitative as well since it follows the interventionist approach to DA (Poehner & Lantolf, 2005). In other words, both qualitative and quantitative research procedures have been used in the study.

This study was guided by the following question: How useful are the scores generated by the computerized dynamic assessment to planning future teaching programs?

3.1. Participants

The participants of the study were drawn from all undergraduates of B.A. Teaching English as a Foreign Language from a university in Iran. From among the 47 available undergraduate students, 32 were non-randomly selected to take part in the study. The participants' age ranged from 22 to 31 years indicating the participants were adults, and English was the second language of these adult learners. The homogeneity of the participants was taken for granted by claiming this statement (also being contended by Poehner, 2005) that the number of semesters the students have spent studying a language shows the proficiency level of whom in that language. Of course, the results obtained from the DIALANG, a free online assessment system to determine learners' proficiency level, were also indicative of the homogeneity of the participants. Among the 32 participants, the results showed that 24 were at the B2 English reading comprehension level, 7 were at the B1 proficiency level, and only one participant was at the C1 level.

The importance of using this study lies in the contradiction between the terms 'advanced', and 'at-risk' learners. Since the participants were seniors, they were considered as 'advanced' students but due to their low proficiency, based on the results obtained from the Placement Test of DIALANG, they were called 'at-risk' too. Therefore, it is of really great importance to reiterate that the tests which have been used in this study were all suitable for 'advanced' level students and that using DIALANG was just to reassure that students were 'at-risk'.

3.2. Instruments

3.2.1. The researchers as tools

It is not possible to separate the researcher from the research in qualitative studies (Merriam, 1997; Summers, 2008). This means that the researcher's impressions and perceptions of events influence data analysis. Due to the social nature of human beings and in line with the Vygotskian perspective, the researcher's role in carrying out qualitative research is demanding. To underscore the inseparable role of researchers in research, Smagorinsky (1995) stated that in the data collection procedure the relationship between researchers, participants, context of the study, and the means of data collection is of high importance. Hence, if a researcher contends to separate qualitative research into the area of SCT from the social situation, it can be stated that researcher has misinterpreted the Vygotskian cognitive theory (Summers, 2008).

Our position is that learning is a socially constructed event and it is thus reflected in the way we teach and assess learners. For us, the environment in which learning occurs is the actual source of learning and that it is not possible to consider learning, instruction and assessment as inseparable. This means that we were participant-observers who held the Enrichment Program (EP) sessions in DA and were actually the facilitators of the C-DA procedure. We also played another role as technology troubleshooter. Therefore, it can be claimed that we were a data collection tool and our presence affected the participants and the data collection. It is noteworthy that the whole data collection was done by the pre-test, the Computerized Dynamic Reading Test (CDRT) developed by Pishghadam and Barabadi (2012) in the post-test, and some Enrichment Program (EP) sessions in between.

3.3. Computerized Dynamic Reading Test (CDRT)

To see whether C-DA could assist the learners realize their learning potential or not, the researchers utilized the previously validated and reliable software developed by Pishghadam

and Barabadi (2012), namely Computerized Dynamic Reading Test (CDRT). With regard to the software, it is worth mentioning that it can easily run on any PC provided that the NET Framework software is installed on it. Students have to enter some information such as their name, age and major (students can choose a pseudonym to remain anonymous for other people but they should say it to the mediator) and after reading the software description go directly into the passage and answer the items while consulting the preplanned hints which are automatically shown if a wrong response is chosen. It takes about two hours to complete the test and after completing it a scoring file is created on the desktop to know about the test taker's performance.

3.4. Procedure

Regarding the design of the study, the following stages were monitored: the pre-test; the Enrichment Program; and the post-test. The first stage, i.e., the pre-test, consisted of two passages which were similar to the texts used in the DIALANG with regard to the degree of difficulty and included items which assessed the same areas the participants showed to have problems with (e.g. their inability to connect the ideas in the passages, their difficulty at identifying the main ideas of texts, etc.).

Having collected the pre-test results and consequently having identified the participants' problematic areas, the researchers determined the number of sessions to be held for the (Enrichment Program) EP (two weeks: two sessions per week; each session one and a half hours).

In the last stage of the design of this study, i.e., the post-test, two scores were obtained through taking the results of the CDRT test as follows: actual or NDA score (i.e., without mediation or the first try of the participants) and mediated (DA) scores. This means that the CDRT which was developed by Pishghadam and Barabadi (2012) was used in the post-test design of this study. Similar to the pre-test, a one-week period was determined to collect the data in this stage too because there were only seven computers available and the participants could not wait there for others to fulfill their job. In this stage which was done individually the students' score gained with the use of hints was termed 'dynamic' score and their score gained with no hint (i.e., their first try) was called 'non-dynamic' score.

In the pre-test, a total of 20 items each worth 5 points were included in the passages in accordance with the areas being questioned in the items of CDRT. It took one week to collect the data in this stage because the tests were in the paper-based form and there was no spacious class for 32 students at our language institute. Before the pre-test stage in which learners'

problems were identified, the EP (EP in DA) comprised an unknown number of instruction sessions and even the time which had to be dedicated to each task was not predictable in advance. This was also underscored by Nassaji and Swain (2000, p. 48), who claimed as follows: "Although it is preferable from research point of view to have equal time-on-task in experimental designs, the nature and the amount of negotiation required in the ZPD condition to complete the tasks collaboratively and successfully was quite unpredictable: it could not be fixed in advance." Hence, it is the participants' pre-test results that can determine the nature and quantity of interaction, not the mediator's intention.

Finally, the post-test stage followed the Enrichment Program. However, on the contrary to the EP, other "mediational sources" such as especially dictionaries were not allowed to be used so that it would be necessary for students to rely for word meaning on strategies such as prediction and hypothesis (Kozulin & Garb, 2002) which were instructed in the EP sessions. It is worth noting that in contrast to actual scores in the pre-test and post-test whose aims were to evaluate the participants' actual level of text comprehension, the purpose of mediated (DA) scores in the post-test was to evaluate the potential level of the students' L2 reading comprehension.

Upon completion of the test in CDRT, the learners were presented with two scores (DA and NDA) and the amount of mediation used for answering the test in a specific span of time. Therefore, to answer the study's research question and identify the more specific and nuanced impacts of the roles of scores generated by C-DA on planning a future teaching program, the participants' scores in nine reading skills were closely taken into account. The usefulness of scores to planning a teaching program which is considered as "an important question" by Lantolf and Poehner was proposed here to see if these scores can lead to designing a syllabus which results in the participants' reading comprehension improvement (Poehner, Zhang & Lu, 2015, p. 346).

Though each participant's scoring profile generated by C-DA was worth investigating, it was not practically possible due to a high number of skills and participants. Thus, since they all yielded high LPSs and due to limitations of space, 6 participants were selected purposively due to their distinguishing actual and mediated scores; 3 from the first 16 and 3 from the second 16 participants, to be explicated. Participants 1, 7, and 16 were selected from the first group, while participants 20, 22, and 26 from the second one. However, they were compared in the following pair: 1 and 22; 16 and 26; and finally 7 and 20.

Participants 1 and 22 were compared with each other because they produced the same actual and mediated scores and hence gain scores and LPSs. One may think that they require

the same amount of mediation or that they have problematic language areas in common simply because they have the same scores or performance.

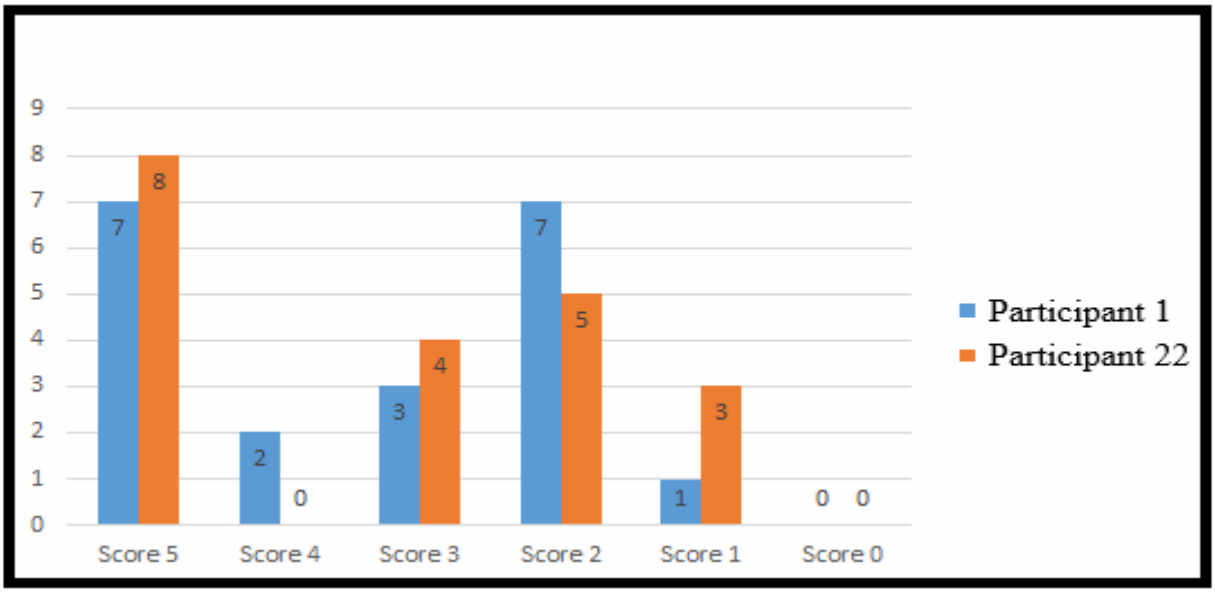

Figure 1. Different levels of mediation required for items by the participants

Investigating their generated scoring profiles unfolded that not only did they have varying problem areas but also they needed different amount of mediation for identical test items. For instance, the Figure shows that Participant 1 responded to 7 items without any mediation but required 1 hint for 2 items, 2 hints for 3 items, 3 hints for 7 items, and 4 hints for 1 item while Participant 22 answered 8 items without any mediation and though he did not score 4 in any items, he required 2 hints for 4 items, 3 hints for 5 items and ultimately 4 hints for 3 items. As it is illustrated in Figure 1, none of the two required 5 hints for any one of the items; meaning that they were able to answer the items before the answer was shown on the screen. As in Poehner et al. (2015), the results of this study showed that simply producing identical actual, mediated, etc. scores does not mean that learners need the same amount of assistance as well. To make sure about their strength or weaknesses in the nine reading comprehension skills, Figure 2 should be consulted.

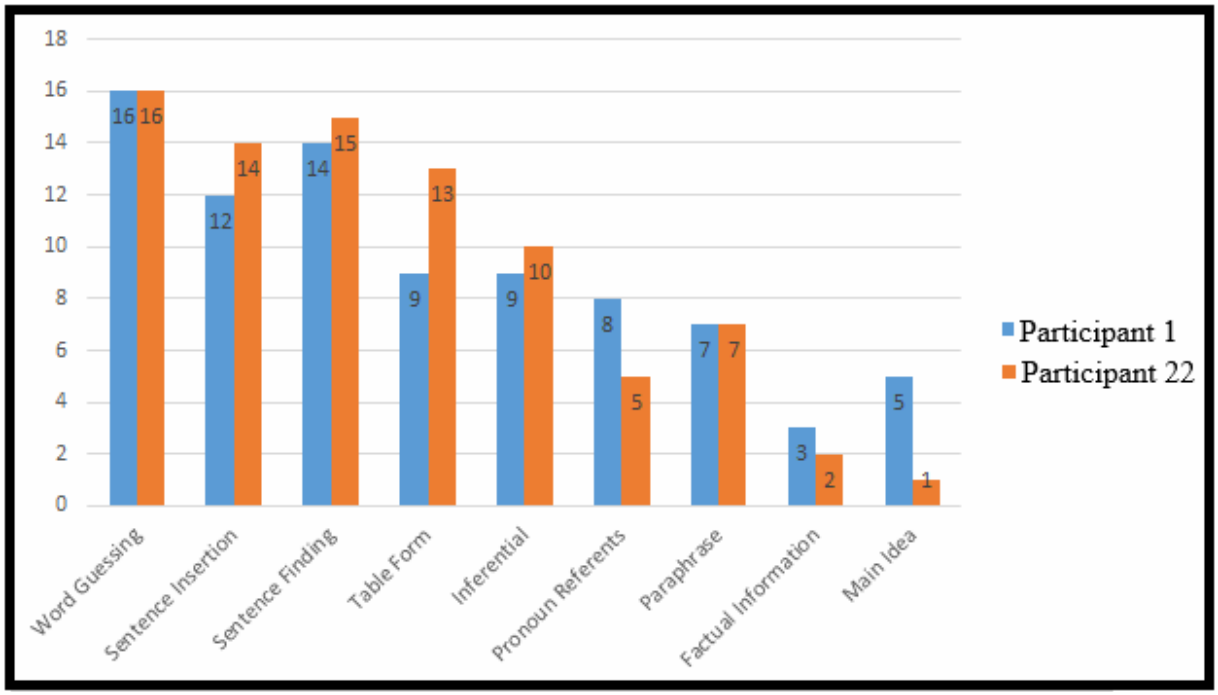

Figure 2. Mediated scores by reading comprehension skills

Figure 2 clearly reveals that even though they performed identically in two skills (word guessing and paraphrase questions), Participant 22's performance was better than his counterpart in the following areas: sentence insertion, where in the passage question (sentence finding), table form, and inferential questions. On the other hand, Participant 1 was stronger in the areas of pronoun referents, factual information, and main idea. This means that the amount of mediation or instruction which should be provided for them varies depending on the specific reading skills; a point which can help teachers with inclusion of different degrees of mediation for different learners in identical items. It seems that mediation required for word guessing and paraphrasing is the same but even a close examination of separate test items might reveal rejection of this idea too (the examination is not included here due to the space constraints).

The performance of Participants 16 and 26 along with Participants 7 and 20 has been also compared with each other, and similar to the previous two participants their levels of required mediation has been examined along with their mediated scores in all nine skills. Participants 16 and 26 who produced the first two lowest scores in the pre-test (10 and 20 respectively out of a maximum of 100) turned out to have an incredibly high learning potential. Figure 3 reveals their improvement under mediation.

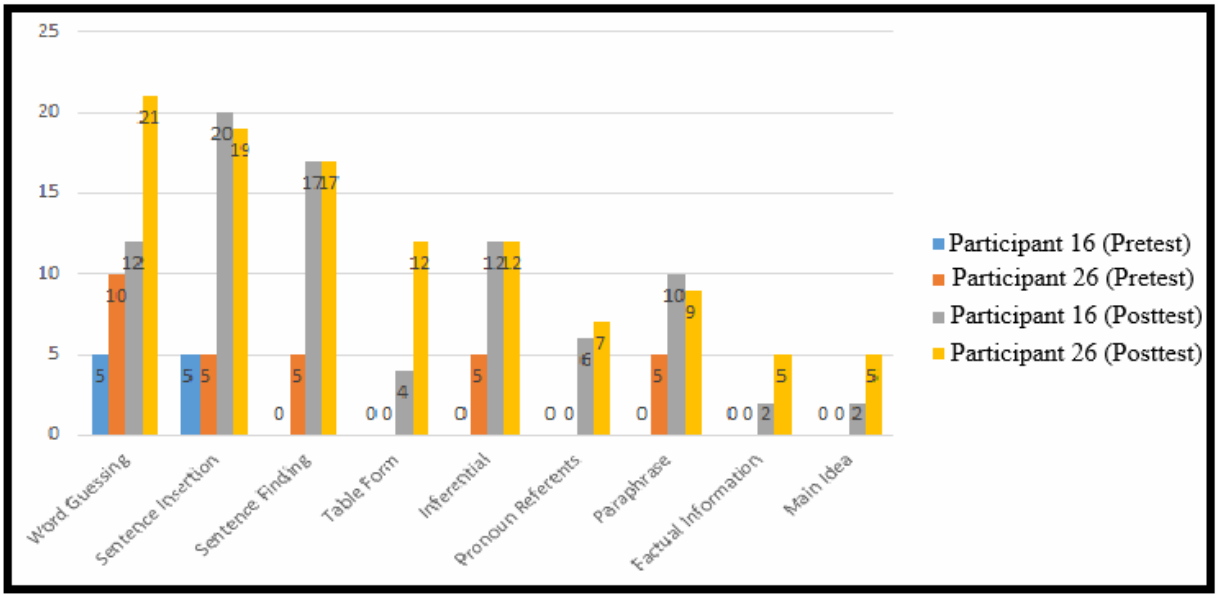

Figure 3. The participants' pre- and post-test scores in each nine reading skills

Note: In case there is no bar, it means the participant received a score of 0 in that skill.

Figure 3 shows both participants' pre- and post-test scores in each nine reading skills. As illustrated, neither of them produced high scores in the pre-test but they unfolded their responsiveness to mediation, which resulted in producing much higher post-test mediated scores as in the participants in Lantolf and Poehner's (2013) study. Grouping the CDRT test items based on the targeted reading comprehension skills showed their more detailed performance. Comparatively, though Participant 16 showed to be equal to Participant 26 in the areas of sentence finding and inferential questions and even better but only in the areas of sentence insertion and paraphrasing, she seemed to be weaker than Participant 26 in the areas of word guessing, table form, pronoun referent, factual information and main idea questions. Instructionally, C-DA is utilized here to uncover and compensate for what traditional testing neglects; based on NDA testing these two participants were not expected to improve but C-DA paved the way for their development. The results revealed that these two participants were actually gainers (to use Budoff's term) because they benefited from the provided intervention markedly (Poehner, 2008; Poehner et al., 2015). Thus, the results were in total discrepancy with the results of Budoff's study, in which some learners were non-gainers in the pre-test and "showed little if any improvement after mediation, performing poorly on both the pre- and post-test administrations" (Budoff, 1987; as cited in Poehner et al., 2015, p. 340).

Therefore, grouping learners simply based on their pre-test scores into high scorers, gainers, and non-gainers would lead to discarding those who can outdo others under graduated and contingent mediation. This would also be in contrast to Vygotsky's opinion

under which understanding an individual's full ZPD exclusively by relying on his/her ZAD is not true. The problem may arise from "lack of fine-grained mediation attuned to the specific needs of individuals", which is one of the "distinct disadvantages of the [interventionist] approach" (Poehner & Lantolf, 2010, p. 318).

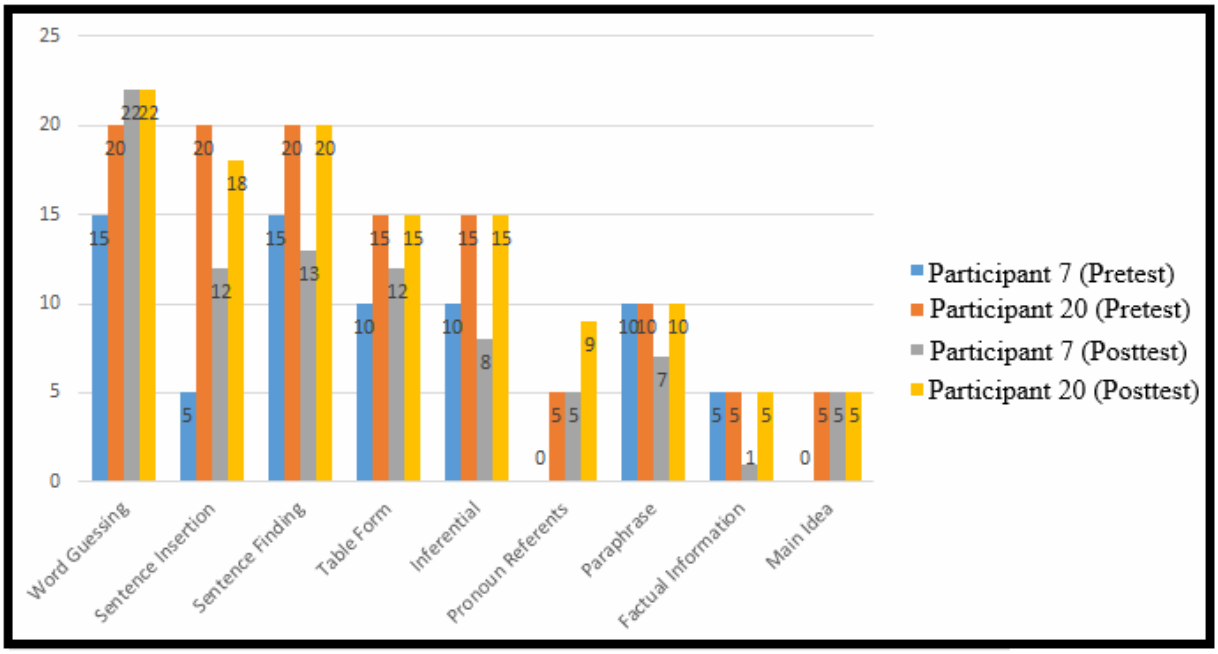

Figure 4. The participants' pre- and post-test scores in each nine reading skills
Note: In case there is no bar, it means the participant received a score of 0 in that skill.

Unlike the ones in the previous Figure, both participants demonstrated in Figure 4 are the two highest scorers of all. Regarding learners of this type, Ableeva (2010, p.120) stated "pre-training [another term for Budoff's high scorers] scores indicate the child's ability to perform on the task independently." The participants' full profile on pre- and post-test performance is illustrated in Figure 4, depicting their high actual (pre-test) scores; especially those of Participant 20. Relatively speaking, Participant 20 who gained only 2 points seemed to have replicated her pre-test scores but that was not the case. She scored higher in the sentence insertion questions on the pre-test (20) but due to her unresponsiveness to mediation she decreased her score to 18 on the post-test. Except for the skills of word guessing and pronoun referent in which she improved her scores (to 22 out of the maximum of 25 and 9 out of the maximum of 10 respectively), her post-test performance was identical to her pre-test one in the other remaining skills.

Regarding Participant 7, it can be observed that, unlike Participant 20 who had identical pre- and post-test scores in some skills, she just improved her scores in some skills,

deteriorated in some others and did not score identically in any skills. For instance, she gained 7, 7, 2, 5, and 5 points for the skills of word guessing, sentence insertion, table form, pronoun referent and main idea questions respectively whereas her scores decreased in the skills of sentence finding, inferential, paraphrase and factual information questions to 2, 2, 3, and 4 points respectively. This backsliding under mediation is also highlighted by Poehner et al. (2015) who explained that even if individuals answered correctly to items, it does not mean that they have not used guessing to reach the correct answer. This is also in line with Vygotsky (1978), who argued that both progressive and also regressive moves are involved in development. Backsliding was experienced by the participants of Ableeva's (2010) study during NDA2 compared to the TA1-IP. In this regard, the software programs for the Transcendence (TR) developed by the researcher shortened reaching the response by guessing through offering explanation for those who score correctly at the first attempt. This is considered as the commitment of DA to supporting learning opportunities by Poehner et al. (2015).

However, readers should be cautioned against getting confused with the gain scores. Earlier it was stated that Participant 7 only gained 13 points under mediation but this Figure shows a lot more than 13; it is because of investigating skills in this nuanced Figure. Items 1, 14, and 15 could be answered by more than one skill and their inclusion increased the number of gained points remarkably. In general, the results are in line with Budoff's proposal under which high scorers had little room for development under mediation owing to their perfect performance on the pre-test. They were also supportive of Poehner et al.'s (2015) study. Optimistically, the future teaching programs should pay attention to high scorers as well since there is no endpoint for development (Poehner, 2008) and producing a high score on a test does not mean lack of flexibility of an individual's level of ability; regardless of whatever it is, as was also stressed by Lidz and Gindis (2003).

In conclusion, counting solely on individuals' pre-test scores to group participants as high scorers, gainers, and non-gainers and subsequently design effective lesson plans might be an insufficient factor (Poehner et al., 2015; and Teo, 2012) as it minimizes the possibility of microgenesis (Lantolf & Poehner, 2013). That is to say, applying DA provides teachers/researchers with a bigger and more nuanced picture of individuals' performance. Hence, in case two learners earn identical scores in the pretest, it does not necessarily imply they have the same proficiency level. Similarly, it is not justifiable to discard low scorers exclusively due to their pre-test performance or consider high scorers as the best performers forever. In this study, the high scorers' trivial improvement under mediation might be due to

applying C-DA, the interventionist approach to DA, which considers "variation across examinees" based on Poehner (2008, p. 25) as "a function of the number rather than the content of the hints, since these are standardized." This means that the shortcoming can be overcome in case both amount and quality of mediation is included over time for individuals.

Practically, this is not possible since the interactionist DA would be beneficial to case study research hence its applicability to large cohorts of individuals is under question (Poehner, 2008). One of the advantages of the interventionist approaches to DA, especially C-DA, is their efficiency, as they provide teachers, researchers, etc. with the opportunity to administer the approach to large numbers of individuals simultaneously and repeatedly (Poehner & Lantolf, 2013; Poehner & Lantolf, 2010). This issue makes application of the interactionist approaches to DA problematic in syllabus design; theoretically, or formal assessment contexts; practically. Besides, owing to its nature of reliance on standardized mediation, C-DA can easily generate each individual's separate scoring profile containing numerical scores which lend themselves easily to psychometric analysis (Poehner & Lantolf, 2010).

5. Discussion and conclusion

This study aimed at identifying the more nuanced impact of scores generated by C-DA on planning a future teaching program; a point which is indicative of the pedagogical implication of the C-DA method. The findings of this study can confirm the practical value of the EFL computerized dynamic assessment procedure through providing in-depth information about various learning needs of the students who have the same standard performance scores. Based on some studies such as Kozulin and Garb (2002) it is confirmed that students with a similar performance level show different, and in some cases drastically different, ability to learn and use new text comprehension strategies. This can confirm the usefulness of DA both in cognitive performance and in such curricular domains as EFL learning.

Through analysis of the obtained results, it was found that C-DA has many advantages. For instance, one of the greatest advantages of the C-DA program is its provision of mediation or intervention when it is required; a point which was underscored by Aljaafreh and Lantolf (1994) who stated that intervention should be provided in gradual progression. In other words, students are provided with hints (mediation) in the C-DA program only if their answers are incorrect. Due to following the interventionist approach to DA in the study and also in order to make the C-DA more systematic, the researchers, in line with Pishghadam, Barabadi, and Kamrorood (2011); Teo (2014); and Shabani (2012), preplanned a series of

mediation (5 hints for each question) which began with the most implicit hints and progressed gradually to the most explicit ones. The C-DA procedure succeeded in overcoming some of the shortcomings of DA approaches such as being time-consuming to administer DA in each class, requiring a fully energetic mediator to take charge of such classes, assessing a smaller number of individual students along with the problem of their age, etc. which there was a general consensus over them by Haywood and Tzuriel (2002), Haywood and Lidz (2007) and Poehner (2008).

Despite such advantages, dynamic assessment has some limitations in its application; that is why it is not used in formal educational contexts a lot. This issue concerned the researchers to take some measures in making DA applicable. For instance, as Pishghadam and Barabadi (2012, p. 73) remarked, "feasibility and concern for psychometric properties of testing are issues that have limited the use of DA approaches." Low number of participants who can be allowed to take part in DA studies and the participants' age are also among its limitations. Haywood and Tzuriel (2002), Haywood and Lidz (2007) and Poehner (2008) all agree upon two more shortcomings of DA: first, it seems it is time-consuming to administer DA in each class and it needs a hyperactive and energetic teacher (mediator) to take charge of such classes. Moreover, DA practitioners worry about its reliability and validity. In addition, since most of the English classes in Iran are large in size, applying the DA procedure, i.e., providing human-to-human mediation to each individual learner, can be unrealistic. Unknown number of instruction sessions or not having "equal time-on-task in DA experimental designs (Nassaji & Swain, 2000, p. 48)" is another problem of DA because in research viewpoint it is preferred to have a certain number showing equal time-on-task. Previously other problems of DA were related to lack of adequate knowledge base and expertise in the field (Haney & Evans, 1999) but due to the increasing interest of some expertise in the field these DA limitations are partially addressed in recent studies.

Furthermore, one of the most important points which still needs exploration is the time which each individual spends on doing a task or test. In the same vein, investigating the relationship between the total amount of time spent on completing a test and the individuals' level of ZPD would either support or reject the argument that those who possess higher ZPD levels require less time to process and perform language activities (Shabani, 2012). In the current study, the overall time each learner spent on responding to all of the items (both in CDRT and in CDRAT) was shown in the scoring file upon completion of the tests, but it was not investigated here because of being far from the aims of the study. Further studies could do so, as well measure the time each learner spends on each item and then examine the

relationship between the overall time and ZPD levels and/or the time spent on each item and ZPD levels.

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INTERACTION ANALYSIS IN AN INTERNATIONAL ASYNCHRONOUS LEARNING ENVIRONMENT

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Abstract

Interaction Analysis has been explored for the initiating topics, turn taking, and asking and answering questions in face-to-face learning environments during the last decades. This study investigated the form and sequence of the questions and answers in an asynchronous environment from a non-interventionist point of view. To conduct the research, 16 questions and answers from the discussion boards of an eight-week international online research course from 30 participants were copied, classified, and analyzed according to the Hmelo-Silver and Barrows' (2008) grid. All the questions were classified as long-answer, short-answer, and task-oriented questions and their frequencies were calculated. Also, the presence of the Initiation, Response, and Feedback/Inquiry (IRFI) pattern was examined

The results indicated that the largest number of questions fell under long-answer types and the participants were more motivated in responding the long-answer queries relating directly to the immediate studied materials or asking about definitions and personal ideas. The findings supported the idea that IRFI pattern might not be applicable in asynchronous environments. Therefore, the instructional patterns need to be designed carefully according to the needs of the new contexts. This study could enhance meaningful interactions in online educational settings such as language learning, teacher training, and professional development.

Keywords: Interaction analysis; asynchronous learning environment; face-to-Face learning environment; synchronous learning environment; IRFI

1. Introduction

Physical distance has led to an increasingly developing variety of online learning techniques in education, such as webinars, videoconferencings, virtual classrooms, and discussion forums. Studies show that today four million American students are taking online courses (Allen & Seaman, 2008). In most educational systems, the virtual spaces are preferred to face-to-face teaching and learning environments in the professional development of teachers and

graduate students (Silva, 2013). On the other hand, 90 percent of the institutions in the United States hold asynchronous online courses and 80 percent would use it as the primary mode of their courses (Waits & Lewis, 2003; cited in Andresen 2009). Thus, the new developments require creative ways of studies on the analysis of interactions between participants in general and the type of questions and answers they employ, in particular, to improve the quality of teaching and learning in virtual learning environments.

Early classroom discourse analysis started when scholars such as Kumaravadivelu (1991) found some mismatches between the teachers' intended meaning and learners' interpretation (Tsui, 2012). Regarding the distance between the teacher and learners in terms of time and place in virtual classrooms and, hence, the gap between the stages of initiation, response, feedback, and inquiry modes (IRFI) within asynchronous learning environments, today, the same mismatches are realized as obstacles in the online courses between the tutors' intended meaning in questions and the participants' answers and comments on the discussion board of online courses which may lead to serious learning problems (Andresen, 2009).

Previous studies have based their analysis of discourse in virtual environments on the patterns of interactions (Powers & Fuller, 2001), discourse functions (Sotillo, 2000), the quality of interactions (Kanuka, 2011), the characteristics of interactions within a specific website (Millard, 2010), and the discourse analysis of teachers (Zayed & Bali, 2015). However, very few investigations in the literature have paid attention to the elements of interactions such as questions and answers and the relationship between the type of questions and the participants' contribution in discussions in an asynchronous environment.

The aim of this research is twofold. First, employing Hmelo-Silver and Barrows' (2008) model, categorizing the type of questions and responses in order to find whether the type and content of the tutors' initiation questions affect the type of the participants' answers and their contributions. Second, examining the sequence of the IRFI pattern in an asynchronous environment to address the difference in sequencing in online spaces. Then, through its findings, the study states the implications for improving teacher discourse, teacher-student, and student-student interaction, and need for designing new instructional patterns in online training.

2. Interaction in virtual environments

As the Internet is globalized and online communication among people is more socialized, a plethora of online platforms is designed for different purposes. Sometimes, different groups of participants or organizers create localized networks for specific purposes to facilitate

interactions among group members (Davies, 2008). In educational settings, the online context is used for conducting courses, conferences, webinars, and so on. When the context of communication among educators changes, inevitable discourse changes are expected in the new context accordingly. They create new ways for effective interactions such as sound effects, hyperlinking, and emoticons that affect meaning and interpretation (Davies, 2008). Therefore, as the variety of online contexts for virtual education increases, so do the complex patterns of online interaction analysis in education.

Herring (2001) defines computer-mediated discourse as the type of communication between human beings through networked computers. Similarly, as one type of computer-mediated communication, Virtual Asynchronous Environment (VAE) can be defined as an internet based system of education through which the instructor posts clear topics, readings, and activities on the introduced platform and the learner does the required assignments on his/her own pace using the 'anytime/anywhere' system of education (Silva, 2013).

Sotillo (2000) investigated discourse functions via synchronous and asynchronous discussions and stated that discourse features in these modes of online communication are different and that can be employed for varied instructional purposes. Sotillo stated that there are similarities in discourse features between asynchronous discussions and question-response evaluation sequence of traditional language classrooms; however, the identified discourse functions are different from those present in synchronous discussions. In another study, Silva (2013) examined the interactions in a virtual learning environment for pedagogical training and suggested conducting further studies on the analysis of foreign teachers' discourse. She also claimed that interventions would improve if the teachers used the virtual communication spaces systematically.

However, dealing with the importance of interactions as a crucial component of online discussions, Woo and Reeves (2007) emphasize the role of the instructor in creating and leading meaningful interactions and state that it is difficult to find meaningful interactions and learning in online discussions. They practice more opinion sharing rather than discussions. Woo and Reeves suggest increasing the quality of asynchronous web-based learning and believe that there is considerable room for improvement of design and utilization of interactive learning environments. Also, in a review, Andresen (2009) argues about the importance of the instructor and the achievement of deeper learning in the literature. He believes that deeper cognitive complexities require spontaneous questions and answers to be clarified, which is something that it is lost in asynchronous learning environments. Consequently, the role of the form of questions in understanding concepts is emphasized and

it is believed that it necessitates the analysis of questions and answers which are posted on the platform. Andresen also highlights some obstacles of asynchronous environments, such as time and place in problem-based discussions and suggest that instructors should be aware of the type of the appropriate questions for these kinds of learning spaces.

An and Levin (2001) analyzed messages on a web board discussion recorded from two graduate classes and identified six major patterns of online educational discourse: inquiry-based discourse, information sharing, reading reflection, analytical evaluation, argumentative discourse, and project-based discourse. Focusing on the instructional patterns found in asynchronous communication, they compared the identified patterns to those found by Mehan (1979) in his analysis of the traditional classroom-based instruction. Accordingly, they suggested designing online instructions in terms of opening, main discourse, and the transition of Mehan's study.

Another study on the patterns of online communication was conducted by Powers and Fuller (2001), who traced students' interaction in an asynchronous learning environment and its impact on collaborative learning. They came to similar conclusions as An and Levin's study, proving that the functions of asynchronous communication follow a traceable pattern similar to the traditional educational environment.

The classroom discourse structure consists of the four moves: teacher Initiation (I), Student response (R), teacher Feedback (F), or Evaluation (E) of the students' response. Studies show that the IRF structure provides most classroom interactions (Wells, 1999). In a study, Laferriere and Lamon (2011), following their previous paper (Laferriere & Lamon, 2010), described knowledge-building principles and knowledge forum. In their paper, they focused on the kinds of questions students asked and their subsequent discourse/ explanation. They used Hmelo-Silver and Barrows' (2008) model and demonstrated that the observed level of explanation in student discourse contrasts with the IRE classroom discourse structure. Actually, finding this contrast led to provide the IRFI (Initiation, Response, Feedback/further inquiry) pattern as a pattern of classroom sequence in an asynchronous context.

3. The study

The present study was conducted to establish whether the type of the initiated question by the teacher affects the type of responses and to examine the interaction sequence in an asynchronous environment. It was executed within the discussion sections of an international online course named "Developing your Research Project" which was conducted by two professors from The University of Southampton and monitored by the Future Learn

organizers. The students who participated in this online course were 189 learners from different countries who could select one of the professors to follow his/her feedback or to post any further inquiries. The course was an eight-week online course. Once a week, on Mondays, instructions along with the assignments were posted on the specified platform introduced from the organizers at the time of registration through the participants' emails. The participants completed the posted assignments, step by step, at their own pace during the week. Each pack of a week was named with a main topic and consisted of three or four parts, each with a specified subtitle. Instruction and assignment pack included articles, reviews, videos, exercises, and discussions. Each pack of a week started with an introductory video and ended with a section called "Summary Activities" consisting of a review of the week contents and a reflection move. Reflection was triggered by questions asked about the learners' ideas about the usefulness and the quality of the materials during the week. A feedback page was designed on the platform of the program to answer the learners' further questions or posting feedback in relation to their assignments. The participants could check this page at any time they needed. A sample page of the platform is presented in the Appendix. It should be mentioned that a written permission was received from the course organizers to use the required sections of the course. They agreed upon referencing the team and keeping the participants' names unidentified for the purpose of the publication.

In most recent studies, interaction analysis has been described in different ways. Powers and Fuller (2001) used Salmon's (2001) model of learning in the asynchronous environment based on the levels and types of interactivity. This model was suitable for investigating the levels of satisfaction with the environment. Also, in some studies, the scholars distinguished knowledge-building discourse from problem-solving discourse in their analyses. They focused on problem-based learning in specific contexts (Scardamalia & Bereiter, 2006). However, in the present research, to analyze the interaction between tutors' questions and participants' answers within the pattern of IRFI (initiation, response, feedback/inquiry), Hmelo-Silver and Barrows' (2008) model was considered suitable and applied. The model identifies three groups of questions: task-oriented questions (monitoring, need clarification, and request/directive), short-answer questions (verification, concept completion, and quantification), long-answer questions (definition, example, interpretation, and judgments).

The total population who registered for the online course of "Developing your research project" in an asynchronous environment consisted of 1,539 international learners, male and female, from different majors, out of which 189 participants remained active by the

end of the eighth week. To answer the research questions, the total of 17 discussion sections were copied from the archive of the FutureLearn platform where the last 30 answers to the postings were selected, described and analyzed from each. It means that for each discussion section, there was one question and 30 answers.

According to Silva (2013), the interactions between participants in online courses should be available to the investigators in order to be carefully analyzed and interpreted. Since the data for the present study were collected from an asynchronous learning environment, the instrument for data collection was the platform of the course from the University of Southampton.

4. Data collection and analysis

To collect data for the purpose of the present study, analysis and interpretation of the moderators' postings and the participants' answers, a written permission was received from the team of the organizers through sending a request email stating that the FutureLearn Organization and the University of Southampton would be referenced and the participants would be kept anonymous during the analysis and at the time of the publication. Then, during eight weeks of conducting the course, all discussion sections through which the questions were posted and the participants answered or commented were selected from the packs of weekly instructions and assignments. In each week, two discussion parts were included. Only the first week had three discussion parts because the first one was allocated to asking participants to introduce themselves. The first question of the first week was not included in the analysis since it was used to collect learners' personal information if needed. Therefore, a total of 16 questions and 480 responses (for each question 30 responses from the active participants were selected) were copied and saved from the archive platform of the University of Southampton. Table 1 illustrates the number of discussions, participants, and the main questions for each section.

Table 1. A schematic representation of the selected questions and the number of respondents for each

WEEK	**Number of participants**	**Main questions**
WEEK 1		
Discussion 1	1,539	Where are you from?
Discussion 2	1,291(83%)	What do you think you can gain personally from undertaking a research project?
Discussion 3	830 (53%)	Reflection: What have you found to be good, useful, or interesting this week?
WEEK 2		

Discussion 4	503 (32%)	Why keep a learning/ research log?
Discussion 5	490 (31%)	What did you find that was good or interesting about the peer review activity?
Discussion 6	382 (24%)	Reflection: What have you found to be good, useful or interesting this week?
WEEK 3		
Discussion 7	359 (23%)	Reflection: What have you found to be good, useful or interesting this week?
WEEK 4		
Discussion 8	337 (21%)	What do you think might be a suitable methodology and why?
Discussion 9	230 (14%)	Reflection: What have you found to be good, useful or interesting this week?
WEEK 5		
Discussion 10	225 (14%)	How can you become proficient at note taking?
Discussion 11	205 (13%)	Reflection: What have you found to be good, useful or interesting this week?
WEEK 6		
Discussion 12	170 (11%)	Is there anything about referencing that surprised you?
Discussion 13	183 (11%)	Reflection: What have you found to be good, useful or interesting this week?
WEEK 7		
Discussion 14	216 (14%)	What is your preferred way to write and why?
Discussion 15	128 (8%)	Reflection: What have you found to be good, useful or interesting this week?
WEEK 8		
Discussion 16	140 (9 %)	What can we learn from others about presenting well?
Discussion 17	189 (12 %)	Reflection: What have you found to be good, useful or interesting this week?

For the purpose of finding the relationship between the type of the questions and answers and examining the IRFI pattern in an asynchronous platform, the questions and answers were collected from the course archive and analyzed using Hmelo-Silver and Barrows' (2008) model. In order to identify the relationship between the type of the questions and answers, the questions were classified into three categories of task-oriented questions, short-answer questions, and long-answer questions. Then, the answers to each question were copied, analyzed, and interpreted with respect to the relativity to the questions and in terms of the quality to find out to what extent the intended meaning of the tutors' was achieved. In the end, the pattern of interactions was examined against the pattern of IRFI in a face-to-face classroom interaction. Table 2 presents the classification of the questions (Initiation move) and the number of responses to each type.

Table 2. Types & number of questions on the Initiation move & the number of responses

Type of the Qs	**Task-oriented Qs**	**Short-answer Qs**	**Long-answer Qs**
# Discussions	2, 4, 5, 8, 12, 16 (35%)	12 (5%)	3, 4, 6, 7, 9, 10, 11, 13, 14, 15, 17 (64%)
# Responses	20.8 %	5%	19.8%

Table 2 shows that 35% of the initiation questions were of the task-oriented type, 5% were short-answer questions and 64% were long-answer questions, which indicates the largest body of the questions. Concerning the responses to each type of questions, it is observed that 20.8% of the participants responded to the task-based questions which is the largest number of participants, only 5% answered the short-answer question (Discussion 12), and 19.8% answered long-answer questions.

5. Findings

The asynchronous educational spaces are different from other environments. Such online programs allow for multiple responses to one single question, are considered as threaded discussion forums and are not time-dependent. Moderators try to facilitate communication among the participants. In respect of the present study, on Mondays, the initiation questions were posted from teachers and students would complete the assignments at their own pace. If some of the learners fell behind with some tasks in the prescribed time, they could complete them later. The responses to questions were stored on the platform so that the other learners could read and comment on them. Both teachers monitored the participants' responses during the week and commented on some ideas or answered follow-up questions from learners. In order to understand how the type of the questions affects the type of the answers and to describe the IRFI interaction pattern in an asynchronous environment, all 16 questions and 480 responses were classified into task-based, short-answer and long-answer and described

Discussion 2 includes one main question following a clarification statement so that the learners know how to answer the question and how to do the tasks in a virtual environment. It concerned the things the learners can gain from undertaking a research project:

- "What do you think you'll gain personally from undertaking a research project?"
- "Do look at the other learners' responses and try to respond to at least one other comment as this will help generate discussion between you. You can also 'like' comments that you find particularly interesting or relevant."

This question is a task-oriented one that was posted under the title of "Why do academic research?", after exposing the participants to a couple of videos about "Academic Research" and "Why are the transferable skills important in research?". The question includes underlying thinking and makes a connection to previous sections of the lesson. In response to this question, 1,291 (83%) learners out of the first 1,539 registered group gave their answers. As it was mentioned in previous sections, for the manageability of the study, the last 30

responses were included in the data collection procedures. Most responses were directed to the intended meaning of the tutors:

- *Improving my communication and response others as positively by using course materials.*
- *Independence, knowledge, meeting timely deadlines and how to use research resources usefully.*
- *I have many subjects in which I would like to research and become a research writer in as many subjects as possible. Research gives a multi-dimensional outlook for approaching any subject. The way of approach gets enriched by research. If I research in Marine Science and International Relations, I can enhance my knowledge in both Arts and Science. I can further my research and become useful.*

However, a few irrelevant or indirect long and short responses were given as well:

- *If I am undertaking a research project, according to the Chris Fuller (lecture_1. 5) Instructions and carry out, then I will give the guarantee of my success.*
- *An experience of what university will be like as the majority of that is an independent work. There is also the aspect of gaining an idea of what you will actually study at university which is also interesting to know before you go there.*
- *I am new to Futurelearn, and this course fits in perfectly with my Bachelor's of Media and Specialist Pathways. My course is compiled with cultural research on how we have a close relationship to mass media. I feel, since I am going into the Communication/Nursing field, I need to have a good understanding on how to compose a critical methodological framework, that can be original yet can be understood by different theorists. These transferable skills are needed for me to move from the media field in the health communication field.*
- *To develop the transferable skills in me.*
- *It will help me in college.*

Out of the analyzed responses, only one of them included an inquiry which led to further interaction between 2 participants. Also, there were 14 interactions among the respondents through just liking the others' ideas.

Discussion 3 was a reflective question about the participants' ideas about the quality of the materials during the week. It is a type of open-ended and long-answer question that follows a second stimulating question in order to seek more collaboration and feedback. The

question is: "What have you found to be good, useful, or interesting this week?" and "What questions, if any, have arisen for you?" Immediately after the questions, a reminder appears that encourages students to respond to others' comments and generate discussions. Only 830 (53%) learners answered this question and left their comments, which were almost half of the total number of the candidates (1,539) on the first day. The answers were one-word, two-word, or given in a couple of long sentences explaining the favorite parts of the week. In spite of the tutors' effort to encourage learners to engage in discussions or generate more questions, one of the responses was realized to be irrelevant and none of the participants posted any further questions arisen for them. Also, 16 learners liked the comments and only 3 of them commented on the responses.

Discussion 4 was posted on the second week of the program after an introductory video. This part included a long-answer question such as: "Why keeping a learning/research log?" Then, tutors continued with a few lines of explanations about how to keep a track of the research. The following questions were: "Why else do you think keeping a learning research log could be useful? Can you think of any tools or apps that might help you with this? Or have you got any experience of using any of the tools that are mentioned?" The main question includes an underlying assumption related to the course materials, seeks the reasons and is an initial explanatory query. In addition, it is a task-based question that is followed by a few mixed types of questions requiring long and short responses. However, in spite of the tutors' attempts to encourage all the participants with different learning styles to respond and comment on the platform, the number of the participants who responded to this question decreased to 503 (32%). Some of the short and long responses were as follows:

- *Research is time consuming and often without a research log, there is a loss of organization. Keeping a research log allows you to keep track of all the information gathered and their sources which will help in the long run.*
- *As explained, it enables the researcher to keep track of the development/progress of work from one stage (crude or ambiguous...) to another stage (more perfect and well structured).*
- *Evernote all the way!*
- *Have any one of you used a software called the brain?*

As it is realized, the first and second responses are answers to the first question in a comprehensive way. However, the learners have not provided any idea for the following questions. The third response is a short and direct response to the second and third questions

that does not present any reason for using any software. The last response is not related to the posted questions and the learner asks a similar question from other participants. A careful analysis of the responses shows that only a few participants answered this part completely.

Discussion 5 concerned the quality and usefulness of the peer review activity. In this section, a question followed the main question in order to stimulate the participants to think more deeply in relation to the previous assignment that was a peer review task. A reminder appears after the questions in order to make connections to the research log that was introduced in the previous activities and to receive and reflect on the others' assignments. Respondents to this section were 490 (31%) learners. Responses to this section also included short and long sentences or even one phrase like: "very good". Mostly they appreciated their peers for their feedback on their activities, not a clear answer to the posted questions. Only one comment appeared on the board and 10 liked the peers' ideas. None of the responses included any further question, according to the content of the queries.

Similarly, further reflection questions (Discussions 7, 9, 11, 13, 15, 17) include almost the same number of irrelevant, short, and long responses which indicate a type of misunderstanding or mismatches between questions and answers. Among other discussion sections during the following weeks, Discussion 16 and the relevant responses were radically different. The main question was: "What can we learn from others about presenting well?" Then, the tutors give an explanation about "presenting research projects and how to present well". The questions were followed by a list of seven step-by-step tasks in relation to the main question. The list of the activities appears below:

1. *Describe a situation where you saw somebody present really well.*
2. *List the characteristics of those presentations that you have really enjoyed and found most useful.*
3. *List the characteristics of presentations that have bored or confused you.*
4. *What is your preferred method for presenting and why?*
5. *What are your biggest fears when it comes to presenting?*
6. *What do you think are your strong and weak points?*
7. *How have you thought you might overcome some of those fears and weaknesses?*

To answer the questions of this section and to do the required activities, 140 (12%) participants posted their responses. Although the number of the respondents declined, they covered all the parts of the question.

Having analyzed the number of participants keeping track of the activities and the categorization of the types of questions, it can be observed that 35% of the questions were

task-oriented questions, 5% short-answer questions, and 64% long-answer questions. Also, the decreasing number of participants indicates that less than 10% kept track of the activities to the end of week 8, which shows weak interaction between tutors and participants. Furthermore, the results indicate that less than 50% of the learners made comments on their peers' work, liked others' comments, or referred to the tutors' feedback. A review of the percentages of the interactions and the type of the questions and answers reveals the fact that there might be a kind of lack of interest, technology illiteracy, or time management problems regarding keeping up with the pace of the course assignments.

6. Conclusion

Technological innovations and expanding use of computers and exploiting the Internet as a means of interaction have appeared to be some of the inevitable aspects of people's lives. Through this global revolution, educational institutions have been successfully evolving to be able to compensate physical distance by developing a myriad of systems and tools to be incorporated to achieve a variety of educational goals. Accordingly, instructional materials have been shifted into downloadable texts through platform delivery system within different online environments. These improvements have shed light on the importance of studies of interactions in virtual learning spaces, in general, and teachers' discourse, in particular.

The present study was designed to determine the relationship between the type of questions and responses, which are the most important elements of classroom interaction and the learners' participation in an asynchronous learning environment. Moreover, the current study set out with the aim of analyzing the sequence of classroom interaction, IRFI, in such spaces.

The findings indicate that the largest body of questions fell in the type of long-answer questions (64% of the questions presented in 16 discussion boards). The number of the participants who responded these questions were 19.8%, which indicates a kind of interest among learners to collaborate in responding the long-answer questions asking about definitions and personal ideas about the course materials. The lowest percentage of responses was achieved for the short-answer question (5%) that was only one yes/No question asking about any referencing that surprised them. The lowest number of respondents participated in this section of discussions. The remaining questions fell in the area of task-based questions, whichs occupied 35% of the questions with the most number of participants.

It can be noticed that learners may be more motivated to answer the questions when the queries make direct connections to the immediate materials that they had studied. Also,

the number of irrelevant responses to each of the questions may point to some probable misunderstanding between the tutors and the learners or some mismatches between the types of questions and answers. In addition, the examination of the sequence of interactions and the number of participants in each mode indicates that as long as the course proceeds, the number of first registered participants decreases ranging from 83% to 8% in the last weeks during the course. The decline in the number of participants may be related to the nature of asynchronous environments that are designed according to some time intervals between the tutors' question, learners' response, and the lack of immediate feedback. Technical difficulties (Hara & Kling, 2000) and technology illiteracy might be other reasons behind this problem. Finally, fewer than 10% of the participants who registered for the course remained active to the final sections of the assignments.

As regards the interaction sequence of the course within the IRFI model (Laferriere & Lamon, 2010), the findings indicate that Initiation (I) and Response (R) are central; however, very little further Inquiry and Feedback moves were observed in the interactions between tutors and learners. Also, very few participants commented on their peers' responses. This might be attributed to the difference in the teacher-student interaction between face-to-face, synchronous, and asynchronous environments.

These findings provide further support for Silva's (2013) claims on the teachers' systematic use of virtual communication spaces; however, they do not support the assumption that "the asynchronous structure of communication promotes higher order thinking skills among the students in a distance education course" (Powers & Fuller, 2001, p. 17). An implication of this study is that carefully creating questions and topics, designing appropriate online platforms according to the needs of the virtual learners and the specifications of the spaces may lead to improving interaction between teacher-student and student-student and consequently enhance learning. Also, it may help to stimulate meaningful interactions in online teacher training courses and professional developments. More research is required to describe the interactive process of online communication, in general, as well as in asynchronous interactions, in particular.

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Appendix
The University of Southampton
A Sample platform of "week 2" Instructions & Activities

1. Week 2: Drafting a research proposal

1. Drafting a research proposal

We will be discussing the process of selecting a suitable theme and topic for a research project. By the end of this week you will be able to identify key research questions drawn from your draft research proposal & hypothesis

2.1 The freedom to choose your topic ... (Video)

2.2 Why keep a learning /research log? (Discussion)

2.3 Top tips: what to think about before you get started ... (Video)

2.4 Exercise: how do you pick a topic? (Article)

2.5 Exercise: creating a draft hypothesis and initial research questions (Video)

2. Developing your ideas

In this peer review activity you are encouraged to share your draft hypothesis and initial research questions and for you to feedback on each other's ideas to develop them further.

2.6 Peer review activity: how to get the best out of this (Article)

2.7 Developing a draft research proposal (Assignment)

2.8 Developing a draft research proposal (Review)

2.9 Developing a draft research proposal (Reflection)

2.10 Questions about the peer review activity? (Discussion)

3. Week 2 - summary activities

In this final activity we summarize the main points covered this week and encourage you to reflect on what you've learnt.

2.11 Review of week 2 (Article)

2.12 Reflection (Discussion)

BLENDED E-LEARNING AS A REQUIREMENT FOR TEACHING EFL IN A THAI ACADEMIC CONTEXT

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Abstract

This paper results from a pilot study in a Thai academic context testing two hypotheses. First, blended e-learning required by an institution can motivate learners extrinsically to learn EFL. Second, blended e-learning can enhance learners' positive attitudes toward learning EFL. The hypotheses were constructed based on an implication that Thai students generally needed extrinsic motivation in learning driven by their authoritative teachers and past relevant studies that showed positive results. Although the quantitative outcomes support the hypotheses, they are not generalizable. Additionally, required blended e-learning may not be the best teaching tool for this group of EFL learners, for they tend to identify themselves better with social media, especially Facebook.

Keywords: blended e-learning, extrinsic motivation in learning EFL, positive attitudes toward learning EFL, Thai academic context

1. Introduction

The current digital era has changed not only people's lifestyles but also teaching and learning strategies. Such changes have caught educators' attention in various fields of studies to make progress in their teaching and students' learning behaviors and outcomes. Nowadays, e-learning, which emerged almost two decades ago, is a popular pedagogical and training tool for all kinds of subjects (Gutierrez, 2014), which include foreign languages (Kilickaya, Krajka and Latoch-Zielińska, 2013), perhaps because it involves trendy and practical technology for new generation students (Tananuraksakul, 2014).

Among e-learning modes, Kilickaya et al. (2013) argue that blended e-learning is the most effective teaching approach due to the integration of traditional and virtual instructions. It is a hybrid model of one-on-one and online teaching (Martyn, 2003), enabling students to be responsible for their own learning (Olejarczuk, 2013). Meta-analysis research by Means et al. (2013) as well as by Lee and Hung (2015) confirm this argument. The outcomes revealed that students performed significantly better in blended learning classrooms than those in

traditional face-to-face instruction due to additional learning time, instructional resources, and course elements promoting interactions among learners.

It is evident that blended learning is commonly adopted in different academic contexts. For example, in the context of UK, Sharpe et al. (2006) observe that blended learning is mostly used to provide supplementary resources through online systems supported by universities for courses traditionally instructed in classroom. The blends aim to include flexibility of provision, supporting diversity, enhancing the campus experience, operating in a global context and efficiency. In Croatia, Žuvic-Butorac et al (2001) quantitatively examined students' perceptions and acceptance of e-learning as an educational tool. The findings showed that students highly valued virtual access to teaching materials because they were given more flexible time to organize their learning. More importantly, they could earn better scores. However, only students who performed well in the study displayed positive attitudes towards the use of blended e-learning.

Since the use of blended e-learning is generally viewed in a favorable light, this paper seeks to explore to what extent this hybrid mode of learning can motivate undergraduate students to learn English and enhance their positive attitudes toward English instruction in a Thai academic context. These two variables correlate with behaviors and achievement in learning EFL (Zimmerman 2008; Kara 2009; Tananuraksakul 2015a). As a pilot study, this paper excludes the area of correlation.

2. The present context of blended e-learning in Thailand and hypotheses

It appears that the Thai government has placed great importance on lifelong learning through Information and Communication Technology (ICT), which can be seen in the recent national education policy framework from 2002 to 2016. To fulfil this policy, the Office of the Higher Education Commission, Ministry of Education, founded Thailand Cyber University (TCU) in 2005. Based on Sombuntham and Khlaisang (2013), TCU has initiated Inter-University Network or central e-Learning infrastructure for hosting and sharing educational resources, contents and necessary hardware and software. Hundreds of open online courses have been developed to support lifelong learning for Thai citizens at all levels. This is the model considered the national best-practice as it was awarded Honorable Mentions in the 2009 UNESCO King Hamad Bin Isa Al-Khalifa Prize for the Use of ICT in Education award (Thammetar and Duangchinda 2013).

In Thailand, e-learning normally refers to distance education that offers online degrees. Although it has potential for universities to expand educational businesses due to its

learning convenience and lower cost, Khaopa (2012) reported that several universities have used it as blended learning along with traditional teaching in classroom to promote students' learning rather than online education. The report aligns with others' claims (Intrapairote and Srivihok 2003; Simasathiansophon 2014). The common use of blended e-learning perhaps is because it has proved to be a teaching tool rather than an educating tool (Pagram and Pagram 2006), which requires a teacher to deliver knowledge to learners.

Past studies into the use of blended e-learning revealed positive results, which suggested that Thai teachers should employ e-learning in the classroom as additional learning support or blended learning only (Simasathiansophon 2014). It also positively affected Thai undergraduate students' attitudes towards the roles of teacher as a provider of feedback, encouragement and learning guidelines in a business statistics class (Suanpang and Petocz 2006), and graduate students' satisfaction with blended e-learning exercises, homework, research and organizational analysis on information management (Nilsook and Wannapirun 2012). Both studies additionally indicated similar outcomes that students concurrently seemed motivated to learn better because they were allowed to access the e-learning materials at their convenience.

In a similar vein, Pagram and Pagram (2006: 4-5) argued that Thai students tended to need much guidance and encouragement from teachers at all levels, even in tertiary education. They would read or study only when their teachers assigned them to do some work or when they had to take an exam. This aspect implies that in general Thai students need extrinsic motivation to learn which is driven by their authoritative teachers. This type of motivation arises from outside the learners, and it can be beneficial for them (Plotnik and Kouyoumjian 2011). The requirement of blended e-learning usage may or may not motivate them extrinsically.

Since English is learned and used as a foreign language in Thailand, the implication and positive outcomes from pertinent literature review led the author to come up with two hypotheses as follows:

H1: blended e-learning will motivate Thai students extrinsically to learn EFL.

H2: blended e-learning will promote Thai students' positive attitudes toward EFL learning.

3. Methods

3.1. Participant recruitment

At Huachiew Chalermprakiet University, e-learning is viewed as an eco-system created under the philosophy of His Majesty King Bhumibol Adulyadej's Sufficiency Economy and used as teaching resources along with traditional instructions in classroom. In other words, all lecturers are required to develop their teaching materials and upload them online for courses offered each semester. It is convenient for students to download those materials anytime and anywhere and to read them on their smart phones without printing.

The institution's top requirement for producing teaching materials via e-learning is to motivate learners extrinsically. Several structures of the e-learning system available for each lecturer encompass Forums, Homework, Uploads, Key Answers, Database, Testing, Survey, Chat Room, Poll, Assignment and External Tool.

In this study, the author purposively selected all 104 participants enrolled in the English Report Writing class (from mid-August to mid-December, 2015) and blended the university e-learning system with the traditional instruction in classroom. The author uploaded all developed teaching materials, which included course outline, PowerPoint lecture slides and handouts to the e-learning system, so that the students could download them at any time and anywhere without printing them.

3.2 Research instrument

Questionnaire is the primary instrument that consists of three parts: personal information (gender, age, frequency of e-learning access; frequency of class attendance); motivation and attitudes (seven statements reflecting on opinions of blended e-learning); and additional suggestions.

Motivation and attitudes are keywords defined according to Tananuraksakul's (2015b) study. The former refers to students' enthusiasm that makes them determined to do something, while the latter concerns liking something as shown by their behaviour. Although both keywords differ in meanings, they influence each other in that positive attitudes affect high degree of motivation and vice versa.

3.3 Data collection and analysis

Out of all 104 students, 56 voluntarily completed the questionnaire at the end of the semester (mid-December 2015). The author employed IBM SPSS Statistics 20 software for data analysis as well as to extract means and standard deviation for data interpretation. The interpretation was based on the following scales and rating:

5-rating Scale	Descriptive Rating
4.20 – 5.00	strongly agree
3.40 – 4.19	agree
2.60 – 3.39	neutral
1.80 – 2.59	disagree
1.00 – 1.79	strongly disagree

4. Results

Findings from the questionnaire reveal that all students are considered new generation because most of them are between 20 and 25 years of age and a few of them are between 25 and 30. There are more females (49) than males (6), and 1 person disclosed his/her gender. Nineteen students attended the class every time, while 32 missed the class around one to three times. Only one person admitted that he/she missed the class over three times.

Table 1. Students' views about the blended e-learning usage.

Statements	Mean	S.D.	Meaning
1. You are enthusiastic to use the e-learning system.	3.5000	.63246	Agree
2. You are enthusiastic to use the e-learning system because you are able to access it at anytime.	3.5714	.65663	Agree
3. You are enthusiastic to use the e-learning system because it is useful for learning English.	3.6429	.88273	Agree
4. You are enthusiastic to use the e-learning system because you have to use it.	4.0357	.73767	Agree
5. You like the e-learning system.	3.3019	.82240	Neutral
6. You like the e-learning system because you are able to access it at anytime.	3.5000	.80904	Agree
7. You like to use the e-learning system because it is useful for learning English.	3.6964	.82945	Agree

As evidenced in Table 1, students agree that they are motivated to use blended e-learning, shown in Statements 1, 2 and 3 and that they are enthusiastic to use the e-learning system at any time and for learning English. The enthusiasm rendering them determined to do something reflects on their motivation in learning the language (Tananuraksakul 2015b) in the Thai academic context. Statement 4, in particular, indicates their extrinsic motivation because they agree that they have to use the e-learning system. This agreement mirrors their behavior to do something, which externally arises (Plotnik and Kouyoumjian 2011), from the authoritative instructor's requirement. The findings informed the first research question.

Similarly, the participants agree about their positive attitudes toward the use of blended e-learning as illustrated in Statements 6 and 7, claiming that they like to use it at any time and for learning English. 'Liking' something which is shown in their behavior reflects on their attitude in learning the language (Tananuraksakul, 2015b) at any time. The agreement is in accordance with the frequency of e-learning access. Seven students said they always accessed the e-learning system, 28 often used it, and 20 used it sometimes. One person did not answer. These findings gave answers to the second research question.

However, Statement 5 demonstrates students' reluctance to agree completely that they have positive attitudes toward the blended e-learning usage because they moderately like it. The neutral level of liking perhaps derives from their preference of social media. As reported by Vichienwanitchkul (2015), out of social media subscribers in Thailand, Facebook is in the lead. Approximately, 30 million Facebook users are active per month, 66% login daily, and 28 million of them are online via smart phones. Through an informal conversation with three students, the author found out that they prefer Facebook because they regularly use it and join other Facebook groups for academic and social purposes.

5. Conclusion

This small-scale quantitative study investigated the effect of blended e-learning on learners' extrinsic motivation and attitudes toward learning EFL in a Thai academic context. The data retrieved comport with Simasathiansophon's (2014) suggestion that Thai teachers should adopt blended e-learning rather than pure online learning, as Pagram and Pagram (2006) posit, so that students need their teachers' encouragement and guidance in learning.

However, although the hypotheses were generally confirmed, the outcomes cannot be generalized because the sample was not representative of the population. In addition, required blended e-learning may not be the best teaching tool for new generation Thais since they appear to relate themselves to social networking tools such as Facebook better.

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COMPUTER LITERACY IN LEARNING ACADEMIC ENGLISH: IRANIAN EAP STUDENTS' AND INSTRUCTORS' ATTITUDES AND PERSPECTIVES

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Abstract

This study aimed to analyze perceptions of Iranian English for Academic Purposes (EAP) students on their computer literacy levels. A total of 641 undergraduate students of civil engineering and 34 EAP instructors participated in the study. Data collection instruments included questionnaires and semi-structured interviews. Findings confirmed that the participants perceived Iranian EAP students' computer literacy levels as low and insufficient for the efficient implementation of Computer-Assisted Language Learning (CALL) in EAP instruction. The results of the study highlighted that computer literacy occupies a significant role in tertiary students' academic and EAP achievement. It appeared that there are several constraints and barriers which would discourage EAP students from promoting their computer literacy and using computers for learning EAP. Furthermore, the study found evidence to support the view that there should be adequate computer literacy training programs for EAP students to facilitate the incorporation of computer technology in EAP instruction. The analysis of qualitative data provided insights into participants' perceptions of several specific computer-based skills required for technology-enhanced EAP learning. Implications for the integration of technology and CALL in EAP instruction are provided.

Keywords: EAP learning; computer literacy; civil engineering; technology; training

1. Introduction

Technological developments and the merits of CALL have obviously influenced EAP instruction similar to other educational fields. In EAP instruction students should acquire the necessary academic and technological skills to be identified as competent members of different academic communities (Jarvis, 2009). The use of technology in EAP instruction has been regarded as effective and necessary. Technology would offer implications for materials development, needs analysis and methodology of EAP instruction. For instance, the advent of the Internet has given EAP instructors several choices regarding their materials development. More specifically, EAP instructors can make use of multimedia applications and Web-based resources to develop specific and discipline-specific materials for their instruction.

Technology has encouraged us to redefine some key terms and concepts used in EAP instruction. These concepts include specificity, authenticity, cost-effectiveness, and needs (Arn´o, 2012).

Computer literacy plays an important role in EAP students' academic achievement. Jarvis & Pastuszka (2008) stress that EAP learners need to be academically competent and proficient to be able to operate efficiently in academic contexts. Nowadays, EAP students are expected to be electronically competent and be able to operate effectively in electronic contexts as well. This shows that electronic literacy should be included in the definition of academic literacy to give it a more comprehensive meaning and a broader sense. White (2003) further states that EAP learners also need a lot of support and training regarding their computer literacy if technology is going to be integrated into EAP instruction. Arn´o (2012) also stresses the fact that there have been a plethora of technological breakthroughs and changes recently, therefore, EAP students should be equipped with the necessary technological, communication, and critical skills to study and operate in international and academic environments. Similarly, Jarvis (2009) points to the problem of e-literacy for EAP students when he mentions the challenges of computer-assisted EAP instruction. "The notion of equipping learners for academic study raises specific challenges of e-literacy for non-native speakers of English and it is by no means clear whether EAP providers are rising to this challenge" (Jarvis, 2009, p.57). Jarvis (2009) further recommends including Information and Communication Technology (ICT) study skills for EAP students.

As for the importance of the integration of technology in EAP instruction, Jarvis and Pastuszka (2008) suggest that there is a close link between EAP and CALL. To argue the significance of the implementation of CALL in EAP instruction, Jarvis (2005) suggests that a wide range of electronic and computer-based materials are used in university courses, higher education and EAP instruction. Moreover, in EAP courses students should be able to read authentic academic materials. Computer-based and online resources are commonly rich regarding their authenticity (Plastina, 2003). Jarvis (2009) suggests that the two main areas should be touched upon if computers are to be integrated into EAP instruction, namely preparing EAP learners for their academic purposes and facilitating language learning.

In the recent years, developments in the field of educational technology and CALL have influenced EAP instruction considerably (Arno, 2012; Jarvis, 2009; Plastina, 2003). As a result, in EAP contexts, students should acquire the necessary academic and digital literacy to be identified as competent members of their academic discourse communities (Jarvis, 2009). The integration of technology into EAP instruction provides tremendous opportunities for

instructors and learners to improve the quality of instruction and learning. Specifically, technology offers implications for materials development, needs analysis, and methodology of EAP instruction. The Internet, together with online language learning tools and applications, can empower EAP instructors and materials developers to produce authentic and up-dated materials related to students' needs and preferences (Plastina, 2003). In addition, EAP instructors can make use of multimedia applications and Web-based resources to develop authentic and discipline-specific materials for EAP instruction. Technology has encouraged us to redefine key terms and concepts of EAP instruction, including authenticity, cost-effectiveness, and needs (Arno, 2012).

Out of all definitions proposed for computer literacy, the one provided by Son, Robb, and Charismiadji (2011) was adopted for the purposes of this study. They define computer literacy as "the ability to use computers at an adequate level for creation, communication and collaboration in a literate society" (p. 26). This definition was adopted for two reasons. First, this definition is one of the most recent and comprehensive definitions which was presented for computer literacy. Second, the emphasis on the concept of the "literate society" might be closely relevant to the characteristics of EAP instruction. In EAP contexts, students should be socialized into academic communities, which are are specialized types of literate societies (Hyland, 2006).

Flowerdew and Peacock (2001, p. 8) define EAP as "the teaching of English with the specific aim of helping learners to study, conduct research or teach in that language". Moreover, EAP courses are based on the needs, learning styles and preferences of students. These courses are based on the principles of learner-centered approaches to education (Hutchinson & Waters, 1987; Hyland, 2006).

2. Background to the study

To date, several research studies have been undertaken on EFL/EAP students' perceptions of their computer literacy. For instance, Bataineh and Baniabdelrahman (2006) investigated Jordanian EFL students' perceptions of their computer literacy employing a survey study. Students reported that they were incompetent in more advanced computer skills, while they were competent in basic computer skills. No significant effect was found for gender, but a significant effect was actually observed for the year of study regarding students' perceptions of their computer literacy. In a qualitative-quantitative study using questionnaires and interviews, Dashtestani (2015) explored computer literacy, self-efficacy and attitudes of 120 Iranian EAP students of four different disciplines (i.e., biology, political sciences, psychology,

and law) towards Web-based assessment of academic vocabulary. A Web-based test of academic vocabulary was administered to students. The findings revealed that the EAP students had positive attitudes toward the Web-based test and enjoyed high levels of self-efficacy in using computers. Kiliç-Çakmak (2010) examined learning strategies and motivational factors predicting information literacy and self-efficacy of e-learning students. She argued that meta-cognitive, effort management, elaboration and critical thinking strategies, as well as belief control strategies predict different aspects of information literacy self-efficacy.

In Japan, Murray and Blyth (2011) analyzed perceptions of 103 university students of their computer literacy levels. They reported that the students lacked competence in using several computer applications, including word-processing, spreadsheets and presentation software tools. They pointed out that the participants lacked knowledge of communication, computers, the Internet and software tools. Similarly, Lockley (2011) assessed perceptions of 105 Japanese students on using ICT. He found that the Japanese students lacked competence in most aspects of ICT, whereas they frequently used computers and the Internet at home and received instruction at schools. He concludes that students learn how to use some software tools at high schools, while they do not need to use them in actual situations.

Verezub, Grossi, Howard and Watkin (2008) undertook a study on building electronic literacy for vocational education and student training. They pointed out that training to apply meta-cognitive strategies enhanced comprehension in the hypertext context. Chen (2006) conducted a case study on the development of email literacy. Using a critical discourse analysis approach, he identified the complexity of an L2 learner's evolving e-mail practice and attempt for appropriateness, particularly in the participants' e-mail communications with professors. Simpson (2005) evaluated the learning of certain skills associated with electronic literacy, namely discourse management and technological skills involved in using synchronous computer-mediated communication (SCMC).

To summarize, previous research has shown that computer literacy and its development are complicated issues. In addition, most students lack adequate levels of computer literacy, which are required for educational purposes. Computer literacy appears to differ from context to context. The findings of previous research on computer literacy imply that the majority of students need training for the efficient use of computers and technology for educational purposes.

3. The study

3.1. The rationale for conducting this study

Plastina (2003) expresses her concern over the fact that limited attention has been directed towards the link between CALL and EAP in the previous literature of language learning. This concern might be best manifested when she asserts that "research relating CALL to General English issues has been carried out, but little attention has been paid to the use of computers in EAP. EAP practitioners have principally grounded their research in the fields of academic writing, academic reading and academic assessment without much noteworthy research on EAP related to CALL" (Plastina, 2003, p.16). Jarvis and Pastuszka (2008) also emphasize that information technology offers several implications and applications for EAP instruction. Concerning the use of computers in EAP contexts, Warschauer (2002) maintains that computers and computer-mediated communication (CMC) would improve interactions at different levels. These interactions among different EAP students and a broader academic community will help learners to be socialized into their academic discourse communities. More importantly, as Plastina (2003) points out, the sociolinguistic and social constructivist view to EAP is in accordance with the principles of integrative CALL (Warschauer & Healey, 1998). Therefore, both approaches emphasize "the value of integrating language skills and technology to combine authentic language, learner autonomy with information processing and communication" (Plastina, 2003, P. 17).

To date, several empirical research studies have been published regarding the issue of computer literacy in the field of EAP instruction. Similarly, some research has been conducted on the use of technology in EAP instruction. Many of the claims about the use of technology in EAP instruction should be backed up by sound empirical evidence. Therefore, this study enriches the literature on the implementation of CALL in EAP instruction. Moreover, the findings will have implications for all stakeholders of EAP, especially on how to gear courses to different types of technological needs, proficiencies and preferences of EAP students. EAP course designers would be able to have a profile of technological needs, perceptions, proficiencies and lacks of EAP students based on which they will be able to design efficient and effective EAP courses systematically. To achieve these aims, the discipline of engineering was selected in this study since some emphasis has been previously placed on the integration of computer technology courses into engineering curricula (Lawal, Adegbemile, Aribisala, & Oke, 2008). It is also stated that engineering stakeholders should be electronically literate

(Lawal et al., 2008). Finally, civil engineering is one of those majors about which limited research has been conducted in the EAP literature.

These assumptions led to the formulation of the research questions of this study as follows:

1. What are the perceptions of EAP students and EAP instructors of civil engineering about EAP students' computer literacy levels?
2. What are the perceptions of EAP students and EAP instructors of civil engineering of the necessary computer-based literacy skills required for EAP learning?
3. What are the attitudes of EAP students and EAP instructors of civil engineering toward the role of computer literacy in students' academic and EAP success?
4. What are the perceptions of EAP students and EAP instructors of civil engineering of the challenges and barriers that limit students' computer literacy?

3.2. Research design

This study was designed based on a survey in support of a qualitative paradigm. Questionnaires were administered to EAP undergraduates and qualitative data were collected employing in-depth semi-structured interviews with EAP undergraduates and instructors. Surveys are commonly used in EAP needs analysis studies. The rationale for using a survey was that the results of surveys can provide useful profiles of information about EAP students' needs and the data will facilitate EAP curriculum development and course designing practices in the future (Jordan, 1997).

3.3. Instruments and data analysis

3.3.1. Questionnaire

To answer the research questions, a questionnaire on student computer literacy was designed. In EAP research methodology, questionnaires can provide valuable information on EAP students' needs, perceptions and attitudes (Jordan, 1997). The design of the questionnaire was backed up by the extensive review of the literature linked to computer literacy and the use of technology in EAP instruction (e.g., Arno, 2012; Bataineh & Baniabdelrahman, 2006; Corbel & Gruba, 2004; Godwin-Jones, 2000; Jarvis, 2009; Warschauer & Liaw, 2010) as well as the feedback received from several EAP students and instructors prior to the conduction of the study.

The six sections of the survey were as follows: Section I (demographic information); Section II (students' perceptions of their computer literacy, 25 items); Section III (factors that limit students' computer literacy, 7 items); Section IV (attitudes toward computer literacy, 2 items); Section V (having a course on computer literacy training, 1 item); Section VI (open-ended items, 3 items). In total, the questionnaire comprised 38 items with a four-point Likert scale format.

Considering the internal consistency and reliability of the questionnaire, a satisfactory range of Cronbach's Alpha reliability coefficient was achieved (α=0.87-0.91), which was appropriate for the purposes of this study. In addition, the content of the questionnaire was validated by a jury of seven senior university professors of EAP, civil engineering and computer sciences. After several sessions of evaluating the items of the questionnaire, certain items were deleted and the content of the questionnaire was improved.

The Persian versions of the questionnaire were distributed among the EAP students and the questionnaires were completed in class. With regard to the objectives of the study, a descriptive analysis was performed to analyze the perceptions of the participants reflected in the quantitative data with the statistical analysis computer package SPSS 16. The mean and standard deviation analyses were used while describing the data. The descriptive procedure of data analysis was used for the results of the questionnaires since this data analysis procedure yields valuable information about the nature of a particular group of individuals (Best & Kahn, 2006).

3.3.2. Semi-structured interview

In EAP research methodology, interviews provide researchers with rich information on students' skills, attitudes and expectations. The triangulated use of interviews and questionnaires to enrich the data is recommended by EAP experts (Jordan, 1997).

Accordingly, to obtain in-depth insights into EAP students' and instructors' perceptions, interviews were conducted. Several aspects and issues related to the focus of the study were taken into consideration in the development of the questions of the interviews. The interview questions were based on the focus of the study and the literature reviewed in the survey phase of the study (i.e., the levels of computer literacy of EAP students, the limitations of using computers in EAP courses, the role of computer literacy in students' EAP and academic success, necessary computer literacy skills required for EAP courses and the need for a training course on computer literacy for EAP students). To compare participants'

perceptions, the EAP students and instructors were asked the same questions. Open-ended questions were used to explore the perceptions of the participants. The questions of the interview were validated by the jury of seven EAP, civil engineering and computer instructors. The questions of the students' interview were as follows:

1. What do you think about your computer literacy level?
2. What factors might limit your use of computers for EAP learning?
3. What is the role of computer literacy in your EAP success?
4. What is the role of computer literacy in your academic success?
5. What is your opinion on including a computer literacy course in the university curriculum?
6. What do you think are the necessary computer literacy skills that EAP learners should learn/know?

The EAP students who participated in the interviews were those who had taken part in the questionnaire phase of the study. The purposes of the study were explained to them and the participants took part in the interview phase of the study voluntarily. The purposes of the study were also explained to the EAP instructors prior to their voluntary participation in the interviews. To analyze the qualitative data, content analysis was applied to the results of the interviews. Content analysis is appropriate for the semi-structured data analysis since it produces in-depth descriptions on the participants' statements of their views and perceptions (Denzin & Lincoln, 2000). The interviews were audio-taped, transcribed and translated into English. The interview data were read line by line by two coders. After ensuring coding consistency, the emerging themes were examined and reported. Also, excerpts from participants' statements were included.

3.4. Participants

Out of all 700 questionnaires administered to the EAP students of civil engineering from seven Iranian universities, 641 completed questionnaires were returned. Both males (561) and females (80), whose ages ranged 20-26, were included in the sample group. All participants took part in the study voluntarily. The distribution of students from each university has been shown in Table 1. For anonymity reasons, the names of universities are shown in Roman numerals. Both public and non-public universities were included in the study. Due to adequacy of time and access, cluster sampling was used to ensure the generalizability of the results (Long, 2005). Also, 34 EAP instructors participated in this study. The interview participants took part in the interview phase of the study to provide qualitative and

supplementary data. They were MA holders (76%) and PhD holders (24%) of Applied Linguistics or English Literature. They had the average years of teaching experience of 9.73 (Table 2). They were selected from the universities from which the EAP students were selected.

Table 1. Distribution of EAP students who took part in the questionnaire survey

University	**Undergraduates of civil engineering (Frequency)**	**Percentage**
University I	N=106	16.5%
University II	N= 98	15.3%
University III	N=111	17.3%
University IV	N=88	13.7%
University V	N= 96	15%
University VI	N=79	12.3%
University VII	N=63	9.8%

Table 2. Participants of questionnaire and interview phases of the study

Questionnaire study	EAP students (N=641)	
Interview study	EAP students (N=100)	EAP instructors (N=34)

3.5. Results

3.5.1. Participants' perceptions of EAP students' levels of computer literacy

Questionnaire results

The total mean of the section related to students' perceptions of their computer literacy equals 2.3, which shows that the EAP students perceived themselves as *a little proficient* or *fairly proficient* in the use of computers in general (Table 3). A comparison of the means shows that the EAP students perceived themselves as *fairly proficient* or *proficient* in computer literacy skills such as formatting drives, copying files, deleting files, writing a compact disk, accessing information on a CD-ROM, installing programs on a hard disk, using the Internet, sending and receiving e-mails, printing selected information from a data base, using a word processor to create documents, typing skills and using a scanner to import graphics. The EAP students further perceived that they lacked proficiency or had limited proficiency in some computer skills, including using PowerPoint for educational purposes, using the computer in

academic researching, fixing common software problems, fixing common hardware problems, using suitable search engines, installing operating systems, creating a spreadsheet, creating a database, programming skills, creating and maintaining a basic weblog, digital image manipulation, using a wiki, and using RSS feeds to store and retrieve information.

Table 3. Perceptions of EAP students of their levels of computer literacy

Scales						
N=641	1. Not proficient	2. A little proficient	3. Fairly proficient	4. Proficient	**Mean**	**SD**
Copying files					3.6	0.71
Deleting files					3.59	0.74
Installing a program on a hard disk					3.03	1.04
Installing operating systems					2.17	0.97
Accessing information on a CD-ROM					3.54	0.73
Formatting drives					3.67	0.72
Writing a compact disk					3.4	0.84
Using a scanner to import graphics					2.55	1.66
Printing selected information from a database					2.64	1.07
Fixing common hardware problems					1.62	0.84
Fixing common software problems					1.95	1
Using PowerPoint for educational purposes					1.5	0.85
Using a word processor to create documents					2.83	1.02
Programming skills					1.34	0.64
Typing skills					2.69	1.08
Digital image manipulation					1.92	1.05
Creating a spreadsheet					1.88	0.92
Creating a database					1.62	0.83
Using the computer in academic researching					2.14	0.97
Using the Internet					2.86	1.05
Sending and receiving emails					2.69	1.08
Using suitable search engines					2.13	1.09
Creating and maintaining a basic weblog					1.28	0.60
Using a wiki					2.04	0.98
Using RSS feeds to store and retrieve information					1.78	0.97

Interview results

In the interviews, many EAP students stated that their levels of computer literacy were low. They asserted that they mostly use computers for non-academic purposes. The EAP students

reported that they lacked English proficiency. More importantly, the EAP students mentioned that they needed to know and learn more about the use of computers in their EAP courses.

> Well, I don't think that I know much about computers. I just know how to perform some simple and routine applications such as word processing, the Internet, e-mailing, and multi-media applications (Student 4).
>
> Actually, we have not attended any courses regarding the uses of computers in our academic studies including EAP. I suppose my current computer literacy level is responsive to my current activities which are not academic ones. For academic purposes, I think I should have some computer literacy training (Student 14).
>
> My academic and general English proficiency are not that high. Because of this I am not able to use the Internet-based academic information efficiently. I think I have to improve my English and computer literacy at the same time (Student 47).
>
> Most of us, I mean the students of civil engineering have learned our computer literacy skills by ourselves in our homes and not in academic contexts. When we enter the academic arena, we are required to have high levels of computer literacy and English competence while we are not ready for them (Student 85).
>
> Computers are changing every day and moment. New applications, software, hardware and other innovations are appearing and I think I have to update my knowledge of these new technologies. I think I am not competent in using computers concerning working with new technologies and applications (Student 54).

The EAP instructors stated that the EAP students need to improve their general and academic English proficiency because these two types of proficiency are interacting with computer literacy levels. They also perceived that students are not proficient enough in most computer literacy skills.

> EAP students lack different sorts of proficiencies. General and academic English proficiencies are important ones. Also, they lack computer literacy skills which are important for both academic and EAP fields in engineering courses (Instructor 12).
>
> I believe EAP students need to be more competent in using computers. They might be competent to use computers in non-academic contexts, but what about academic contexts which are more demanding and complicated? (Instructor 3).

3.5.2. Participants' perceptions of factors that limit EAP students' computer literacy levels

Questionnaire results

Examining the mean scores presented in Table 4 depicts that some challenges, including the lack of computers at universities, slow computers at universities, the lack of competence in appropriate use of computers, and the lack of motivation to use computers, are perceived as

important or *very important* by EAP students. On the contrary, the lack of time, hardware problems, and the high cost of using computers are perceived as *unimportant* or *somewhat important* factors which restrict the use of computers in EAP courses.

Table 4. Perceptions of EAP students of factors that limit students' computer literacy

Scales						
N=641	1. Not proficient	2. A little proficient	3. Fairly proficient	4. Proficient	**Mean**	**SD**
The lack of time					2.1	0.94
The lack of computers at universities					3.19	0.79
Hardware problems					2.2	1.11
Slow computers at universities					2.98	0.99
The lack of competence in appropriate use of computers					2.67	1.13
Not being motivated to use computers					2.84	1.02
High cost of using computers					1.84	0.88

Interview results

Many EAP students and instructors stressed that there was a lack of computers at universities. Slow Internet connections, absence of computer-based training, the lack of financial support, ineffective EAP instruction methodologies and students' low computer competence were the other major constraints pointed out by the participants.

> There's a clear the lack of computer-based facilities at universities. There are not enough computers for the use of all students. Most of computers available are old and slow (Student 27).
>
> University authorities should support instructors to include computers in their EAP courses. We need to improve our technological equipment at universities and also encourage students to use computers for their academic studies by some awareness-raising measures maybe (Instructor 8).
>
> The current EAP curriculum is not responsive to the integration of computers and technology. It's my belief that we should improve the current curriculum so that technology can be integrated into it efficiently (Instructor 22).

3.5.3. Participants' attitudes toward the role of computer literacy in EAP students' academic and EAP success

Questionnaire results

The majority of EAP students perceived the role of computer literacy in their academic and EAP success as *very important* or *important* (Table 5). The EAP students further *strongly agreed* on having a course on developing their computer literacy (Table 6).

Table 5. Attitudes of EAP students toward the role of computer literacy in their academic and EAP success

Scales						
N=641	1. Not proficient	2. A little proficient	3. Fairly proficient	4. Proficient	**Mean**	**SD**
Role of computer literacy in EAP students' academic success					3.66	0.66
Role of computer literacy in students' EAP success					3.46	0.79

Table 6. Attitudes of EAP students toward having a course on developing computer literacy

Scales						
N=641	1. Not proficient	2. A little proficient	3. Fairly proficient	4. Proficient	**Mean**	**SD**
Having a course on developing computer literacy					3.73	0.6

Interview results

Both EAP instructors and EAP students stated that computer literacy is a very important factor in EAP students' success in the field of EAP learning and their academic courses. The EAP instructors believed that computer literacy, academic literacy and Academic English proficiency depend on each other closely. The EAP instructors believed that we should try to improve these literacies at the same time in EAP instruction. Many EAP students also believed that the importance of computer literacy is not limited to EAP courses. They argued that computer literacy is important to all the subjects which are relevant to their field of study.

> Computer literacy is very important for the students of civil engineering. We should be able to use different software and applications in our major (Student 73).
>
> This is a fact that computer literacy is an important element of success in academic contexts. EAP courses are not exceptions in this regard (Student 61).
>
> It's obvious that those students who are more competent in using computers, especially the Internet can be more up-dated and knowledgeable than others regarding the changes that occur in their disciplines (Instructor 30).
>
> My opinion is that there is a relationship among different sorts of proficiencies. Thus, success in academic milieus depends on improving all of these proficiencies and it's clear that computer literacy is one of those necessary ones (Instructor 18).

Also, most EAP students deemed that having a course or a program which promotes their levels of computer literacy can be beneficial. The EAP instructors also agreed that students should have a course or program on improving their computer literacy. They asserted that in

addition to providing students with the relevant types of training, students need to be aware of and encouraged to include computers and technology in their educational practices. Students should be trained to use computers for their academic purposes.

> Yes, it's a good idea to have some course-specific training on our computer literacy. Though, the course should be a specialized one which will help us to know new things about computers (Student 40).
>
> The course would benefit EAP students a lot (Student 88).
>
> The idea of training courses is good provided that they are designed based on students' specific needs. What is more effective, in my view, is continuous awareness-raising programs on the issue of computer literacy. I believe this would have a more permanent effect (Instructor 1).

3.5.4. Participants' perceptions of computer-based literacy skills necessary for EAP courses

Interview results

The EAP instructors and students admitted that all students should be competent in various computer skills. The majority of participants perceived using online English dictionaries, using various search engines, developing advanced word-processing skills, exchanging academic emails in English, participating in English academic forums, reading and using academic cyber-genres and using computers in conducting academic research as important computer-based needs of EAP students. The EAP students reported that they need to know how to locate academic information on the Internet.

> We need to find some texts related to our major in English on the Internet. I also guess that we should write academic articles in English, especially in our MS courses. Typing in English is also very important for students of civil engineering (Student 28).
>
> Searching for locating English academic information is very important for us. Wikipedia also provides us with a lot of good information, but the problem is that we have to use the Persian version of Wikipedia and the information which has been translated into Persian is not complete and valid. We need to be able to read the English information on Wikipedia (Student 3).
>
> Being able to use different kinds of search engines is very important. I think most of us Google and no other search engines. We need to know how to work with other search engines too (Student 66).
>
> In my view, students of civil engineering should be competent enough to distinguish what kind of online English information is valid and what information is invalid (Student 58).
>
> EAP students are supposed to be able to use different computer applications and also the Internet competently and critically. They need advanced levels of computer skills (Instructor 19).

4. Discussion

The analysis of the quantitative and qualitative data indicated that the EAP students' levels of computer literacy are generally low. More importantly, the EAP students' seem to be incompetent in computer skills which are relevant to EAP learning. For instance, the use of wikis is deemed to promote autonomous and collaborative learning among EAP students (Felea & Stanca, 2010), while the findings of this study revealed that most Iranian EAP students were not competent to use wikis for their EAP learning effectively. Another computer skill which is relevant to EAP learning is the use of computers and the Internet for conducting academic research (Kasper, 2000). EAP students can further benefit from making use of and creating electronic genres such as blogs and databases (Toledo, 2006). Contrary to these expectations, the EAP students who participated in this study perceived themselves incompetent in using and creating blogs and databases for academic purposes. The competence to design and make PowerPoint presentations in English for Academic Purposes is yet another computer skill that can offer several merits for the students of EAP (Dashtestani, 2013). However, the EAP students who participated in this study perceived that they had a low level of proficiency of using PowerPoint for their academic purposes. A further computer literacy skill which can help EAP students to learn academic English is searching and organizing information via search engines. It is crucial that EAP students become able to evaluate the quality of academic information on the Internet (Jarvis, 2001). The findings showed that the EAP students showed a low level of competence to use search engines for their academic purposes. Arno (2012) points out that there is a close connection between the use of Web 2.0 applications and EAP learning. Web 2.0 applications can help EAP students be members of discourse communities, be exposed to various genres and receive authentic input. Creating and using websites are necessary skills that might contribute to EAP learning (Jarvis, 2004). Apparently, EAP students should be trained and instructed in how to use computer applications related to EAP learning appropriately and effectively.

Both instructors and students pointed out the significance of promoting students' computer literacy for EAP and academic learning. This implies that EAP authorities and providers should devote close attention to the issue of computer literacy and the ways of promoting EAP students' computer literacy levels. The participants expressed their positive attitudes toward the inclusion of training courses and programs to develop students' computer competence levels. This demand was put forward in other studies accordingly. Huckin (2007) suggests that electronic and online genres are new types of genres and students should be trained to read and produce these specialized types of genres. Jarvis (2009) calls for the

integration of computer literacy courses in EAP curricula. When EAP students learn about technology, they can take advantage of the considerable opportunities to learn academic discourse. The results would suggest that computer literacy plays a considerable role in university students' EAP and academic achievement. This finding is congruent with the previous studies which suggested that the issues of computer literacy and academic success of university students are closely interrelated (Hyland & Hamp-Lyons, 2002; Warschauer, 2002). Arno & Rueda (2011) posit that EAP students of engineering show interest in the use and integration of technology in their EAP courses. They argue that technology should be integrated into engineering curricula since technology can offer engineering students a plethora of learning opportunities.

The results provided valuable information on several technology-based skills that the participants deemed as necessary and beneficial to be included in EAP instruction and learning. These computer literacy skills are similar to the computer skills suggested by Jarvis (2004) for students in EAP contexts, including using the Internet, writing and sending emails, word processing, using PowerPoint, creating websites and using multimedia. Accordingly, using online applications were perceived to be effective for EAP learning. Plastina (2003) argues that the Internet would be an appropriate resource for socializing EAP students into academic communities. Arno (2012) asserts that technology, especially the Internet, would provide EAP students with adequate discipline-specific materials and resources. Hyland (2006) highlights the importance of exploring the specific needs of EAP students in EAP courses and meeting these needs in language instruction.

Furthermore, there are several obstacles that might discourage EAP students from using computers for their academic and EAP practices. Pragmatic constraints, such as slow computers and the lack of computers at universities, are serious concerns that need to be considered and heeded by educational providers. Identifying and removing these shortcomings in EAP courses are essential measures that should be taken immediately and reasonably (Hutchinson & Waters, 1987). If these impeding factors are not identified and accommodated, they may influence the attitudes of teachers and students toward technology in the future (Dashtestani, 2012).

Another significant impediment might be related to EAP students' low levels of motivation to use computers. The interdependence of EAP students' motivation and realization of their needs should not be overlooked in this regard. The use of technology will foster EAP students' both motivation and autonomy (Arno, 2012). The lack of EAP students'

motivation to use computers in EAP learning might be related to their lack of computer literacy or EAP practitioners' negligence in identifying their technological needs.

Jarvis (2009) maintains that EAP authorities should pave the way for the integration of computers into EAP courses. This implies that possible barriers to the use of computers should be removed. Admittedly, CALL will be normalized (Bax, 2003) in EAP contexts if we eliminate some limitations such as time restrictions, low computer literacy of educational stakeholders and the lack of computers (Ioannou-Georgiou, 2006). Moreover, EAP students' levels of English proficiency should be improved so that they can make use of various Internet-based and computer-based applications in English. The results of this study are commensurate with the limitations that Jarvis (2009) identified regarding the use of technology in EAP instruction, including practical limitations, and insufficient computer competence of EAP practitioners.

5. Conclusions and recommendations

The present research has offered insights into the perceptions of EAP students and instructors of computer literacy levels. Based on the findings, it appears that EAP students did not have adequate computer literacy levels to use computer applications which can be used for EAP learning. This issue should be taken into consideration by EAP providers and authorities and they should implement measures and plans in order to foster EAP students' computer literacy levels. Findings related to participants' perceptions unraveled that specific computer literacy training courses and programs can be offered to EAP students. EAP instructors should use computer applications and resources and encourage their students to use technology in EAP courses. More importantly, the findings identified the types of computer-based needs and skills that EAP students perceived as important for EAP learning. These needs include using online English dictionaries, using various search engines, developing advanced word-processing skills, exchanging academic emails in English, participating in English academic forums, reading and using academic cyber-genres, and using computers in conducting academic research.

Despite EAP students' interest in fostering their computer literacy and the considerable role of computer competence in EAP students' academic and EAP learning, several pragmatic constraints were identified which might restrict learners' use of computers. Definitely, these limiting factors which hinder the integration and use of technology in EAP courses should be detected and eliminated. Eliminating these constraining parameters will

facilitate the integration of technology in EAP courses and enhance students' motivation for and interest in using technology for their EAP and academic learning.

There are a plethora of opportunities and directions for future research since the issue of computer literacy in EAP instruction is still not a fully explored area of study. More research is needed into the nature of each computer literacy skill which might be related to EAP learning. In addition, future research is expected to evaluate the actual use of different computer applications and skills in EAP courses in order to identify the gap between EAP students' perceptions and their actual computer-based needs.

Lastly, it is equally important that more similar context-based and local studies be carried out in other countries concerning EAP students' technological needs and computer competence as well as barriers to the use of technology (Dashtestani, 2012). Obviously, the issue of EAP students' computer literacy is an important one and insights which might be gained from research in this realm would benefit future EAP course designing drastically.

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Appendix 1. Computer literacy questionnaire

Dear participants,

The following questionnaire is part of a research project that investigates the perceptions of undergraduate students of CE about their levels of computer literacy and challenges to include computers in Iranian EAP courses.

Section I: *Background Information*

Name of University: _____
Gender: _____
Age: _____

Section II: *Students' perceptions of their computer literacy*

The second section of the questionnaire aims to explore the perceptions of EAP students of CE of their levels of computer literacy. Please tick (√) the relevant choice for each question.

Items	Not proficient	Fairly proficient	A little proficient	Proficient
1. Using a scanner to import graphics				
2. Installing programs on a hard disk				
3. Using PowerPoint for educational purposes				
4. Sending and receiving e-mails				
5. Using the Internet				
6. Using the computer in academic researching				
7. Fixing common software problems				
8. Fixing common hardware problems				
9. Typing skills				
10. Using suitable search engines				
11. Printing selected information from a database				
12. Installing operating systems				
13. Using a word-processor to create documents				
14. Creating a spreadsheet				
15. Creating a database				
16. Programming skills				
17. Accessing information on a CD-ROM				
18. Copying files				
19. Deleting files				
20. Formatting drives				
21. Creating and maintaining a basic weblog				
22. Digital image manipulation				
23. Using a Wiki				

24. Using RSS feeds to store and retrieve information

25. Writing a compact disk

Section III: ***Factors that limit the use of computers***

The third section aims to explore the perceptions of CE students of the limitations of using computers in EAP courses. Please tick (√) the relevant choice for each question.

Items	Not important	Fairly important	Important	Very important
1. Lack of time				
2. Lack of computers at universities				
3. Hardware problems				
4. Slow computers at universities				
5. Lack of competence in appropriate use of computers				
6. Not being motivated to use computers				
7. High cost of using computers				

Please tick (√) the relevant choice for each question.

Section IV: ***Attitudes toward computer literacy***

1. How important is the role of computer literacy in your success in EAP courses?

A) Not important ○ B) Fairly important ○ C) Important ○ D) Very important ○

2. How important is the role of computer literacy in your academic success?

A) Not important ○ B) Fairly important ○ C) Important ○ D) Very important ○

Section V*: Having a course on computer literacy training*

3. Do you agree to have a course on developing your computer literacy?

A) Strongly disagree ○ B) Disagree ○ C) Agree ○ D) Strongly agree ○

Section VI: ***Open-ended questions***

In this section write any problem or strategy regarding the notion of computer literacy that you assume is useful for the purposes of the current study:

1:_____

2:_____

3: _____

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