

Technology Mediated Instruction and its Effect on Cognitive Scaffolding, motivation and Academic Performance in EFL Context

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Abstract

Technology mediated learning brings together the users with shared interests. This method makes learners informally engaged in language learning. This study intended to investigate the effect of technology mediated instruction on cognitive scaffolding, academic performance and motivation. Employing a quasi-experimental research, 80 learners from two intact classes at Islamic Azad University, Osku Branch were selected as the experimental and control groups. Telegram as a tool was used in the experimental group, while the control group received traditional way of instruction. Critical ethnography approach was implemented to consider the amount of cognitive scaffolding. To measure the students' motivational level in both groups, Course Interest Survey (CIS) was administered at the end of the semester. The total average score for each group was calculated. To compare students' academic achievement, their average scores in the final academic test were considered. An Independent samples t-test in was used to compare the mean scores. The results indicated that technology mediated learning brought about cognitive scaffolding and the students in the experimental group outperformed the control group in terms of motivation and academic achievement. The results of the study suggest that to bring about academically successful students, practitioners should use technology mediated instruction.

Keywords: academic achievement, cognitive scaffolding, motivation, technology mediated instruction

Introduction

Social networking sites generate communities based on users' shared interests and beliefs (Kuswara, Cram & Richards, 2008). Moreover, these kinds of sites increase opportunity for personal learning for university students. According to Baatarjav, Phithakkitnukoon, and Dantu (2008), social networking sites bring together the users with shared interests, mutual trust, and seeking access to similar resources. Being friendly with users, engaging them collaboratively in multiple groups, and providing flexible communication are their attributes. Rambe (2012) believed that these sites are ideal spaces for mediated intellectual engagement because of the kind of participation and informal knowledge sharing that they trigger. Therefore, as Rambe stated, cognitive scaffolding can be the most important outcome of using technology mediated learning in instructional setting.

The shift to learner-centered teaching approach in technology-mediated instruction has also created learning environment and experiences that enable student to construct their own knowledge rather than adhering to the traditional teaching method of knowledge transferal (Van der Schee, 2003). This kind of setting can challenge learners to learn and perform better. In fact, student-centered instruction is a potential method for enhancing intrinsic motivation among students (Hancock, Bray, & Nason, 1995). By using methods such as cooperative learning, critical thinking exercises, and problem solving activities, student-centered instruction brings about active learning (Felder & Brent, 1996). Technology mediated instruction helps learners to have more choice and control over instructional activities, which can lead to high intrinsic motivation (Wilson & Corpus, 2005).

Themes such as web-based learning, electronic learning, online learning are evident in defining technology mediated learning. According to Freeman (1997) and Grabe and Grabe (2004), technology mediated learning refers to an environment where it is possible for learners to learn at different times, different places and without direct control and supervision of educators, which cause instruction to be delivered through specifically computing technologies. This is always evident in distance education where learners and instructors majorly operate from separate geographical locations. As Lim and Chai (2004) state, in this kind of instruction learners need to have autonomy over learning

process so that they can engage in activities related to higher order thinking and learning in technology mediated learning. In other words, technology mediated learning refers to what students learn from thinking in meaningful ways while using a technology. Thinking is engaged by the different learning activities which can be embedded in the task and technology application.

Russel and Shneiderheinze (2005) believe that technologies become part of the complex social and pedagogical interaction and stop to be independent when they enter the learning environments. Many researchers have found out a diverse effect of technologies in learning, but what is clear is that, as Areavi and Hadas (2000) state, technology would have a very great impact on learning, but the design of the materials still needs investigation. Nonetheless, technology is making an impact on the quality and effectiveness of teaching and learning that produces higher order cognitive skills. To appropriately analyze and understand technology mediated learning and development of higher order cognitive skills Activity Theory is necessary.

Activity Theory (AT) suggests that there are certain things to look at in order to understand technology mediated learning. Technology and learning form the social and pedagogical interaction that requires a careful approach for clear understanding. According to Russel (2002), activity system refers to a focus on a group of people sharing a common object and motive over time and a varied range of tools to realize a motive. According to Engestrome (1987), activity theory focuses on learning as an interactive activity and interaction of human activity and consciousness within an environmental context relevant to it. As Engestrome stated, learners must cope with activity structures, tools and sign systems, socio-cultural rules and community expectations while learning because conscious learning is a human activity. Understanding technology mediated learning without the context in which it is happening is impossible. Kaptelinin and Nardi (2006) believed that the concept of activity is a very fundamental one when it comes to understanding activity theory. This is because learning is activity packed. Kaptelinin and Nardi stated that the analysis of technology mediated learning as a human activity, should not only examine the kinds of activities that people take a part in but also who is engaging in that activity, what their goals and intentions are, what objects or products result from the activity, the rules and norms that govern that activity, and the larger community in which the activity happens.

According to Vygotsky (1978) and Nardi (1998), in activity theory, an activity refers to an action a person or group of persons perform to achieve a particular goal while addressing a special object. As Nardi (1998) stated in distance education, tools used to perform the activity always mediate the mutual relationship between the activity subjects and object (blended with face-to-face). Furthermore, the fact that human activity tends to take place in a social and cultural context introduces the idea of considering the collaborative nature of human activity, including technology mediated learning. The expanded mediational model incorporates the community and other mediators like rules and division of labor. In distance education, the community is composed of all subjects involved in the shared object. Rules are implicit and explicit established by social conventions and relation. Division of labor is related to the organization of the work. It would lead to a structure (triangle) which indicates *tool* on its top, *subject* and *object* in the middle, *rules, community* and *division of labor* at the bottom. According to Activity Theory model triangle, *tools* are material artifacts which mediate the reciprocal relationship between subjects and the object of activity (Kuutti, 1995). It represents considering technologies in instruction.

The middle of triangle indicates Subject and Object. A subject is a person or group of individuals participating in an activity and act on the object. According to Nardi (1996) object is held by the subject and lets the activity go in a specific direction. In fact, the subject represents students acting on the object (learning), may be an idea or experiment. The bottom of triangle shows rules and norms which have been developed historically and as Collis and Margaryan (2004) stated they are implicit and explicit norms and guidelines that enable the activity. The community refers to all the people in the learning environment in distance education where learners engaged in technology mediated learning. According to Jonassen and Rohrer-Murphy (1999), the community negotiates and mediates the rules and customs which talks about how it functions, what it believes and the ways different activities are supported.

The division of labor, as Collis and Margaryan (2004) state, refers to all horizontal and vertical roles and relationships within the community that impact task division. The multiple roles that teachers and students have during

their collaborative participation include information seeking, information synthesis, and critical inquiry through questions, queries and explanations. Thorne (2004, p.58) also defines division of labor as “the actions and interactions among the members of the community” which also accounts for division of power and status.

According to Oliver and Herrington (2003), learning supports need to be designed as integral parts of the learning process in on-line learning environments. Helping learners and providing responsive feedback mechanism, which is sensitive to individual needs, make it essential to provide the support. A number of writers like Laurillard (1993) have developed strong frameworks to describe the ideal forms of cognitive support in on-line learning environment and in each case, the role of teacher as an active and involved one has been emphasized. The role of the teacher, however, tends to be defined as that of a coach and facilitator. In contemporary settings, this form of learning support is called *cognitive scaffolding* in recognition of the way in which it helps to build knowledge and is then removed as the knowledge construction occurs (Oliver & Herrington, 2003).

The socio-cultural approach emanating from the work of Vygotsky has had a major influence on the development of scaffolded instruction and apprenticeship models of learning (Rogoff & Lave, 1984). Socio-cultural approach emphasizes the role of social interaction as a cultural amplifier to extend cognitive processes. Culture and context are essential to be considered in analyzing cognition, as human development is seen to be located in social practices. This perspective resists the separation of the individual from society and the daily environment, and believes that meaningful activity should be embedded in authentic situations. According to Lave (1991), cognitive change can be influenced by social interaction in which ideas are articulated, shared, revised, modified and adopted because of their relevance to the cultural context. Lave also believed that successive approximations of the learning task is necessary to progress through the ZPD by attempting, cooperation with peers, or with a teacher. Support offered in the form of dialogue, discussion and demonstration has been found to be effective in enabling cognitive change.

Cognitive scaffolding has long been considered as an activity in which teachers provide support and assistance to learners. However, it can be provided by a range of other elements in the learning process, for example,

learning resources, interactive technologies and/or other learners. According to McLoughlin (1997), a consideration of more recent work in technology-supported environments indicates that the concept of scaffolding has expanded to include many new forms of support, increased responsibility for students and a fading of the directive of asymmetrical aspect of earlier work on scaffolding. While Vygotskian theory makes an explicit connection between social interaction and cognitive development, other forms of support can be provided by technology thus enabling learners to engage in cognitive change and skills advancement. In online and flexible learning environments, there is often a diminished role and opportunity for teachers in providing direct teaching and the forms of assistance usually associated with scaffolding. Cognitive scaffolding describes a situation where learners receive some degree of assistance and help in the learning process as they attempt to make meaning and construct their own knowledge. The essence of cognitive scaffolding is that the assistance and help is gradually reduced as the learning progresses to the point where the learner is finally able to act independently. According to Oliver and Herrington (2003), in on-line learning environments, learners often need help and assistance in the various learning activities they undertake. As they stated, in settings where technology provides open communication lines between learners, cognitive scaffolding can be provided by the purposeful design of activities involving peer cooperation and collaboration.

As intrinsic motivation affects learning outcomes, it is considered important to both students and teachers. Tavani and Losh (2003) believed that the most important predictor of academic performance is intrinsic motivation. This indicates that intrinsic motivation is a major factor in determining academic success (Wilson & Corpus, 2005). Yet, learning context can change intrinsic motivation. According to Brophy and Merrick (1987), the learning context accounts for not only instructional design but also classroom design and atmosphere. Pintrich (2002) used the term situational intrinsic motivation to state that teachers can enhance motivation and thus increase academic achievement by finding tasks and activities that are highly engaging for students. Even though many factors affect student intrinsic motivation, positive results can occur when motivational design is included in instruction (Gabrielle, 2003).

According to Clifford (1990), high intrinsic motivation is a product of the level of academic risk-taking which is promoted in learning contexts. Clifford indicated attributes of risk-taking learning environments. For example, students are allowed to select activities and materials at various levels of difficulty. Success in more difficult tasks is important than success in easier tasks. Supportive feedback and tolerating students' errors are other attributes. Student-centered instruction can help to create such a learning environment for increased intrinsic motivation, an environment that challenges students appropriately and gives them some choice or control over activities and instruction (Wilson & Corpus, 2005). Gethring (2003) stated that in creating motivationally positive learning environments, the experiences and culture of students must be considered as instruction is designed and implemented.

Student-centered instruction can foster improvements in the intrinsic motivation of students if properly designed and implemented. As Clifford (1990) and Lashaway-Bokina, (2000) stated, principles to remember in the design process include promoting risk-friendly learning environment, using flexible deadlines, taking a part in less overt supervision to increase student independence, and giving students opportunity to have choice and control over instruction. Problem-solving activities can be some of the most effective methods for using student-centered instruction to enhance intrinsic motivation. Sanacore (1997) demonstrated that problem-solving activities, especially when they resemble real life problems, increase student motivation and brings about more verbal, solution oriented behaviors.

Investigating technology mediated instruction in the process of second and foreign language learning is something new. Technology's mediation of knowledge construction, emergence of reflective learning, and use of Activity theory (AT) to inform the design of new environments and supporting mobile learning have been emphasized in multiple studies. Jonassen and Rohrer-Murphy (1999) employed AT to demonstrate the emergence of human consciousness in socio-cultural contexts and how it can be transformed through engagement in activity systems. They argued that AT provides a powerful framework for analyzing the needs, tasks and outcomes of designing constructivist learning environments. Similarly, Jenlink (2008) demonstrated how conversations mediate the design of educative human activity systems. He placed conversation in an activity systems framework to show its dynamic

relationships with subjects, purpose, artifacts, community, design work, and socio-cultural rules governing design.

Lehtinen (as cited in Houtsonen, 2003) also examined the impact of modern information and communication technology for teaching and learning in geography. He did it by means of meta-analyses and concluded that learners in classes where information and communication technology was used as a teaching aid generally learned more than those in other classes, performed better on average in cognitive tests, learned faster, enjoyed the lessons more, and were in general happier in their academic work. Golightly (2008) integrated the DVD in the teaching and learning of map work and found that students take responsibility for their own learning through proper planning. In a study of computer-based instruction, Wang and Yang (2002) identified that features of the World Wide Web enhance student motivation. They also believed that computer use alone was not as successful as a combination of student-centered methods and computer-based instruction for improving student motivation.

By taking Iranian EFL context into account, it becomes clear that students' motivational level is really low. The lack of motivation hinders learners' success and this in return affects their academic achievement. To increase learners' interest, technology mediation can be a great help. The results of this study can have an encouraging effect on teachers and learners to move toward more learner-centered instruction which can be stated as an ultimate aim in educational settings. Currently, while there is a great tendency to use web technologies for teaching purposes, studies that employ an AT framework to unravel collaborative knowledge development to bring about cognitive scaffolding, and also researches into learners' attitudes and their academic achievements are scarce. Therefore, by implementing AT framework, this study intends to investigate the effect of technology mediated instruction on cognitive scaffolding, students' motivational level and academic achievements in an EFL context. Telegram as a technology used profoundly among university students has been adapted as an object of study and the following research questions have been developed to investigate the issue:

1. Do teacher-student and student-peer engagement, using *Telegram*, cognitively scaffold students?

2. Does *Telegram* academic mediation affect the students' motivational level?
3. Does *Telegram* academic mediation affect the students' academic achievement?

Method

Participants

Two intact classes of pre-intermediate undergraduate EFL junior students at Islamic Azad University, Osku Branch-Iran participated in this study. All of the participants were students majoring in Electronic engineering. The number of students participated in this study was 40 in each class. Their age range was 18-25. These two classes were randomly assigned into the control (applying traditional way of instruction) and experimental (applying technology mediated instruction) groups.

Instrumentation

Various instruments were used in this study to collect data, including Course Interest Survey (CIS) and achievement test:

Course Interest Survey (CIS). Course Interest Survey (CIS) was used for observation and interview (Appendixes 1&2) which was developed by Keller (2006b) and designed to measure students' reactions to classroom instruction. Accordingly, one of the researchers who was the teacher of the class observed her classes and she also took into account all discussions and activities in *Telegram* to investigate the process of learning and cognitive scaffolding.

CIS is also a situational measure of students' motivation to learn with reference to a specific learning condition. Based on this instrument, to understand whether *Telegram* as a technology mediated instruction scaffold learners, all 80 students took part in scheduled in-depth interviews. As a situational instrument, CIS is not intended to measure students' generalized levels of motivation toward school learning (i.e., it is not a trait- or construct-type measures). There are 34 statements in this questionnaire. It consists of four sub-scales of Attention, Relevance, Confidence and Satisfaction. The survey can be scored for each of the four subscales or the total scale score. The response scale ranges from 1 to 5. The minimum score on the 34 item survey is 34, and the maximum is 170 with a midpoint of 102. The minimums,

maximums, and midpoints for each subscale vary because they do not all have the same number of items. The reliability in CIS is estimated to be .95.

Achievement Test. As a post-test students took a final achievement test at the end of the term in both control and experimental groups. Their final score was out of 20. The test comprised of five parts: testing vocabulary, synonyms, antonyms, grammar and reading comprehension.

Procedure

After choosing two intact classes for the purpose of investigation, they were randomly assigned into control and experimental groups. The teacher taught the book “Cover to Cover” by Richard R. Day and Junko Yamanaka (2008) which included vocabularies, grammar, and reading texts. In order to consider the amount of cognitive scaffolding that can be achieved by means of applying technology mediated instruction, the experimental group was observed and interviewed during the semester. The teacher/researcher conducted in-depth analysis of all observations, discussions, consultations and interviews both inside classroom and on Telegram in the experimental group (cognitive scaffolding is not provided in traditional classes). The Telegram teacher-student and student-peer discussions comprised questions, queries, elaborations and answers posted by the teacher and students. The development of the questions and subsequent analysis of activity system elements were informed by Jonassen and Rohrer-Murphy's (1999) AT analytical framework.

Each observation lasted 90 minutes. A total of 15 in-class observations were conducted. Audio recording of lectures was clearer than video recording. While the teacher consented to these recordings, progressively, the students became oblivious to these recordings as they were less intrusive and did not target any individuals. The interviews were also conducted during the semester. Three phases were adopted: 1. in-depth interviews at the beginning of the treatment; 2. Interviews during the treatment; and 3. Interviews at the end of the treatment. In AT, the dialectical relationships between the subjects, object, and multiple activities continually change over time as communities evolve and new objects are sought. Being aware of these dynamics, follow-up interviews were considered necessary. The interviews at the beginning of the treatment explored the students' use of Telegram, the structure of their online and offline networks, and their Telegram mediated relations with academics. The

interviews lasted about 45 minutes. In total, five in-depth follow-up interviews were conducted which elicited information on the academic support students had achieved on Telegram. Interviews during the process of treatment lasted also 45 minutes. Interviews conducted at the end of the treatment provided a perspective on previous interviews, and were corroborated with evidence from observations and teacher reflections on his participatory observation in Telegram.

To measure the students' motivational level both in the control and experimental groups, ICS was administered at the end of the semester. After measuring the total scale score for each student, the total average score for each group was calculated. The collected data were entered into the SPSS 20 for the purpose of comparing the two groups. Moreover, to compare students' academic achievement in both groups, their average marks in final achievement test as a post-test were taken into account. An independent sample t-test was used to analyze the data.

Design

This mixed method study was a quasi-experimental research and adapted a quantitative and critical ethnography approach. Telegram as an academic mediation and collaborative learning tool was taken as an independent variable. Cognitive scaffolding, motivational level and academic achievements were taken as dependent variables. By applying AT as a framework and by implementing critical ethnography approach, this study made use of triangulation to gather data on cognitive scaffolding. According to Yin (1994), in data triangulation, findings or conclusions are considered as convincing and accurate if they are based on corroborative evidence from different information sources. This research combined online ethnography of mined Telegram data, direct observation of teacher-student and student-peer interaction while engaging in telegram activities and discussions, and in-depth, semi-structured interviews with the participants.

The analytical framework, which draws on Engeström's (1987) work, emphasized an understanding of socio-cultural contexts in which activities occur, the participants' motivation and interpretations of perceived contradictions in the system, the community-communities, object, activity, rules and roles of the activity system; therefore, this research study draws on this framework to do the analyses.

Results

The first qualitative analysis was based on the activity elements of socio-historical context in the following analytic frameworks (Tables 1 &2).

Table 1

Summary of Activity Elements Socio-historical context

Elements of activity	Extracts of observation and interview transcripts and Telegram discussions	Researcher/teacher comments
Socio-cultural and historical influences	<ul style="list-style-type: none"> - I am eager to use and I am also comfortable with e-mail and chatting on Internet. I cannot keep pace with new things. - I started using the Internet, Telegram and Viber when I came to university and I had no idea how to use it. 	<ul style="list-style-type: none"> - Self-contentment and conservatism is employed to mask a limited literacy background -Students background knowledge indicate their limited access to Internet and new technologies in high school
Object of activity		
<ul style="list-style-type: none"> - Meaningful interaction in class that drew upon Telegram and familiarized students with IS disciplinary knowledge - Mastery of particular concepts on Telegram 	<ul style="list-style-type: none"> - One thing I want to note is that some of us cannot ask our questions in class. So call on Telegram. - We are trying to understand vocabularies and concepts in our books through Telegram; so, whenever you face a film or an image you should 	<ul style="list-style-type: none"> -Telegram acknowledged as complementary learning space - the purpose is to make them ready for exam by making learning easy for them through Telegram
Subjects of activity		
-Student A	-I use telegram to interact with teacher and students. If I don't understand any material, I discuss it and I also comment if I have a problem. Is peak with others and learn more	<ul style="list-style-type: none"> -Telegram complements classroom learning. -Telegram encourages collaborative learning -Shy students preferred sending messages to telegram rather than consulting face to face.
- Introvert Student B	- I am very shy, so, I do not ask questions in class. I prefer to send messages to Telegram so that I don't seem to ask silly questions.	<ul style="list-style-type: none"> - For active students Telegram served multiple

- Active students	- I read all students questions and answers to learn more and know how they think	functions: requesting information, collaborating with peers' and reflections on one's thoughts.
Tools mediating activity		
-Material artefacts - Psychological tools a. direct questions b. prompt questions	-These handouts will help you to make yourself ready for exam. -Why should we use telegram to prompt learning? - Which picture shows the meaning of new word in the text? (on Telegram)	-handouts are used as scaffolding tools -Teacher uses questions to diagnose students' current knowledge
Human tool	-My observation is that if someone posted a message on Telegram, the next day the teacher considers it in class. The teacher talks about it to the entire class. (Interview)	-The teacher connects Telegram and teaching practices and in this way cognitively bridges the gap.
Technological tool	-I answer students' questions and queries on telegram. If they cannot ask their tutors or come in person, they consult via Telegram. (Teachers own viewpoint)	- Telegram recognized as a scaffolding academic tool. - Elaborations and explanations recognized as cognitive levers.

Table 2 represents the data related to the social dimensions of activity.

Table 2
Summary of activity elements- social dimension

Elements of activity	Extracts of observation, interview transcripts and Telegram discussions	Teachers comments
Explicit rules	-Teacher: Some students asked me on Telegram that: with vocabularies we have learned so far can we start reading story books.... (class observation) -Teacher :(two students are speaking and laughing) Can you keep quiet? Can you tell what interesting is?	-Telegram is considered as a consultative space. - Students consultation with peers and the teacher increases their resource base. Teacher's authority is strengthened by students' silence.

Teacher's roles	-Teacher: the notes for doing assignments will be on Telegram. You can ask your questions there. -T: Did you understand? S: No T: I will repeat it again -Today we are going to read page 22. You should pay attention because this is what you need to do.....	Teacher's roles: -Locating academic resources. -Explaining and elaborating -Assigning tasks
Students' roles: -Information-seeking	Student: On Telegram I can ask any question that I like. I have stress whenever I want to ask question in class - Teacher: Students discuss the responses provided on Telegram in class. I heard several students who did not understand discussing my Telegram responses and they wanted some further explanations.	-Telegram helps students to have access to knowledgeable peers and teacher's support. -Telegram interactions brought about in-class collaborative participation
-Peer-based networking		
-Resource Person	Can anyone help me with the meaning of the word <i>defiant</i> ? (observation on Telegram)	Informal peer mentoring is supported by students provision of information
Community	Teacher: Students ask their question and discuss with me and their peers not only in class but also on Telegram.	Students and the teacher constitutes teaching community constitutes teaching community
Outcomes	Teacher: Telegram empowers students because students are eager to use it and it doesn't become a kind of imposition.	Teacher-student and peer-student interactions on Telegram were envisaged to support meaningful student learning and academic empowerment.

For the second research question regarding the effect of technology mediated instruction on motivational level of students, the CIS average

mean score was calculated for both experimental and control groups. Then, an Independent-Samples t-test was used to compare the mean scores. Table 3 shows the descriptive statistics of the analysis.

Table 3
Descriptive statistics for the experimental and control groups

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	40	160.85	8.83	.1.39
Control	40	108.02	12.93	2.04

Table 4 indicates the results of the independent samples t-test used for comparing the means.

Table 4
Independent-sample t-test

		Levene Test		t-test for Equality		
		F	Significance	t	df	Sig(2-tailed)
Motivation	Equal variances	6.25	.015	21.33	78	.000
	Not Equal Variance			21.33	68.89	.000

Note. * $p < .05$

As Table 4 represents, there was a significant difference, $t(68.89) = 21.33$, $p = .000$, between the experimental group ($M = 160.85$, $SD = 8.83$) and the control group ($M = 108.02$, $SD = 12.93$) in their motivational level, implying the better performance of the experimental group using technology mediated instruction.

For the third research question regarding the difference between the experimental and control groups in their academic achievement scores, after administering the final test, the mean scores were calculated for both experimental and control groups. Then, an Independent Samples t-test was used to compare the mean scores. Table 5 shows the descriptive statistics of the analysis.

Table 5
Descriptive statistics for the experimental and control groups

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	40	17.31	2.33	.36
Control	40	11.66	3.42	.54

Table 6 displays the results of the independent samples t-test used for comparing the means.

Table 6
Independent-sample t-test

		Levene Test		t-test for Equality		
		F	Significance	t	df	Sig(2-tailed)
Achievment	Equal variances	5.06	.027	8.619	78	.000
	Not Equal Variance			8.619	68.77	.000

Note. * $p < .05$

As Table 6 indicates, there was a significant difference, $t(68.77) = 8.619$, $p = .000$, between the experimental group ($M = 17.31$, $SD = 2.33$) and control group ($M = 11.66$, $SD = 3.43$) in academic achievement, implying the better performance of the group implementing technology mediated instruction.

Discussion

Student networking on Telegram represented students' information sharing. Students used Telegram to consult with peers on solving theoretical problems, access learning resources, perform tasks and for general course administration. The alignment of in-class activities with Telegram increased the opportunity of perceiving Telegram as a cognitive tool which scaffolds them to take part in questioning and collaborating with peers to do pedagogical tasks. The students perceived peers and the teacher as a learning community which assist them to have access to experts and academic support. Reinforcing the discussions in class, which was initiated on Telegram, turns the informal learning into formal and structured learning and represents the teacher as the authoritative power in

the class (Rambe, 2012). Telegram messaging also increases shy and under-prepared students' confidence and help them to communicate with peers. Therefore, the findings of the study affirm the fact that technology-mediated instruction brings about cognitive scaffolding which is considered as an important factor to be a successful academic learner.

The results of the study also indicated that academic interactions in Telegram mediated pedagogy (activity) not only draw the students' attention to the objects but also help them to attain optimal level of meaningful learning. This fact explains some of the students' skeptical views on the academic value of Telegram. As Engeström (2009) suggested, AT is a theory of object-driven activity whose objects are generators and foci of attention, motivation, effort and meaning through which people constantly change and create new objects.

With regard to second research question, the results indicated that motivational level of the students in the experimental group is higher than the motivational level of the students in the control group. Further, all of the attention, relevance, confidence, and satisfactions sub-scores revealed significantly higher levels of motivation among the students in the experimental group students. These findings confirmed decades of research which show that motivation is one of the most critical concerns in how and why people learn (Efklides, Kuhl, & Sorrentino, 2001; Keller, 1979). The use of a familiar, ubiquitous technology brought about academically motivated students and retained their motivation to excel in Internet System (IS). Therefore, improved performance can be expected to occur when motivational design is included in instruction. The findings related to the third research question approved this fact. Results showed that there were significant differences in the academic performance of the experimental group who accessed the technology mediated instruction compared to the control group students who were taught in traditional manner. Telegram mediates academic learning through establishing online connections, participating in online groups and communicating with online participants (Kim & Jeong, 2009). These findings confirm previous research findings that suggest that motivation plays a critical role in performance (Song & Keller, 2001).

This study employed AT as a theoretical and analytical framework for understanding the potential of Telegram to cognitively scaffold learners and motivate them to learn, and its effect on the students' academic performance.

The findings indicated the meditational role of Telegram which is empowering. Telegram had a productive role in decreasing social distance and linguistic barrier that impede successful communication. Telegram brought about a dynamic activity system which emerges from complex socio-historical environments. Since activities are dynamic and context-bound, contextual factors should be considered to increase productive use of online educational resources.

The findings also indicated that technology mediated instruction also increased the motivation of students which had a profound impact on the academic performance of the students. Generally speaking, AT provides rich theoretical and analytical information into collaborative learning and student-controlled learning environments. In these contexts, teachers' roles shift from knowledge disseminators to facilitators. Material developers and EFL teachers must know that rather than merely providing supplementary instructional materials, whenever feasible they should include more interactive, technology-based motivational strategies to bring about academically successful students. The present study intended to compare the cognitive scaffolding, motivational levels and also academic achievement of both control and experimental groups after implementing technology-mediated instruction. Further research is needed to set employ a proficiency test for homogenizing purposes and pre-test at the beginning of the course of the study to measure students' proficiency and motivational levels before instruction. And also further areas of research are needed to investigate the role of other electronic media in EFL courses.

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Appendix 1: Student interview

Activity elements	Questions that were asked from students
<p>A. To understand the context of activity</p> <p>B. To define subjects</p> <p>C. To understand subjects and their motivational level?</p> <p>D. to Define community</p> <p>E. define object</p>	<p>1. Do you use Telegram?</p> <p>2. What do you use Telegram for?</p> <p>3. What information do you share on Telegram?</p> <p>4. What kind of information do you share with your teacher?</p> <p>5. What kind of activities do you take a part in Telegram?</p> <p>1. Who do you have as your Telegram Friend?</p> <p>2. Would you accept if a teacher asks you to be her Telegram friend?</p> <p>3. How does Telegram interactions relate to in-class interactions?</p> <p>4. Can you talk about your personal interest in Telegram?</p> <p>5. How does Telegram impact your understanding in class?</p> <p>6. Does Telegram have impact on your interaction with peers?</p> <p>1. What did prompt you to use Telegram?</p> <p>2. What do you expect to get from academic interactions in Telegram?</p> <p>1. Can you tell about the groups that you are a member of?</p> <p>2. What rules exist in interaction with peers and the</p>

<p>F. Define the activity itself</p> <p>G. Define mediators</p>	<p>teacher?</p> <ol style="list-style-type: none"> 1. Do you think Telegram can be used to help learning and your autonomy in learning? 2. Does using Telegram increase amount of support that you need? <ol style="list-style-type: none"> 1. What kind of interaction do you prefer to have with your peers in Telegram? 1. What different roles do you play in Telegram? 2. Do rules have any role in your learning? 3. What applications do you use in Telegram to learn?
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Appendix 2: Observation

Context of class and Telegram	<ol style="list-style-type: none"> 1. Interactive pattern 2. The position of the teacher and the students 3. Tools and technologies in use
Relations	<ol style="list-style-type: none"> 1. Teacher and students roles 2. Academic support available 3. Student-peer interactions 4. Student-teacher interactions

Biodata

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