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Message from the Editor-in-Chief

Dear Colleagues,

I am very pleased to publish v14i4, 2015 issue. As an editor of The Online Journal of Educational Technology, this issue is the success of the reviewers, editorial board and the researchers. In this respect, I would like to thank to all reviewers, researchers and the editorial board.

The v14i4, 2015 issue covers different research scopes, approaches which subjects about new developments in education educational technology by valuable researchers. The editorial team will be pleased to share various researches with this issue as it is the miracle of our journal. All authors can submit their manuscripts to tojet.editor@gmail.com for the next issues.

TOJET, Governor State University, Sakarya University and Vienna University of Technology will organize International Educational Technology Conference-2016 (www.iet-c.net) between February 04-06, 2016 in Dubai, UAE.

Call for Papers

TOJET invites article contributions. Submitted articles should be about all aspects of educational technology and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET.

October 01, 2015
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Prof. Dr. Aytekin ISMAN

Editorial Board

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Computer-Assisted Pronunciation Learning in a Collaborative Context: A Case Study in Taiwan

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ABSTRACT
Computer-assisted pronunciation training (CAPT) software provides language learners with an individualized free environment where they can have access to unlimited input and repetitive practice pronunciation at their own pace. This study explores the impact of CAPT on 90 Taiwanese college students' pronunciation learning and examines if other kinds of mediation, such as peer support, could enhance its effect. It includes two experimental groups using *MyET*, a CAPT program designed in Taiwan, either independently (i.e., the Self-Access CAPT Group) or with peers (i.e., the Collaborative CAPT Group) while the control group only had access to MP3 files for practice. Though the quantitative results did not indicate group difference, the qualitative analysis showed that all three groups went through different learning processes. The Self-Access CAPT Group reported the most frequency in the category of *self-monitoring of language learning and production* while the Collaborative CAPT Group had the most frequency in the categories of *gains and strategies*. Lacking the mediation of peers and the feedback from *MyET*, the MP3 Group reported the highest frequency in *difficulties* and the least frequency of *gains and strategies* during the practice. Some pedagogical implications are also presented.
Keywords: Computer-assisted pronunciation training (CAPT), Collaborative learning, Strategy, Social cultural theory

INTRODUCTION
Pronunciation is an important factor in effective communication. Poor pronunciation may cause misunderstanding and therefore can become a barrier to communication. However, pronunciation instruction has long been ignored (Breitkreutz, Derwing, & Rossiter, 2001; Chun, 2012; Brown, 1991; Neri, Cucchiarini, & Strik, 2006). Learners' acquisition of English suprasegmentals did not receive much attention until the 1970s (Celce-Murcia, Brinton & Goodwin, 2004). Furthermore, in the history of L2 pedagogy, the core of pronunciation instruction stresses the importance of segments rather than suprasegmentals. A proficient L2 learner needs to have a good mastery of suprasegmentals as well as segmental pronunciation. Egbert (2004) highlights the fact that language learners are not able to speak and listen in a second language merely with phonemic correctness. Linguistic, syntactic and semantic information, according to Crystal (1981), can be more easily conveyed if a speaker can produce correct pitch variations in his/her own speech utterance, which consequently results in effective communication.

Prosody (i.e., stress, rhythm, pitches, and intonation) did not become a principal focus for pronunciation learning until the 1980s (Chun, 2002). Because of its importance in effective communication, prosody has been given high priority in the teaching of pronunciation (Dickerson, 1989; Gilbert, 1987; Hardison, 2004; Pennington & Richards, 1986). Instead of asking learners to speak as accurately and fluently as English native speakers, the goal of teaching prosody is to help learners achieve mutual intelligibility (Derwing & Munro, 2005; Jenkins, 2002). To achieve this goal, it is indispensable for teachers to include in their curriculum design suprasegmentals such as thought groups, stress, intonation, rhythm, reduced speech, and linking (Goodwin, 2001).

It was not until the late 1990s that the role of pronunciation pedagogy in English teaching was justified when many international language proficiency tests, such as the iBT TOEFL Test, began to include the evaluation of speaking ability. Similar to what has occurred in western countries, pronunciation (including prosody) learning

and teaching in Taiwan has been an area that does not receive enough attention. The reason that pronunciation teaching is not given a high priority is because most high-stakes examinations in Taiwan test students' reading and writing abilities instead of pronunciation. To cope with the shift in the testing trend, more and more pronunciation courses have been incorporated into English teaching in Taiwan. Importantly, technology has been employed to develop some pronunciation software to improve students' speech production. For example, LLabs Inc., a company located in Taiwan, uses advanced audio and visual technology in its product, *MyET* (MyET, 2012), to raise learners' awareness of their pronunciation problems. For its design of visualization of *MyET*, see Figure 1.

Because of the international shift in pronunciation instruction, there are more studies in Taiwan evaluating the efficacy of pronunciation software (cf. Chen, 2004; Chen, 2005; Chen & Chiu, 2005; Chen, M.W., 2006; Tsai, 2006). However, most of the studies mainly presented quantitative results of the learners' practice with pronunciation software. Therefore, it is necessary to probe empirically into the interaction between learners and pronunciation software and examine how they feel during the interaction. This present study investigates the impact of computer-assisted pronunciation training (CAPT) software, i.e., *MyET*, on learners' pronunciation learning including the difficulties the students had while using *MyET* as well as the strategies they developed from their interaction with the system of their peers. Moreover, this study aims to clarify the role of the CAPT system in pronunciation instruction and to investigate how other kinds of mediation can also reinforce its efficacy, such as the human element (peers or teachers).

To achieve the objectives stated above, two research questions await to be answered in this study:

- To what extent does CAPT software have an impact on students' pronunciation learning? Can practice sessions using the CAPT system result in a change in the students' performance in all the rating components or just in some of them?
- What are the learning processes of participants' pronunciation learning and their perceptions toward their learning through different mediations (i.e., CAPT software and peers)? What are the difficulties and challenges they encounter during the processes?

LITERATURE REVIEW

Much pedagogical instruction for foreign-language learners of English to practice pronunciation used to be based on the drill method (Spaai & Hermes, 1993). Rutherford (1987) and Schmidt (1990) suggest that instead of asking students to do rote imitation, teachers should try to promote discovery in their classes by focusing their learners' attention on specific targeted phonological forms in the input, and on the distance between the present level of their inter-language and their target form. However, language teachers seem to have difficulty in helping their students on an individual basis, detecting a distance due to his/her time limitation in class.

With the development of advanced technology, computer-assisted pronunciation training (CAPT) software has been developed to improve learner's pronunciation. Technology has made it possible to conduct a delicate and unbiased analysis of intonation, a difficult task for teachers who try to evaluate their students' performance based on human perception alone (Chapelle, 2004). CAPT software utilizes Automated Speech Recognition (ASR), a state-of-the-art technology that allows a computer both to recognize words that are read aloud or recorded and to compare a student's production of those words with that of a native speaker. Specifically, the software can provide learners with a visual feedback such as a contrast between pitch contours made by the learner and that of a model teacher. The feedback can then help learners understand how their speech deviates from that of the model utterance. Ideally, with constant practice and modification, learners will be able to narrow down the difference between their production and the model. The visual display can be conducive to the acquisition of correct intonation for learners of English because through the visual feedback, learners are made aware of their production differences from the model utterances and they can correct them in subsequent learning trials (Spaai & Hermes, 1993). Not only can CAPT software give students the autonomy to review any part of the materials as many times as they wish but it can also provide them with unlimited input, individualized feedback and additional assistance in a private, stress-free environment (Butler-Pascoe & Wiburg, 2003; Neri et al., 2002).

Though the integration of technology into pronunciation instruction has been found beneficial to pronunciation learning, Spaai and Hermes (1993) suggest that more conclusive empirical evidence is needed to verify the pedagogical benefits of using CAPT software in language classrooms. Some studies have explored the effect of speech technology (e.g., animation or visualization of pitch contours) on learners' learning of segments (Chen, 2012; Fatima Zaki Mohammad Al-Qudah, 2012; Hardison, 2003; Lively, Logan, & Pisoni, 1993; Motobashi-Saigo & Hardison, 2009; Wang & Munro, 2004). Others have examined its impact on users' learning of suprasegments such as intonation (Anderson-Hsieh, 1992 & 1994; de Bot, 1983; Delmonte, 2010; Hardison, 2004; Levis & Pickering, 2004). However, research related to its impact on learners' acquisition of the pattern of timing (i.e., tempo and rhythm) is limited. According to Chen (2006), timing is a crucial component that may influence native speakers' judgment of a foreign accent in learners of English speech patterns. Therefore, it is important to investigate the impact of practice with a CAPT system on EFL learners' performance of English timing pattern. Moreover, there is little research on computer-assisted pronunciation training that involves collaborative learning. The collaborative strategies are said to be the catalysts for peer interaction and are conducive to L2 learning (Oxford, 1997; Vandergrift 1997; Vygotsky, 1978).

Many studies have approached the effectiveness of speech technology solely by means of statistical evaluation. However, Lantolf and Thorne (2006) note that 'learner performance, despite its external manifestation, can have a very different underlying psychological status that changes over time' (p. 287). Because of the limitation of a quantitative study, a study needs to be done through cross-referencing of the learners' actual language gains and their reflections on their interaction with the technology. Advanced as modern technology appears to be, it is not uncommon to come across the fallacy that technology is the solution to all learning and teaching problems. To see through this fallacy, language teachers may need to know exactly to what extent the incorporation of technology into pronunciation instruction has influenced their students' learning. Apart from the employment of advanced speech technology, they may also want to use some other heuristic teaching methods in their pronunciation instruction. As Hirata (2004, p. 358) states, "The development of training techniques for L2 pronunciation is in its infancy, and there is much to be explored in assessing whether various methods of pronunciation training are effective in enabling subjects to accurately produce L2 contrasts."

While some teachers are advocating the use of technology in pronunciation pedagogy, others see collaboration learning as a method in improving students' learning of English pronunciation. Chela-Flores (2001) underscores that pronunciation pedagogy has to provide an opportunity for freer practice in which learners interact with peers in discourse situations that exemplify a variety of prosodic features. Such practice, she believed, can increase awareness of the communicative aspects of pronunciation. Apart from facilitating the language learning *per se*, collaboration learning was also found to be capable of raising the learner's awareness of some strategies that he/she alone would never think of applying in his/her learning of a language otherwise. Collaboration and social interaction are at the core of the Vygotskian socio-cultural theory.

A Vygotskian view of language acquisition is that it is essentially a social activity within a socio-cultural framework. According to Vygotsky (1978, p. 57), "Any function in the child's cultural development appears twice, or on two planes": first at the social plane (between people, i.e., inter-psychological) and then at an individual one (within the child, i.e., intra-psychological). Vygotsky underlines the importance of society because it determines human beings' behavior. He probed the causes and process of how interaction between two people in a dyad (i.e., on an interpersonal dimension) could lead to higher mental functioning (i.e., on an intrapersonal dimension). The Vygotskian sociocultural framework accentuates that knowledge is constructed through a process of collaboration, interaction, and communication among learners in social settings (Vygotsky, 1978, 1986).

There have been studies adopting the Vygotskian sociocultural framework to probe the myth of language proficiency. For instance, Swain, Brooks and Tocalli-Beller (2002) claim that peer collaborative dialogues can mediate second language learning. Jones (2006) also found that collaborative learning in a computer-based environment can support L2 learning. In a similar line, according to Chao (2007), a case study on community

learning reported that the assistance and guidance from teachers and peers as well as dialogic communication among them can have an invaluable impact on the participants' concept and attitudes toward the given task. According to Fang and Chen (2012), learners practicing pronunciation in two learning contexts (i.e., both computer-assisted pronunciation training and classroom-based pronunciation training) were able to develop more use of strategies. They assumed that the increase might result from the fact that the learners had more opportunities to observe and practice. This present study navigates how different mediations may impact students' pronunciation learning process.

METHODOLOGY

Subjects and experiment design

This study involved an experiment composed of 90 Taiwanese college English major students , who were divided into two CAPT groups (the experiment groups) and one non-CAPT group (the control group). The CAPT groups were the Self-Access CAPT Group and the Collaborative CAPT Group. The participants of the Self-Access CAPT Group studied independently using *MyET*, a CAPT system made in Taiwan, while those of the Collaborative CAPT Group practiced *MyET* with peers sharing one computer. In contrast, the non-CAPT group had only access to the written texts and the MP3 recording of the texts from *MyET*. For ten weeks these groups practiced the texts and the recordings of Part I of a play named *Cinderella* and Part I of *The Three Billy Goats* offered by *MyET*, which were featured with dramatic intonation. Appendix A (Excerpted from Tsai, 2006) presents a snapshot of the text for practice.

All the groups received the same pretest and posttest, i.e., an excerpt from the story, Cinderella. Each week after practice with the texts and listening to the recordings of the texts, the participants were asked to write down their learning reflections in their learning logs, on which their teacher would make her feedback every week. The teacher (i.e., the researcher of this study) played the role of facilitator, giving her students help only when they asked for it. It was not until the fourth week that the teacher/researcher of this study gave a ten-minute instruction on some basic concepts of English prosody to each group because quite a few participants had revealed that they had difficulties catching up with the reading speed of the model utterance. The teacher's instruction time was limited to 10 minutes because it was hoped that it would not influence the results of the experiment.

In the tenth week, a posttest was given to the students using the same test material and procedure as used in the pretest. The audio files of the participants' reading of Part I of *Cinderella* in both tests were collected for later analysis. The data collected were then managed through both statistical and qualitative analyses. A procedure sketch of this study is shown in Table 1.

Table 1: Procedure Sketch of this Study

Groups (N=30 students in each group)	Self-Access CAPT	Collaborative CAPT	MP3
Treatment (10 weeks)	Practicing *MyET* independently	Practicing *MyET* with peers	Practicing the handouts through MP3 player
Materials	1. *MyET* program with the texts and the recordings of Part I of *Cinderella* and Part I of *The Three Billy Goats*		1. Handouts with the texts and the recordings of Part I of *Cinderella* and Part I of *The Three Billy Goats*
	2. Learning logs		
Data Sets	1. The participants' recordings in the pretest and the posttest (i.e., Part I of *Cinderella*) 2. Learning logs		

Data analysis

All the audio files were then randomly uploaded to a database operating behind a rating website specifically designed and developed for this study. Each audio file was rated by four raters with a scale of 5 points. All the

sound files were presented to the raters without revealing the names of the participants and the order of the tests (i.e., pretest or posttest). Such arrangements prevented the raters from knowing whose production they were listening to and which productions had preceded or followed the treatment.

The rating criteria adopted in this study are similar to that of *MyET*, which categorizes the scores for a learner' production into four components: pronunciation, intonation, timing and intensity (i.e., loudness). Due to the fact that, the recording of the participants' speech might be affected by the operation of their microphones, the criteria this study set for the articulation rating did not include the category of intensity. The rating categories of this study, therefore, consist only of three components: pronunciation, intonation and timing. Additionally, a score for overall production was added to the rating items because, according to Chen's finding (2006), the subjective impression of human judgment may be more holistic than discrete.

As to the qualitative inquiry, in order to evaluate the learning processes each group went through and the performance differences across the groups during the process, the participants' weekly learning logs were compiled into a database for careful analysis. The analysis basically followed the naturalistic data processing procedure suggested by Lincoln and Guba (1985, pp. 336-356), a constant comparative content-analytic method. First, emerging themes related to the research questions were identified and were iteratively modified to reflect categories emerging from the data, such as those related to collaborative relationships or the role of technology in producing learning opportunities. Then the themes were categorized and interpreted, whose procedures are considered essential to all successful analyses of qualitative studies (Richards, 2003). Following that, the frequency of each category found in each group's learning logs was calculated and a summary table was made to display the pattern of learning progress each group had been through.

RESULTS AND DISCUSSION

This section presents the quantitative and qualitative analysis results of this present study. The former analysis is based on the scores given by the four raters of native speakers of English while the latter is grounded on the frequency counts the themes as emerged from the learning logs of the participants. First, the quantitative results are presented, which are followed by the qualitative ones.

Table 2 depicts the descriptive statistics on each group's progress in reading Part I of *Cinderella*. *P Progress* refers to the score mean difference between the segmental pronunciation rating from the pretest to the posttest for each group, *I Progress* to the change in the intonation rating, *T Progress* to that in the timing rating, and *O Progress* to that in the overall performance.

Table 2: Descriptive Statistics on the Three Groups' Progress

		N	Mean	Std. Deviation
P1progress	G1	30	0.16	0.45
	G2	30	0.21	0.44
	G3	30	0.21	0.48
	Total	90	0.20	0.45
I1progress	G1	30	***0.86***	0.60
	G2	30	***0.81***	0.63
	G3	30	***0.90***	0.72
	Total	90	***0.86***	0.64
T1progress	G1	30	0.70	0.49
	G2	30	0.59	0.60
	G3	30	0.63	0.55
	Total	90	0.64	0.55
O1progress	G1	30	0.53	0.44
	G2	30	0.51	0.52
	G3	30	0.55	0.49
	Total	90	0.53	0.48

Notes. Progress= the score mean difference from the pretest to the posttest

P1=pronunciation scores for the reading of Part 1 of *Cinderella*
I1=intonation scores for the reading of Part 1 of *Cinderella*
T1=timing scores for the reading of Part 1 of *Cinderella*
O1=scores for the overall performance of the reading of Part 1 of *Cinderella*
G1=Self-Access CAPT Group
G2=Collaborative CAPT Group
G3=MP3 Group

Table 3 shows that the degree of improvement in intonation precedes that of timing and segmental pronunciation. This result is encouraging for the integration of CAPT software into prosody instruction. As shown in Table 3 below, a one-way ANOVA involving Time (pretest, posttest) and mediation type (self-access, collaboration and MP3) did not reveal any significance of mediation in the practice of Part I of *Cinderella* (with all *p*-values > 0.05). That is, the employment of different kinds of tools for the practice did not result in a significant change in the students' reading performance in all the rating components in the posttest. This result is in accordance with Chen (2005), who reported that though the experiment group did make significant improvements as a result of the experiment, its improvement was not great enough to outperform the control group. One potential explanation for this result may be that the practice sessions were long enough for all the groups to improve themselves at the end of the experiment. Further study is needed to evaluate the accountability of this result.

Table 3: ANOVA on the Performance in Reading Part I of *Cinderella* across Groups

Progress	Groups	Sum of Squares	df	Mean Square	F	Sig.
P1	Between Groups	.05	2	.02	.11	**.889**
	Within Groups	18.47	87	.21		
	Total	18.52	89			
I1	Between Groups	.12	2	.06	.14	**.863**
	Within Groups	37.39	87	.43		
	Total	37.52	89			
T1	Between Groups	.17	2	.09	.29	**.749**
	Within Groups	26.82	87	.30		
	Total	27.00	89			
O1	Between Groups	.01	2	.00	.03	**.966**
	Within Groups	20.75	87	.23		
	Total	20.77	89			

Notes: Significance is set at p-value<0.05
Progress= the score mean difference from the pretest to the posttest
P1=pronunciation scores for the reading of Part 1 of *Cinderella*
I1=intonation scores for the reading of Part 1 of *Cinderella*
T1=timing scores for the reading of Part 1 of *Cinderella*
O1=scores for the overall performance of the reading of Part 1 of *Cinderella*

As for the qualitative results, four themes are generated from the reflections all the participants kept in their learning logs: *learning difficulties*, *gains*, and *strategies* used in their practice, and the *monitoring of one's own performance or language learning*. The participants in this study reported difficulties in comprehending the linguistic aspects of the material and in overcoming their psychological barriers during the learning process. The linguistic difficulties included the fast speed of model teachers' speech, and the variety of pitches manifested in the model teachers' speech depending on the context, i.e., sometimes low, high, lively, arrogant, sounding like an old man's or a young child's voice. As for the psychological aspects, the participants revealed that they were afraid that they might be overheard by the other classmates sitting next to them in the lab, so they were hesitant in practicing the texts loudly and felt shy in recording their reading.

The category of *gains* refers to the benefits the three groups reported to have had from their practice with the CAPT system (i.e., *MyET*) or the texts and the recordings of the fairy tales. Some of them even revealed in their learning logs that they could feel that they had made improvement in the first few weeks in terms of speech rate, intonation, segmental pronunciation, and in understanding of the vocabulary and sentences of the texts. Others claimed that their pronunciation practice helped in the development of skills other than speaking. The students also wrote that they enjoyed themselves during practice.

The students stated that they were able to deal with their learning difficulties with some strategies. Some would imitate the model teachers' reading and then practice the sentences over and over. The strategies that the students were found to use most often were listening and repeating, i.e., imitation, a result similar to that of Fang and Chen (2012). Others wrote that they would listen to the model utterance many times, read with variable intonations and emotions, resegment syllables (e.g., such as *once upon a time*), and control their pitches in reading.

The category of *monitoring their own or peers' learning and language production* refers to the students' evaluation of their own performance (such as *funny* and *too flat*) and the improvement that they made, getting to know the functions of intonation (e.g., to express different emotions), being aware of their incorrect pronunciation, observing the need to express feelings in their reading, and becoming aware of the need to control of the rhythm to make their reading sound more natural. The distribution of each theme category across the three groups is presented in Table 4.

Table 4: The Frequency of the Theme Categories Emerged from the Reflections

Categories	MP3 Group	Collaborative Group	Self-Access Group
D	**406**	192	219
G	203	**263**	243
S	104	**172**	152
MON	39	35	**58**

Notes: D = difficulties, ***G*** = gains, ***S*** = strategies,
MON = monitoring of one's own performance or language learning

As indicated in Table 4, differences were found among different groups. The MP3 Group reported the highest frequency of difficulties (N=406). In contrast, the Collaborative Group had the lowest frequency in reporting their difficulties (N=192) and the highest frequency in describing their gains (N= 263), and strategy brainstorming (N=172). As for the Self-Access Group, it was discovered that they had produced the highest frequency of self-monitoring of language learning (N= 58). This might be because the members in the Self-Access Group had more time to continuously engage themselves in individual on-tasks. Their engagement might have facilitated their awareness of the learning progress during their practice with the system. Nevertheless, working alone, the students in the Self-Access CAPT Group reported more difficulties than the Collaborative Computer Group. Moreover, the former group did not develop as many strategies as the latter one. Though most students in the Self-Access CAPT Group had the potential to sustain their effort in practicing with the system, they might have been feeling lonely during practice. Some of them revealed their need to interact with a real person. Specifically, they were not able to have the support from their peers as experienced by the Collaborative CAPT Group.

Different from the Self-Access CAPT Group, the students in the Collaborative CAPT Group reported the highest frequency in gains and revealed that they had made much improvement in their fluency, their production of intonation, and segmental pronunciation. The collaboration between peers might have created some anesthetizing power, which made them feel that lots of improvement had been made. Explicitly, the students in this group might have received from each other some consolidating statements, such as praise, appreciation and

encouragement so that they thought that they had been performing very well. Metaphorically, the support the students received during the collaborative learning, like a pain killer, was able to alleviate the sense of difficulty and anxiety that might have arisen from their practice with the CAPT system otherwise.

The reflections of the Collaborative CAPT Group showed that the external assistance from their peers did facilitate their awareness of errors. Some students reported that they would revise their production upon receiving assistance from them. In other words, collaborative learning was also conducive to the self-regulation of their learning behavior. Moreover, with the mediated assistance from their peers, the collaborative group was also found to have generated the highest frequency of strategies to deal with their learning difficulty. Specifically, the students could brainstorm many strategies and give feedback to each other to improve their intonation performance. The quantitative results of this study attested the positive outcome of their collaborative learning in learning English prosody.

Like the Self-Access CAPT Group, the students in the MP3 group gained more time to spend on their learning since they did not have to work with other peers. With repetitive imitation, they could listen to the MP3 input more times and do more practice to achieve mastery. However, without peers' assistance and the feedback provided by *MyET*, they were not able to detect their production errors easily. This was the only group in which some of the students claimed that they did not have any difficulties. Their ignorance might have been induced by lack of mediating tools. Moreover, due to the lack of mediated assistance from peers and feedback from CAPT software, they were not able to generate as many strategies as the CAPT groups to tackle their own learning difficulties. As a consequence, the MP3 Group reported the highest frequency of difficulties and the least frequency of gains during the practice.

Finally, the participants' reflections showed that there is room for improvement of the feedback design of the CAPT system. First of all, some students using *MyET* complained about the fluctuation of scoring. They also expected to receive more constructive suggestions on how their production could be improved. For example, some students said though the feedback from the system had helped them modulate their pitch production somewhere in the sentences, they had no ideas how to modify their production to match that of the model utterances. Finally, some of the students considered practicing with the model teachers monotonous and mechanical after practicing for some time. To sum up, while the CAPT Groups (i.e., the Self-Access and Collaborative CAPT Groups) revealed that they benefited from the assistance from the CAPT system, there were times when they felt that their mediated learning through technology itself became a new problem to them.

As to the mediated learning through peers, the reflections of the Collaborative CAPT Group showed that the students were able to encourage and help each other. Some students even reported that the discourse help from their interlocutors (either more competent tutors or peers with equal status) enabled them to detect their gaps in the knowledge of the patterns of spoken English and to produce utterances they could not construct on their own. On the other hand, other students of the Collaborative CAPT Group revealed that they preferred autonomous learning methods because they considered it too tedious and time consuming to work out a way to collaborate with their peers. Some also revealed their concern about being laughed at in their production or not having peers competent enough to coach them for better production of pronunciation. Our finding here is in line with that of Swain, Brooks and Tocalli-Beller (2002), who reported that some learners might still rely more on teacher feedback than on peer feedback. Moreover, some students in this group reflected that working with their peers did take away the limited time they could have saved for their own individual practice.

IMPLICATIONS

The analysis of the students' learning logs verified that the software was able to specifically raise the students' awareness of the prosodic elements such as intonation, which was visually illustrated in various pitch contours. Nevertheless, new technology, such as some updated learning software, should be treated as a mediating tool to stimulate learning and thinking rather than as something that can replace the teacher's job. It was not unusual to hear that teachers can leave their teaching work to certain state-of-the-art software because of its specific

powerful features. As Warschauer (2005, p. 48) claims, “CALL advocates should not view the use of computers as an end in itself but as another tool to promote language learning [that] mediates and transforms human activities.” Therefore, even if seemingly trivial instruction is rendered to a CAPT program such as *MyET*, teachers still need to scrutinize students’ attitudes and responses to the computer-assisted learning program and provide immediate help for their students if the help is necessary.

The documentation of the learning process of the Collaborative CAPT Group was an example validating what socio-cultural theories have emphasized, i.e., the social nature of learning, and the interaction in cultural-historical contexts through which symbolic, physical, and mental spaces are mediated. The students collaborated with their peers to make and test their hypotheses of the patterns of English pronunciation and co-construct new and useful understandings of English pronunciation and thus developed their capability for learning it. As found in this study, the collaborative learning not only serves as a soothing function in relieving learners’ anxiety and sense of difficulty but also boosts up more brainstorming for strategy use. Therefore, it is important for teachers to develop a curriculum that emphasizes interaction.

This study would like to suggest a staged instruction for English pronunciation or pronunciation teaching in general. At the beginning of the class, students can listen to the material and repeat after the model utterance for some time. Practice at this phase can help students internalize the text recording. In this way, the practice starts on an inter-psychological dimension (i.e., an interaction with the recording of texts) and then moves onto an intra-psychological plane (i.e., internalization through repetitive imitation). Then teachers can encourage students to work in pairs to practice some CAPT software. Practice at this stage again returns to the interactional dimension, in which peers help detect each other’s errors, assist each other, and co-construct their knowledge of the features of the target language. Then, students can be left alone to work with the software to focus on their individual problems that have either been detected on their own or with their peer's assistance. The feedback that the CAPT system provides can further help identify the errors that cannot be easily or consistently detected by the human ear. Such practice enhances their learning on the intra-psychological dimension, that is, the mediated assistance from the CAPT system can facilitate the students’ internalization of what they are learning. Above all, teachers need to invite their students to make reflections on their practice. As Swain (2000, p. 113) has claimed, “Through saying and reflecting on what is said, new knowledge is constructed.” The proposed different stages for pronunciation teaching are illustrated in *Figure 1*.

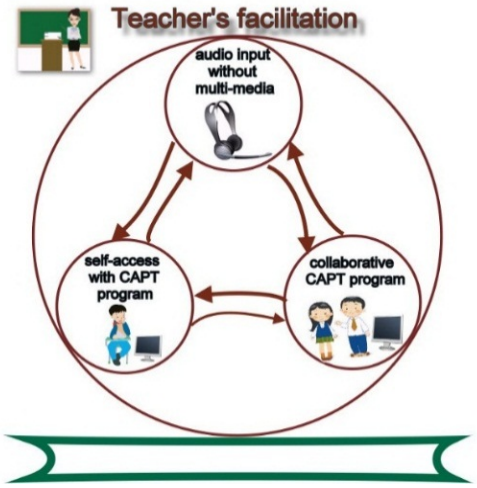

Figure 1. The Proposed Different Stages for Pronunciation Teaching

CONCLUSIONS

This study explores how various kinds of mediation (e.g., MP3, CAPT software and of peers) can support the pronunciation learning process of EFL learners in the colleges in Taiwan. The findings of this study present abundant evidence of the power of collaborative learning in mediating the learning process of the learners.

Moreover, this study sheds light on the difficulties and challenges of EFL learner during their computer-assisted pronunciation learning, and thereby becomes a good reference for both language instructors and CAPT developers. Based on their students' reflections, teachers can see clearly the learning process their students' progress through; and so teachers can further tailor the course to meet the students' needs. As for program designers, the results of this study also give insightful suggestions that may be beneficial for future product design. It is hoped that the program developers will be able to come up with a product that truly incorporates not only technology but also pedagogy.

Specifically, this study suggests a staged employment of various kinds of mediation for teachers to obtain a better outcome for their language teaching. Teachers should not expect that technology can solve all the students' learning problems. Instead, they should pay attention to the different roles assigned to technology and other kinds of mediation. If teachers can introduce various mediating tools to their students to facilitate their learning at different learning stages, they will be able to assist them to move to the next advanced learning stage.

If the peer-peer dialogues of the Collaborative Computer Group of this study could have been recorded, more substantial evidence could have been collected to illustrate the advantages of using CAPT software in a collaborative context. Future research can adopt the framework of Swain (2000) to examine the pattern of the dialogues between peers. According to Swain, collaborative dialogues can mirror the moments of language development. Further experiments involving more learners at different levels of proficiency and studies of retention would contribute to refining our understanding of the impact of different mediating tools on learners' pronunciation learning. As Lynch and Maclean (2001) reported, only less proficient learners were found to show improvements in phonology, syntax and lexis as a result of their incorporation of language from their interlocutors.

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APPENDIX A: A Screen Capture of a Learning Interface of *MyET*

(Excerpted from Tsai, 2006)

Electronic Continuous Professional Development (E-CPD) for Teachers: Bridging the Gap between Knowledge and Application

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ABSTRACT
The continuing professional development (CPD) is a concerted effort to ensure the educational service officers to equip themselves with professional knowledge, skill, values and practices of teachers through in-service training program organized based on competency development, lifelong learning and career path. Nonetheless, educators do not only teach or lecture but also have other stipulated duties such as involvement in research, committees and administrative duties. All these activities are time consuming and to achieve a proper balance will be a great challenge for educators. Thus, an online training system, electronic Continuous Professional Development (e-CPD) was designed to provide training for primary school teachers virtually. This study aims to identify the activities that occur at every level of Bloom Taxonomy with the integration Zone Proximal Development (ZPD) activities in e-CPD. Qualitative methodology specifically content analysis was utilized during the data collection. The content of e-CPD was analyzed searching for the activities in relation to Blooms Taxonomy embedded in ZPD. The findings of the research indicated that the e-CPD system implemented the four levels of mentoring; coaching, self-coaching, fossilization and applications. Apart from that, the system also involved the teachers with the six levels of Blooms Taxonomy; knowledge, comprehension, application, analysis, synthesis and evaluation. The incorporation of Blooms Taxonomy bridges the gap between the teachers' knowledge and its application. Hence teachers are able to apply their learning to authentic workplace situations to improve on-the-job performance.

INTRODUCTION
Some researchers say mentoring can only be done by face to face so they can see their mentor (Evans &Volery, 2001). However, e-mentor is especially effective when there is no opportunity for mentors to mentoring traditional which is, face to face (Single & Single, 2005). If the is a internet connection, mentoring will be the choice of a national and international where it very beneficial for people who are unable to access a mentoring opportunities (Kasprisin, 2003), although it may involve additional costs and time. (Single and Single 2005) agree that e-mentoring is not saving time or a cheaper option to traditional mentoring, such as setting up Web sites and software programs but it can be an expensive consultation process and takes time.

But, e-mentoring is also able to overcome the constraints of time by allowing flexibility in the information; and communication independently (Kasprisin, 2003; Stewart, 2006). For example, e-mail can be read, considered and we can respond on time by allow appropriate reflection and constructive feedback. Restraint social status, physical appearance and behavior are not present in electronic communication, which in turn encourages disclosure will occur in communication face-to-face (Bierema& Merriam, 2002; Knouse, 2001; Stewart, 2006). It may be easier to store e-mail messages than words by face-to-face talk, which can lead to problems in communication. Mentoring which is traditionally not has additional signals such as body gestures and non-verbal communication. Instead, the e-Email provides a permanent record that can be returned for further reflection (Kennett,2006). Technological developments, particularly increased the access to the internet among all levels of society, e-mentors (known as e-mail mentor, mentoring online, telementoring, and mentor e-CPD) has become famous in recent years (Cravens, 2002; Miller & Griffiths, 2005).

In addition, CPD training and e-learning should have key features such as following (Jamaluddin, 2000); transmission system and manage course material, access control-usually using a password, assessment of performance which monitored participants, collection and analysis of scores, track record of participant, system-level communication as inconsistent (asynchronous) and consistent (synchronous) face to face; one to many or the other round and many to many (such as through video conferencing), facilities timetabling of teaching and learning, formative assessment-shaped (self-assessment), storage space for students to exchange and store materials / data, resource base of teaching and learning materials are flexible, facilities support and help guides online, tool or facility to update the materials, tutor support or adviser, structure-in-class with e-CPD but there should be collaboration, mentoring, projects and portfolio preparation and progress of learning tasks effectively, term of a course or learning-not for a lifetime : It should however be flexible and cost of payment for course fees / program: fee e-CPD mentor and phone bills.

RESEARCH FRAMEWORK OF e-CPD

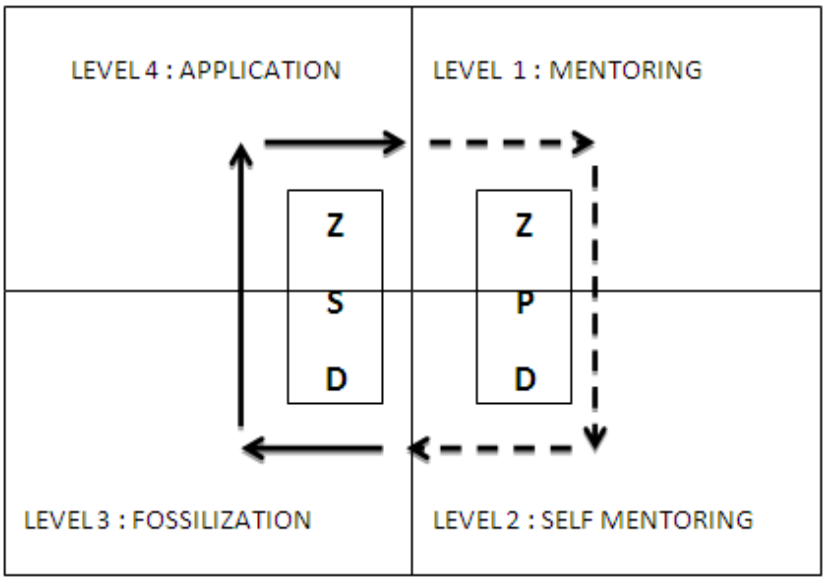


Figure 1: Theoretical framework of mentoring system based design in e-CPD

(Sources : Vygotsky, L.S. (1978). *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.)

Conceptual Framework of e-CPD is designed adapting Zone Proximal Development (ZPD) proposed by Vygotsky. The design of the system is intended to provide guidance for teachers who participating in virtual training in ICT skills of certain level so that they can manage their own learning at the next level.

Based on Vygotsky's (1978) an individual can come up with something or make their own designs in the future if they have guidance from someone. Vygotsky's theory differs from Piaget's theory which simply states that the behavior Human influenced by society. Vygotsky explains that human behavior is built through transformation and collaboration which influenced by culture, faith and other individuals (Vianna, 2006). ZPD is "the gap between the original development involving problem solving skills by self guided by someone or collaboration with skilled peers (Vygotsky, 1978). In other words, the meaning, ZPD is a zone where the skills cannot be mastered by an individual and requires guidance of a skilled peer or an expert (Woolfolk, 2000).

There are 4 levels in this conceptual framework. Level 1 and Level 2 involve "Zone Proximal Development (ZPD)"in this conceptual framework. Level 3 and Level 4 involves "Zone Self Development (ZSD) ". All of the works in the form of a cycle whereby every time teachers will be guided when a new skill is taught or introduced to them. Mentors play an important role in every cycle of this level. Cycle is shown by the arrows perennial and normal arrows. Perennial arrows represent significant guidance provided by the mentor. Normal arrows shows independent learning style which is supervised by a mentor. Thus, the overall mentor plays an important role in every level of activity.

Level 1 is the level of coaching whereby mentors will guide and assist teachers in primary schools to implement a virtual assignment. Mentor will play an important role in helping to solve the problems faced by teachers in the

design. Continuous communication and proper guidance are essential components of a successful mentoring relationship. It will start mentoring relationships, setting and monitoring of professional goals in helping participants ICT skills training (Portner, 2002).

Level 2 is the level of self-guidance. Elementary school teachers are required to solve the problem independently based on the demonstration of a virtual mentor. Independent learning style is an important element of life in modern society (McLoughlin & Lee, 2008). An individual is always looking for information to deal with problems at work, school, or to satisfy curiosity or inquiry. Therefore, they need to take advantage of technology and network not only to get information, but also to share information. Thus, an individual cannot be considered as passive consumers of information, instead, they active co-mentor. In addition, learning in social media contexts such as learning virtual provide motivation, autonomy, and informal, and it also a part from self experience (McGloughlin & Lee, 2010; Smith, Salaway, & Caruso, 2009; Solomon & Schrum, 2007).

Level 3 is called as the fossilization. Teachers can relate the skills that learned in coaching and mentoring skills obtained independently. Self guidance plays an important role to improve the productivity of the system education by conducting teaching and learning based on individual needs and make individuals more active in effective learning. Individual learning is also will produce a new generation of self-confident and more independent in their learning challenges (Miliband, 2003).

Level 4 is the application level. It is the level which teachers can apply what they have learned in a self-mentorship and guidance in the future. They can solve problems and design learning in this stage. Self-regulated learning by ongoing mentoring in the face task difficult in the daily routine of teachers (Kitsantas &Dabbagh, 2010).

LEARNING DESIGN OF e-CPD

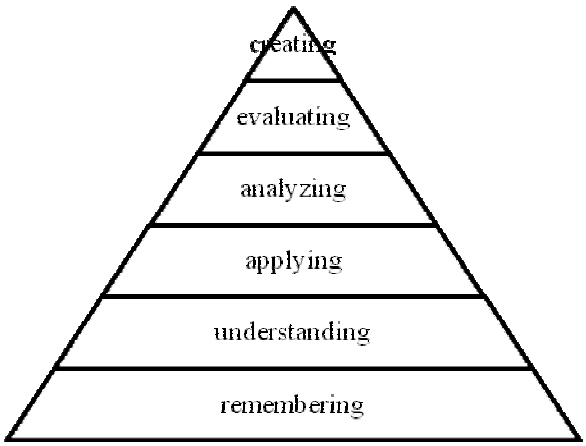


Figure 2 : Revised Taxonomy Bloom

(Source: http://ww2.odu.edu/educ/roverbau/Bloom/ blooms_taxonomy.htm)

The shift from one dimension to two dimensions in the RT has led to the formation of a two-dimensional Taxonomy Table (TT). This table functions as an analytical tool of the RT (Bumen, 2007). Amer (2006) in his study mentioned that the TT can be used for several reasons such as (i) to analyze and reflect the objectives of a curriculum or a syllabus, (ii) help teachers not to confuse their activities or tasks with the objectives, (iii) to help teacher be aware of the relationship between assessments and their teaching-learning activities, and (iv) to examine the curriculum alignment. Anderson (2002) revealed that TT can be advantageous in estimating the curriculum alignment regardless of the subject matter or the school level. He further added that a strong link between the objectives, instruction, and assessments ensures that the curriculum is aligned. Gorin and Blanchard (2004) concurred that the alignment of the abovementioned elements will result in successful student learning; research shows that alignment of the curriculum brings a positive influence on achievement (English & Steffy, 2001).

Bumen (2007) stated the pluses of using the RT and his research, and added that studies conducted based on RT and planning skills are very minimal. The results of his study confirmed other studies which have indicated a number of benefits of RT in the planning of lessons (Anderson, 2002; Andrich, 2012; Ferguson, 2012; Krathwohl, 2002; Mayer, 2002; Pintrich, 2002; Su et al, 2004; 2005; Amer, 2006). Owing to the results of these

studies, it is fair to come to a consensus that RT has made several improvements in curricular development in the field of education (Bumen, 2007). Nasstrom (2009) conducted a study in Sweden using RT to evaluate functions of mathematics and considered it valuable in his research. Furthermore, Nobel (2004) incorporated RT with Multiple Intelligences and found it to be effective. Ayvaci and Turkdogan (2010) also reported RT to be successful in evaluating Science and Technology questions. Ari (2011) mentioned that RT has gained its popularity on the international stage. More studies should be done to develop pre-service or in-service teacher education by using the RT (Bumen, 2007); also, to see if the RT is across other subject fields (Bumen, 2007; Nasstrom, 2009). Bumen (2007) in his study also recommended the taxonomy table to be used by teachers to model the way they teach and later, to analyze they teaching.

Borko (2004) argued that professional development should be underpinned by both the cognitive and social aspects of learning; nevertheless, Watson (2013) pointed out that theory has tended to place emphasis on either cognitive or social perspectives. Cognitive perspectives focus on the concepts of changes in teachers' beliefs and knowledge (Watson, 2013) whereas the social perspectives arecentered on professional development through participation (Lave & Wenger, 1991).Lave and Wenger (1991) advocated that professional development must be revolved around the communities of practices. According to Bradley (2011), constructivism is the cutting-edge learning theory among all the three major schools of learning theory – behaviorism, cognitivist, and constructivism. Since most of the professionals in this day and age adopt a constructivist pedagogical framework, the behaviourist and competence-based process model is found to be inconsistent in the professional development programs (McMillan, Walsh, Gray, Hanna, Carville, & McCracken, 2012). Hence, Sullivan Palinesar (2005) has proposed that the design professional development programs for teachers should be based on the principles of social constructivism.

Knabe (2004) pointed out that among all the theoretical frameworks that underpin online course development and teaching, survey of the literature shows that the most commonly cited is the constructivism theory. Researchers have come to a consensus that online course designs that are based on the constructivist theory have borne success of the particular online course (Gold, 2001; Ausburn, 2004, Salter, Richards & Carey, 2004; Wiesenberg & Stacey, 2005; Chitanana, 2012). The constructivist epistemology is supportive to teachers in terms of setting an environment which emphasizes on learner collaboration, reflections and designing authentic tasks, which enhances learner participation and encourages active learning (Merrill, 1992; Gold, 2001; Savery & Duffy, 2001, Ausburn, 2004). Thus, in this respect, the constructivist theory is in line with the successful online teaching strategies which involve community learning, collaborations and interactions, as well as deep and meaningful learning experiences (Chitanana, 2012). Gulati (2008) has mentioned that a "social constructivist experience" occurs when constructivism is applied in the design of online courses (p.184).

Most online learning is related to social constructivism with an emphasis on collaboration in solving tasks (Bonk & Cunningham, 1998; Jonassen, Peck & Wilson, 1999) as well as individual development through sharing of text and other cultural tools (Gergen, 1995; Postholm, 2012). Chitanana (2012) stressed on the significance of the social aspect in designing an online learning content and that participants ought to be provided with chances to engage in dialogues with other learners as well as experts of the respective fields. Previous literature confirms that that the discussion platform enhances learning and promotes engagement in learning, application of critical thinking besides the building of knowledge (Laurillard, 1994; McLoughlin & Luca, 2000). Pitsoe and Maila (2012) reported that despite the availability of rich literature on constructivist learning theories and their usability in South Africa, there is, however, a very minimal attention on the implications of constructivist insights and practices for teacher professional development and teacher education; hence, they argued that principles that are attuned with the contemporary paradigm should underpin and guide the teacher professional development programs.

RESEARCH METHODOLOGY

Content analysis technique is used in analyzing the data which is based on ICT Competency Matrix for primary school teachers. Suggested activities are analyzed in this section.

Analysis of the data is applying Bloom's Taxonomy. The data is further looked into three domains such as cognitive, affective and psycho-motor. Cognitive domain is used to measure intellectual skills. The affective domain is used to measure generic skills, which have been applied to participation in associations and also in a variety of group discussion as in the course of system design and so on. Psycho-motor domain seeks to measure the practical and technical skills. These skills are applied through industrial training, laboratory testing and technical visits. Thus Bloom taxonomy can be used to measure the effectiveness of training. (Kim Chee Mang, 2002). Each of these categories will be analyzed in each level of e-CPD mentoring based on activities at all levels.

Domain taxonomy of cognitive skills is used to measure intellectual skills based on a cognitive hierarchy are sorted from low level to high level of level of remembering, understanding, application, analysis, evaluation and creating (Russell Baker, Gina M.Almerico, Barry Thorton, 2008).

RESEARCH FINDINGS

Domain taxonomy in cognitive skills is used to measure intellectual skills based on a cognitive hierarchy. They are sorted from low level to high level of remembering, understanding, application, analysis, evaluation and creating.

Figure 3 : Forum

Remembering

Remembering involves activities such as recall, recognize the idea, the basic fact, the definition of the theory, law, dates, events and other learning from the past. An individual can state, describe, name and label of acquired knowledge. Forum Questions About Creative Multimedia helps the teachers to recall what they have learned via e-mentoring. Figure 3.1 shows that teachers are able to describe about the font that they have learned to mentor via forum. It suggests that teachers be able to recall what they have learned in the forum like a new font that helps a teacher in his or her job well. Teachers are using some fonts that they learned in their work. Teachers are able to identify what they have learned through the downloaded videos from a web application for their assignments. They get to know about the instructions and all steps or activities from the video as shown in Figure 3.2. This indicates that teachers are able to follow the instructions shown in making good power point presentation without any problem and they can recognize new ideas in their product.

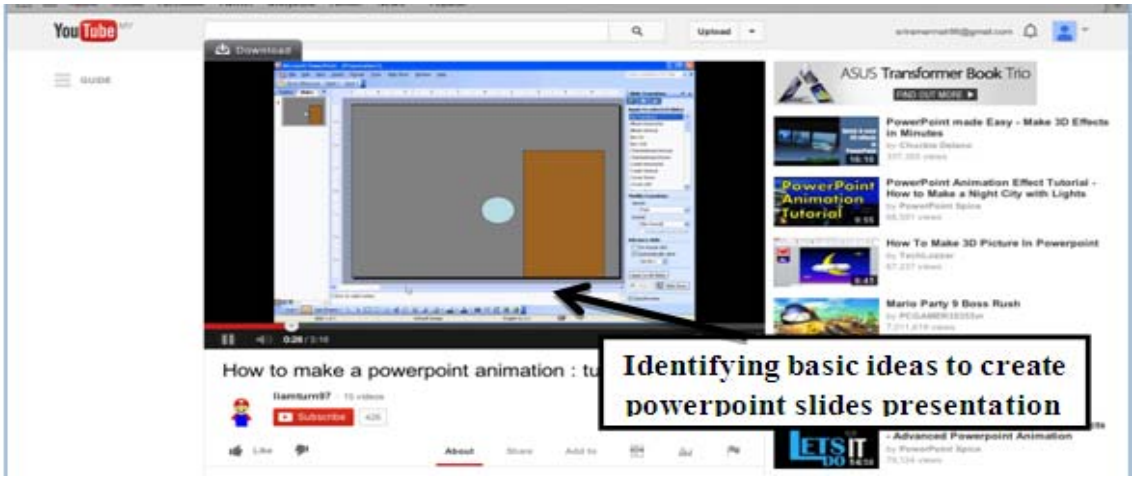


Figure 4 :Video on '*How to make powerpoint animation*'

Understanding

Understanding involves comprehension activities which involve changes from one form to another form, stating the main ideas in our own words, translate, give examples of the concept and translate the draft. Teachers can choose, explain and rewrite what they have learned in the mentoring system for e-CPD. Tasks performed by the teacher are able to prove that they can change what is understood in mentoring from one form to the another form. For example, a teacher has to understand how to download fonts creatively through e-CPD mentoring. He can use it in Year 1 for decorative purposes. The activities conducted in e-CPD mentoring is showing that teachers are also able to express or translate what is known for them during the application of learning. A teacher has to get guidance from mentors on how to create a montage for e-CPD tasks, which is given by e-mentor. The teacher has produced montage and have uploaded in Youtube with the guidance of e-mentor. This suggests that teachers can choose appropriate methods of instruction and utilise it in more detail to achieve creative result.

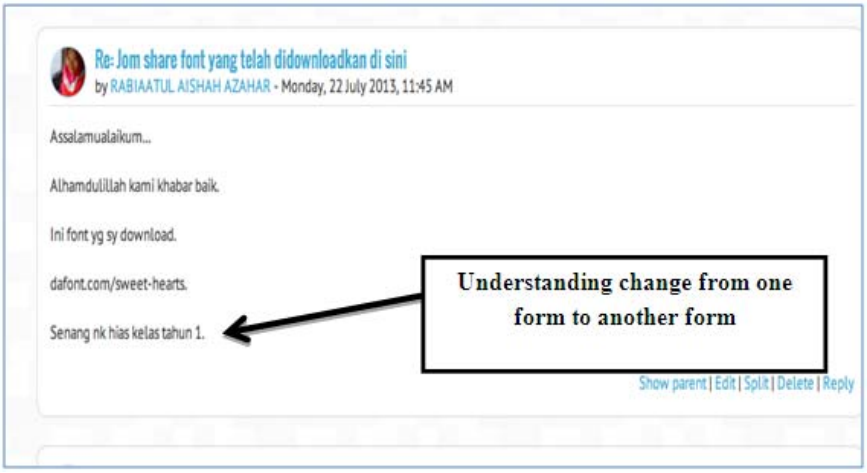


Figure 5: Forum Jom*Share Font*

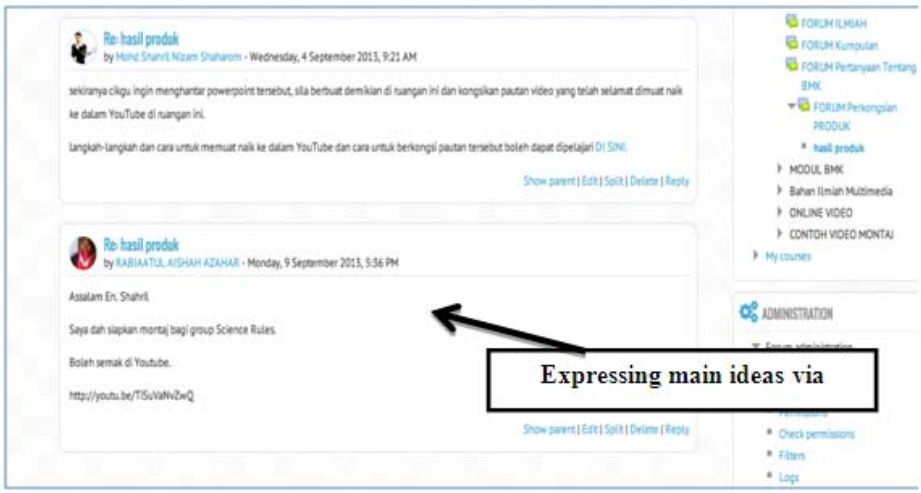
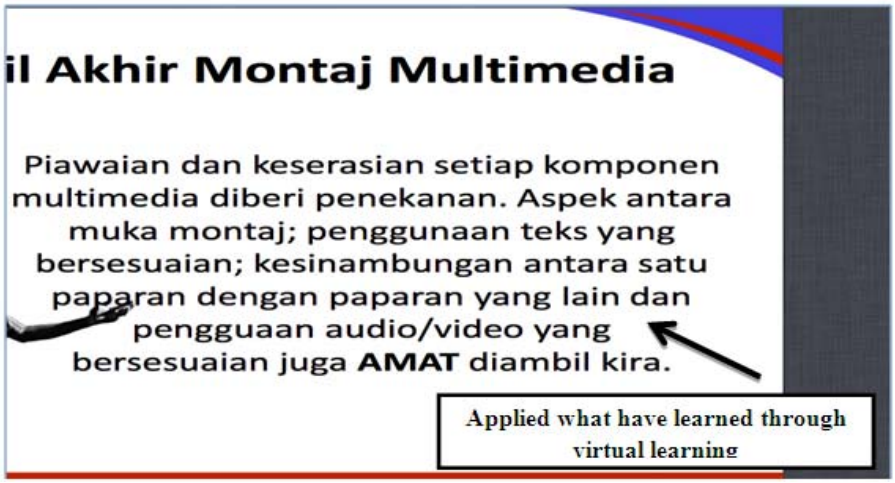


Figure 6:Portal to upload products

Application

The application involves activities such as using information in new situations, including solving problems, using the principles, rules, laws, theories and formulas, creating graphs from data, and others. Teachers can use the information obtained from a mentor to new situations. For example, teachers can find on how to complete their tasks through a mentoring system for e-CPD and utilize what they have learned in the training to do further studies. Teachers are also able to solve the problems being faced through a video uploaded in the web application by e-mentor. Teachers can correct their mistakes during the task by viewing the steps or stages shown in the video to solve their problem.



Forum 7 :Module – Guide to design develop educational montage

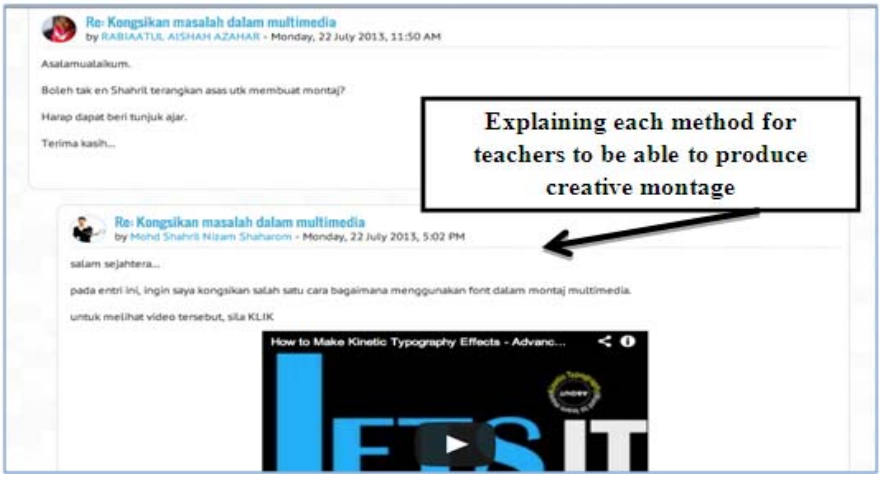


Figure 8 : Forum how to produce creative montage

Analysis

Analysis includes activities such as break something complex to a small, distinguish fact from opinion, association between the familiar and the known structure of the organization. Teachers can differentiate, and choose a method to solve the assignments given by e-CPD mentor. Teachers can distribute or break what they have learned to other ideas. For example, they can analyze the guidance provided by mentors and utilise it in other situations that are appropriate to them in their fieldwork. Teachers are able to distinguish fact from opinion given by the mentor. They can also relate to their daily work. For example, teacher is able to ensure key facts of the ideas given by the e-mentor.

Figure 9 : Montage – Youtube video

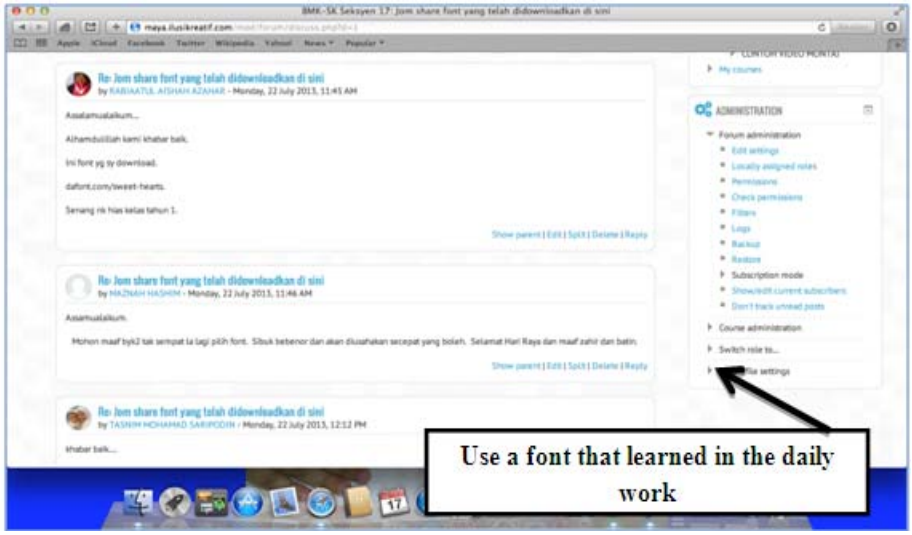


Figure 10 : Forum about the introduction of new fonts

Evaluating

Evaluating includes activities such as integrating, assembling ideas into a single, independent efforts, solve problems, make predictions and make the classification. Teachers can build, create, organize and develop what they have learned through mentoring system of e-CPD. Teachers can integrate, assembling ideas into one and work independently to fulfill their duties. For example, teachers can create a powerpoint presentation and change it's format in slideshare. Teachers are also able to solve the problem of e-CPD mentoring through the downloaded video from e-CPD. Teachers can classify what they have learned through the video.

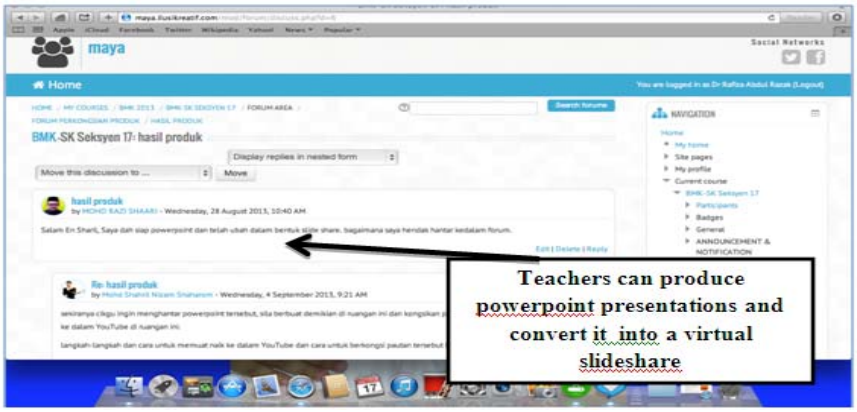


Figure 11 : Forum to create products

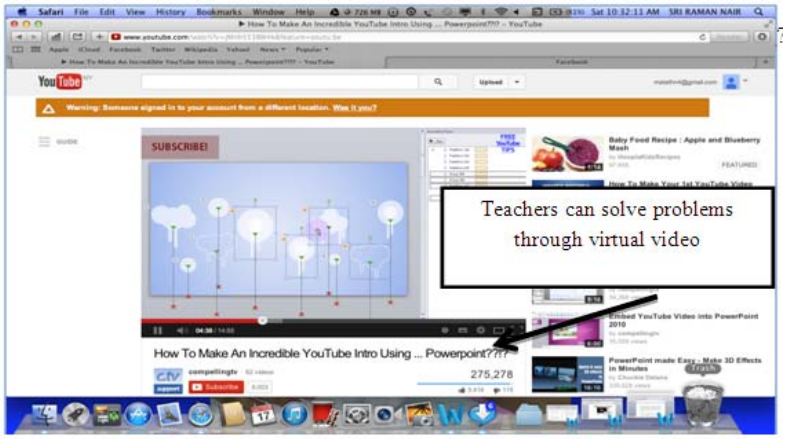


Figure 12 : Virtual video

Creating

Creating involves activities such as making a rational judgment, including internal or external, and to read and criticize. Teachers can choose, justify, critique and prove through a mentoring system of e-CPD. Teachers may consider the reasons given by the mentor via e-CPD. Teachers think rationally before using them in their work. Teachers can read and criticize each result in the forum. They can improve the quality of work through criticism and positive comments.

Figure 13: Answers from mentor for teachers' questions through forum

Figure 14 : Video uploaded at sites

RESEARCH IMPLICATION

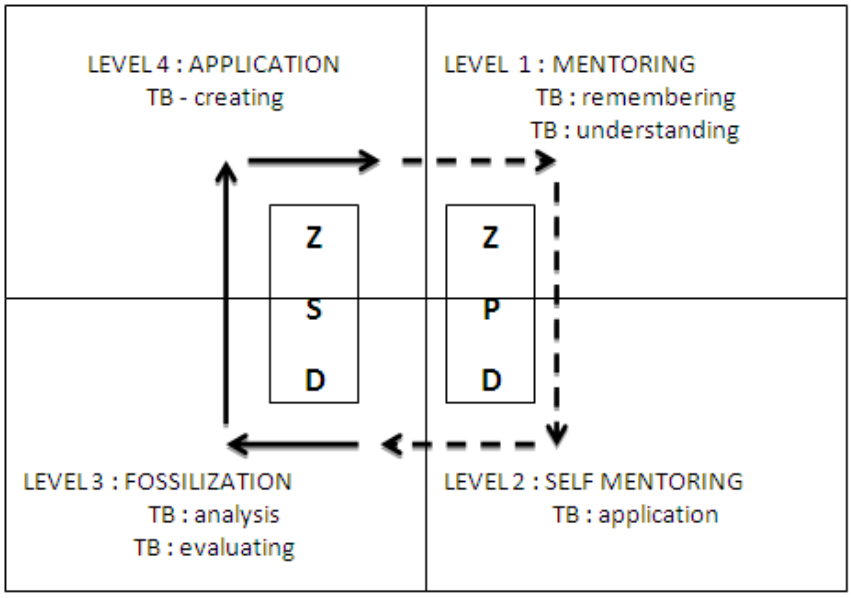


Figure 15 : Transformation of knowledge to application via e-CPD

e-CPD was implemented applying Taxonomy Bloom (TB) that covers all phases and activities of the professional training of teachers in e-CPD. Bloom's taxonomy includes remembering, understanding, application, analysis, evaluating and creating. These activities can be distributed into four levels, such as, coaching, self-coaching, fossilization and applications.

Level 1 and Level 2 involves "Zone of Proximal Development" in this conceptual framework. Level 3 and Level 4 involves " Zone of Self Development ". It is a form of a cycle where every time the teachers will be guided when a new skill is taught or introduced to them. e-CPD mentors play an important role in every cycle of this level. Therefore, on the whole the mentor plays an important role in every level of activity to run it properly.

Level 1 is the level of coaching in which mentors will guide and assist teachers in primary schools to perform certain tasks in the e-CPD. e-Mentor will play an important role in helping to solve the problems faced by teachers in the design. Continuous communication and proper guidance are essential components of a successful mentoring relationship. It will improve mentoring relationships, setting and monitoring of professional goals in helping the participants of ICT skills training (Portner, 2002).

Level 2 is the level of self-guidance. Primary school teachers are required to solve the problem independently based on the demonstration given the e-CPD mentor. Self or personal learning style is an important element of life in modern society (McLoughlin & Lee, 2008). An individual is always looking for information to deal with problems at work, school, or to satisfy curiosity or inquiry. Therefore, they need to take advantage of the technology and the network is not only to get information, but also to share information. Thus, an individual cannot be considered as passive consumers of information, instead, they are active with their e-mentor. In addition, learning in the context of social media such as e-CPD provide motivation, autonomy, and informal experience (McGloughlin & Lee, 2010; Smith, Salaway, & Caruso, 2009; Solomon & Schrum, 2007).

Level 3 is called as the fossilization. Teachers can relate the skills learned in coaching and mentoring skills which is obtained independently. Self guidance plays an important role to improve the productivity of the education system. Other than that, self guidance also helps to carry out the teaching and learning process based on individual needs to make the individuals play more active role in effective learning. Individual learning will also produce a new generation with self-confident and more independent in learning (Miliband, 2003).

Level 4 is the application level. It is the level where teachers can apply in the future what they have learned in personal learning and e-CPD mentoring. They can solve problems and design learning process in this level. Personal learning via mentoring helps t to overcome difficult task in the daily routine of teachers (Kitsantas&Dabbagh, 2010). In addition, teachers can learn ICT skills, such as creative multimedia elements such as text, audio, video, graphics and animation via e-CPD.

According to Vygotsky (1987), an individual's benefit from using tools or instruments in two ways. First, the tools that are used to mediate activity and changing all psychological operations fundamentally. Therefore, there are high opportunities for learning through the use of tools. Second, the use of tools with the help of social interaction through field experts or an adult. It plays a role as a mediator of higher mental processes and cognitive engagement triggers greater than themselves (Vianna, E. &Stetsenko, A., 2006). So, learning occurs when individuals are less skilled are scaffolded (guided) by individuals who are experts in social interaction by working in groups (Verenikina, I., 2003). Therefore, students or course participants have the opportunity to work and learn together.

Based on the results, the bloom taxonomy of cognitive processes qualitatively constructed based on the integration of multiple ICT skills in the learning process. Bloom's Taxonomy are sorted from from the lower to higher level. ICT skills are used to create an environment where personal learning can help participants learned skills independently. However, an increasing number of websites provide a way of cooperation or collaborative skills in improving aspects of understanding. Guidance (scaffolding) is a term often used to describe any help, involves the design of supervised learning (scaffolded), which is a demonstration of teaching skills and assessments. By Jill N.Samuel Hamzah and Joy (2010), this concept refers to the guidance given by an adult in the process of teaching and learning through the questions and interactions. Taxonomy Bloom focuses on the cognitive processes involved in ICT skills. It is a process that helps learning mechanisms. The incorporation of Blooms Taxonomy bridges the gap between the teachers' knowledge and its application. Hence teachers are able to apply their learning to authentic workplace situations to improve on-the-job performance.

CONCLUSIONS

Overall, e-CPD based on mentoring system plays an important role in training teachers in cyberspace. The role of education is important in this challenging era where education has a great responsibility to implement educational policies where able to increase the use of ICT in teaching and learning. The use of ICT is increasingly important in generating and developing ideas and creativity of educators in the teaching and learning process. In this context, globalization has brought with the concept of a world without borders. These changes affect either positively and negatively to the community in developing countries.

Implementation of ICT is a paradigm shift in education which will help our country to compete with other countries. The information revolution that occurred due to advances in ICT provide new challenges to the teaching profession. As well as, it is a drastic progress where should be used to enhance the prestige of the teaching profession which is facing changes in the 21st century. In this case, developing countries need more teachers who have specialized knowledge of the field of information of communication and technology (ICT). Teacher education training also requires a paradigm shift in order to produce teachers who are qualified and capable of educating and developing a nation.

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Empowering English through Project-Based Learning with ICT

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ABSTRACT
This paper reports the findings of an action research implementing project-based learning (PBL) with information and communication technology (ICT) in an English classroom. Twenty-five students from a vocational higher institution were interviewed after the conduct of three project activities over a six-week period. They were also observed while being exposed to a PBL teaching approach. Results of this study revealed that students could experience a more interesting and meaningful learning in a PBL English class. They were also becoming highly motivated to use English more intensively while exposed to this teaching approach. This research also proved that PBL with ICT could bring positive gains due to teacher's pedagogical and technological beliefs. Thus, it concludes that teaching with PBL and ICT would bring about a positive change once supported with teacher's belief about teaching and learning (pedagogical belief) and his belief about ICT (e.g., technology-supported learning offers better outcomes that that of the traditional one).

INTRODUCTION
The ways how English is taught and learnt are now undergoing some adjustments in order to keep up with the advancement of information and communication technology (ICT). Two decades ago, for example, online communication through internet was not a common view in an English classroom. But now, such a learning activity may easily be spotted in most modern classes. This phenomenon is a critical indication that teachers of English should always update their teaching approaches.

Previous research has suggested that ICT can make a difference in students' learning (Castro & Alves, 2007; Demiraslan & Usluel, 2008; Eteokleus, 2008; Ferdig, 2006; Marwan & Sweeney, 2010; Mouza, 2003; Murphy, 2007; Mutula & Bakel, 2007; Mwanza & Engestrom, 2003; Pajares, 1992). However, such a learning change can only be gained if multiple factors affecting the success from factors related to individuals (e.g. skills, knowledge, attitude and belief), implementation process (e.g. planning, responsibility, quality of resources and people involved) and whole organization (e.g. external influences, leadership, organizational culture) are considered in the process of implementation (Tearle, 2004). Among all these factors, teachers are regarded as the key persons who play a big part in determining the success of students' learning with ICT (Li & Bratt, 2004; Lim & Khine, 2006). Thus, research looking into how teachers use ICT for teaching and learning is always a necessity. In Kozma's (2003) view, teachers need to be innovative in the ways they use ICT. As such, it is their innovation which is mostly worth investigating (Marwan & Sweeney, 2010).

There has been a quite large number of research investigating how teachers use ICT for teaching and learning in general and many also see it within the setting of English classrooms. But studies how teachers specifically utilize this technology within the context of PBL for empowering students' English are still underrepresented in the research literature. The present study aims to fill this gap by examining teachers' use of ICT in a project-based English learning in Indonesia.

THEORETICAL REVIEW
ICT in Teaching and Learning
Research has proved that ICT facilities do not improve students' learning. It is how they are used for teaching and learning which makes students perform better in their learning (Lawless & Pellegrino, 2007; Lim & Chai, 2007; Lim & Hang, 2003; Lim & Khine, 2006; Mainka, 2007; Marwan & Sweeney, 2010; Morgan, 2001; Mouza, 2003; Moyle, 2006; Mwanza & Engestrom, 2003; Tearle, 2004). So, teachers play a key role in determining the successful use of ICT in education. As Lim and Chai (2007) argue, it is "the decision made by teachers, based on their pedagogical beliefs, that have significant influences on the effectiveness of teaching and learning in most learning environments, including computer-mediated ones" (p. 2). They further explain that pedagogical beliefs refer to teaching and learning related beliefs. Teachers who demonstrate traditional pedagogical belief (i.e. knowledge is transferred only by a teacher) may choose to teach using ICT with teacher-centered approach while those with constructive pedagogical belief will opt to adopt a learner-centered approach in their ICT mediated teaching (Marwan & Sweeney, 2010). Teachers usually develop their beliefs about teaching and learning when they undergo years of study at teacher training colleges where they are exposed to

information (including through teaching practice and classroom observation) about how to become effective teachers (Applefield, Huber, & Moallem, 2001; Lim & Chai, 2007). Overall, teachers' pedagogical beliefs influence "their perceptions and judgments, which, in turn, affect their behaviors in the classrooms" (Pajares, 1992, p. 307).

In addition to pedagogical beliefs, ICT can be effectively used if teachers have positive beliefs towards technology (Marwan & Sweeney, 2010; Russell, Bebell, O'Dwyer, & O'Connor, 2003). According to Russell et al (2003), teachers who demonstrate negative beliefs may consider that ICT may have no impact on teaching and learning. They may even think that it can harm students. If that is the case, technology facility will be a useless investment because teachers may decide not to use it (Cuban, 2001). If they do, it is only to make the management happy but not to make their teaching more meaningful (Marwan & Sweeney, 2010). In other words, ICT presence is only a symbol of prestige but not a means to bring about educational change (Russell et al., 2003; Tearle, 2004). In short, the use of ICT by teachers should be supported with their positive pedagogical and technological beliefs. This type of teachers can then demonstrate a greater chance to succeed in their use of ICT to enhance students' learning (Castro & Alves, 2007; Lee, 2002).

It is obvious that the successful use of ICT for any disciplines including English is determined largely by the quality of teachers (in terms of their pedagogical and technology beliefs and understanding) who use this type of technology into their teaching and learning programs.

Project Based Learning

Review of literature suggests that there is no consensus as to the definition of PBL. Despite the fact, researchers agree that "project-based is an instructional method centered on the learner" (Bas, 2011, p. 2). Bell (2010) points out that in a project based learning classroom, students are provided with a topic which they should develop through research or project work for their individual or group learning and teachers should monitor the project performed by students. Students, in this learning framework, are trained to be critical and responsible for their learning (Bell, 2010; Postholm, 2005, 2006) and this, for example, can be done through problem-solving activity (Barge, 2010; Bas, 2011; Kloppenborg & Baucus, 2004; Moss & Van Duzer, 1998).

According to Kloppenborg and Baucus (2004), with this PBL, students will experience much more meaningful and interesting learning where they should accomplish the assigned project. Normally, they are given freedom to plan and manage their project and the end product including the process involved should be presented in the class. More importantly, with this approach, students "have the opportunity to construct their creative knowledge and demonstrate their creative thinking and skills through their project" (Simpson, 2010, p. 44). In Barge's view (2010, p. 14), one of the keys for achieving the successful implementation of PBL is that there has to be "a high-level of self-motivation and personal responsibility for learning" from students (see also Stoller, 2006). Without this, students can easily give up their usually tiring and demanding project. Thus, teachers should always monitor their students' motivation and confidence (Maleki, 2005). One way of enhancing motivation and learning responsibility as well as confidence is through the creation of "a collegial atmosphere" where "students to actively engage in substantive dialog with faculty members regarding their course work and the application of knowledge within the context of their project" (Barge, 2010, p. 15). Providing feedback and support or encouragement is also another way that can boost students' learning motivation and confidence (Dornyei, 2001) and therefore reducing their level of second or foreign language anxiety (Casado & Dereshiswsky, 2004; Goshi, 2005; Kondo & Ling, 2004; Marwan, 2007).

Simpson (2010) provides the steps of PBL which include project start, development, report, and assessment. He explains that,

> Starting the project involves selecting the topic that is of interest and relevance to students. The teacher can create guiding questions … The project should be challenging and motivating such that students can develop and have the flexibility to work at their own level. Then, project development involves the research which is undertaken by all group members either individually, in pairs, or as a group. This should be decided by the group before commencing the project. Reporting to the class involves presenting and receiving feedback from other students. Lastly, assessment is when the final product is evaluated by an individual student, students as a group or a teacher. (pp. 58-59)

Adding to the project assessment issue, Simpson asserts that this innovative teaching approach does not merely apply a rigid type of assessment like a pencil-paper test but it employs a variety of assessment formats such as peer evaluation and portfolio. Even, the students may perform self-reflection as a means to evaluate his or her own learning. In Hutchinson's (2001) view, in a PBL, evaluation should not be targeted on students' language

competence (i.e. grammar and linguistics). Rather, in assessing the project, teacher should put more emphasis on the project making efforts and processes. In short, assessment integration (i.e. multiple assessments) is becoming an issue in a PBL environment (Simpson, 2010).

As suggested by the literature, PBL can be understood as a teaching approach which centers on learners and focuses more on the process or efforts. This type of innovation aims to assist learners to be more responsible towards their own learning and if they can develop this sense of responsibility, they can then optimize their learning gains.

METHODOLOGY

The present study aims to seek the answers to the following question: How well is the learning of English with PBL approach using ICT?.

Design of the Study

An action research design was chosen to empower students' English through PBL with ICT. This design was selected since the main intention of this research was to bring a new teaching approach (i.e. PBL with ICT) to the classroom and such an approach was also meant to tackle students' learning difficulties when exposed to conventional teaching ways. The ways that I used before the conduct of this action were rather monotonous where the materials of teaching were entirely taken from the available commercial textbooks. Students were rarely exposed to ICT and the application used for teaching was only PowerPoint for presentation. Just recently, I realized that this conventional teaching failed to help students to experience meaningful learning. After a few semesters with them, I could not see them make good progresses with their English learning. Accordingly, I decided to change the way I teach them.

Setting and Participants

A higher vocational institution where I currently work as a senior English teacher was chosen as the venue for this action research. One class of 25 students in this institution was selected. The students of this class possessed the ability to converse in English but often produced ungrammatical sentences and improper use of words. For the purpose of this research, all students were informed that their English learning from the beginning of semester 3 would undergo significant changes where more ICT-aided learning and project-based activities were to be incorporated. These diploma-level (3 year program) students studied English for two hours a week each semester and the programs of teaching (e.g. what and how to teach) were all determined by the teacher. Due to this autonomy, I then tried to bring this innovation into my EFL classroom.

Procedures

The implementation of PBL with ICT in this action research was tried out for 6 weeks. It was planned that students would complete a project over a two-week period. As previously stated, students of this class had only two hours to learn English in the classroom. So, the first two hours was used to introduce the project and develop the plan and the second hours were to hear from students about their project accomplishment in the form of class presentation. Overall, students were required to complete four projects involving ICT in this action research study.

In the first project, the students were assigned to write an email to a university overseas asking for information about the things they wanted to know (e.g. scholarship, course). This was a group project where each group should write an email using their leader's name and email. Prior to sending the email, the group should discuss the plan and search for the targeted overseas universities via laptops connected to internet in the classroom. While doing this, I was monitoring all the groups to check if they encountered difficulties when performing the task. The students were also informed that the project could be continued after the class and the email draft should be shown to me for suitability check, particularly, in terms of content and grammar before being sent to universities.

For the second project a selection of conversational topics were presented to students. I divided the students in a number groups and each group could choose the topics on the list (e.g. friendship, education, family life, pastime activities, love story and jobs) or they may propose their own topic but subject to my approval. They were instructed to plan a discussion activity in which such the discussion can be in the form of drama or role play and the activity should last between 15 to 20 minutes for each group. They were free to choose their own venue and all groups were obliged to videotape the discussion and create an interesting video or movie. These videos were to be displayed in the classroom were the subject for the class discussion.

Then, in the third project, I assigned the students to do two activities. Firstly, they should find the profile of a well-known university in an English speaking country from You Tube and this profile would be presented in

upcoming week meeting. Secondly, they should present a brochure which could be downloaded from the website about a Master program relevant to their discipline offered in the chosen university. Then, I asked them to find the answer to the questions related to the length of the program, entry requirement, course structure, scholarship (if any), and contact person. The program brochure and the answers to the questions should be presented to the class.

Data Collection and Analysis Strategies

This study used semi-structured interviews with each group performing the projects. The interviews were held after the accomplishment of all the projects. The purpose of the interviews were to identify students' perceptions about the learning experiences they had when exposed to the PBL activities. Then, to identify any possible change of behaviors during teaching and learning with this innovative approach, observation was also undertaken. During the observation, any important behaviors happening during the activities were noted. The documents or products made or collected by the students from the website were collected too for analysis. Then, all the collected qualitative data were screened and analyzed in search for emerging themes.

RESULTS

Project 1

The purpose of this project was to train students to write electronic mails in English to someone overseas whose first language is English. Writing was the first skill targeted to be improved through this activity and followed with speaking when they performed the presentation. However, listening and reading were also indirectly learnt when they were listening to their friends' talk during the group discussion or class presentation and when reading the responses from the person overseas whom they sent their email to.

During the planning phase, the students were busy talking about the university that would become their target. It was a quite interesting activity because there appeared differences within the group members when discussing some possible universities. When discussion on this was underway, some of the group members (two or three persons) were browsing the information from the internet and as recorded in the observation notes, they were all good at finding the information about universities based in other countries. Google was the search engine of their favorite. They simply typed the key words like universities in Australia and New Zealand and once the information came up, they then got into the website of individual university. After spending a couple of minutes doing this, most of the groups except one had no idea about the right person whom they should write their email to. Knowing such a problem, I then interrupted their activities informing them about how to find such contacts (i.e. based on the information they requested, for example, should they ask for scholarship information for international students, then they should link to the international office website of the selected university).

When monitoring them doing this planning and searching activity, some students were talking in Indonesian language and I stopped them from doing so. They were encouraged to ask questions to their peers about the English words or expressions they did not know. If no one in the group knew these words, they could then refer to me. It was not that easy to make some of them speak only in English, but this matter could soon be solved when I frequently listened to them undergoing the discussion. The results of observation proved that they did not use English at some stages of learning activity due their unfamiliarity of the English words or expression and also because of their lack of awareness regarding the importance of the total use of English in the class.

Prior the closing of the first meeting, all the groups were requested to present the draft of their emails for me to check. All the groups seemed to have been able to write quite well despite some minor grammatical mistakes. For these mistakes, I corrected them directly and provided a short explanation on them. Having done this, I then dismissed the class and instructed them to send the emails to their chosen universities after they finished their study on the day.

In the following week, all the groups were given time to talk to the class about their project beginning from displaying the content of their emails to the universities and the responses they received from the relevant persons. It was as expected that all emails received answers. The first three groups inquired about the course information handbooks from universities in New Zealand and England. The first group was promised by the university staff to receive the handbook at the sender's home address while two others were informed that such information could be accessed at the university website. Then, the last two groups requested information about scholarships for international students offered in two universities in Australia and Singapore respectively. They received similar responses where they were instructed to refer to a web link for the information on the scholarships. An example of email sent by one of the groups and the university staff overseas can be viewed in table 1 below.

Table 1: Emails from the group and university staff

The groups' email	The University staff's email
I am writing to request for the handbook and/or brochures containing the information about the Master in Information and Technology courses offered in your university and also about things that future international students need to know. If you can mail me this package, please mail it to my address below.	Thank you for your email. Below is information on applying to our University and links to the courses offered. There are two ways to apply for Postgraduate study at our university. 1. Apply directly online (submitting your supporting documents through the post). 2. Apply through one of our Overseas Representatives. For information on Representatives in your area, please go to the relevant country page. Supporting documents: In addition to the completed application you will also need to submit two references, academic transcripts, a degree certificate and either a study or a research proposal (for research programmes). If your first language is not English you will also have to prove your English Language skills, usually by taking an IELTS or TOEFL test. Please do not hesitate to contact us if you have any queries.

All students involved in this project expressed their excitement with this way of learning English. Communicating via email to a native speaker of English was a rewarding experience for them. "I never thought that I could make an email contact in English with a native speaker in Australia. After this first experience, I am thinking of writing and sending more emails in English to people overseas. I am sure my English writing will improve significantly through email exchanges" said one of the students in charge of sending email on behalf of the group.

This project-based activity was also viewed as a real life learning experience. Students maintained that email was a powerful tool both for empowering their English and finding information from people on different parts of the globe. Some of them who demonstrated good use of English even started to think of applying for jobs overseas by using emails as soon as they graduate from their current university.

Project 2

This project aimed to make students practice their speaking through videotaped conversational activities like drama and role play. The skills sought to be improved in this project were speaking and listening.

In the start of the project, students were sitting in groups of five and each group was instructed to choose a topic from five topics provided. The same topic might be shared between two different groups and each group might also propose their own topic. After ten minutes discussion, the groups decided to discuss the issues of education, friendship, profession or jobs, and family life. Two groups agreed to share the same topic (i.e. friendship).

Having decided their topics, all the groups began searching for samples of conversational activities from the internet. As of the first project, the groups used Google application to locate the materials they wished to use and they were all good at doing this. While observing them doing this search and find activity, I could note some website addresses accessed by the groups (see table 2).

Table 2: Samples of website pages accessed by the groups

Website address	Content
http://englishconversations.org/	Various English dialogues
http://www.agendaweb.org/listening/real-english-conversations.html	Daily life conversations
http://www.focusenglish.com/dialogues/conversation.html	Everyday English in conversation
http://www.talkenglish.com/	English lessons from basic to advanced level

Once the materials required for their group project were collected, the groups continued with next activity. Some of them began modifying the conversational samples taken from internet, for example, by substituting the names of the speakers with their names, changing the place names as well as adding and reducing sentences, while others began discussing the content of the conversations, distributing the roles to each of the group member and planning for the next meeting for practicing the discussion or conversation and the videotaping of the activity.

Students' views of this project stage were all quite positive. Many of them found that this part required active participation of each group member because only by so doing, the group could accomplish the project with a success. In fact, one student argued,

> Everyone was contributing actively in their group project. There was no chance for us to stay passive as we were competing with other groups and the teacher was around us monitoring our work. We are really learning English in this project.

Some of the students also began to realize that they were not only practicing their English speaking through discussions and conversations in this project, but they were informed "by Google" that there were a large number of learning resources which could be accessed with no charges from the internet.

In the meeting for project presentation, all the groups played the videos where everyone in the class could watch and listen. I could observe some interesting findings after observing their discussion and conversational activities and these findings indicated that all the groups put serious efforts to the project. First, I did not anticipate previously that students would dress like the persons they acted as. In one video, for example, some students in one group performed like a transgender and conversed in English talking about their family life including their own life as a transgender (see figure 1). Second, all the groups showed videos with background music and visual effect. Some of the groups were even surprised to see the creativity made by other groups.

Figure 1: Sample of Students' Video

The presentation activity was not only filled with joys in terms of video (including music and visual effect) watching. Most importantly, students communicated exclusively in English. In the videos, I did not record the use of Indonesian words. However, as I have previously expected, some students might have memorized parts or

all the words or sentences they were speaking during their video recorded project. In an interview, they admitted that they tried to memorize the sentences to be spoken. “But, I did understand the meaning of these sentences before performing the drama. If I was unfamiliar with the words to be said, I would consult my colleagues” said one of them.

This second project required more time than that of the first one since the task was more challenging. The students argued that they had to get together outside their English class for several times in order to complete the project. But, they all seemed to enjoy the activity despite extra hours spent. They perceived that the hours they spent for making this project were so valuable since they could experience meaningful and fun learning.

Project 3

This project sought to enhance students’ speaking and reading skill. Speaking was practiced through group discussions when preparing for the project and project presentation while reading was through brochure skimming and scanning activity.

To start with, I informed the project that the students should be doing. In this regard, they ought to locate the profile of a university from English speaking countries from YouTube. Then, they were also instructed to figure out information about a Master program relevant to their discipline (in this case Information and Technology) offered in their designated campus. Just like the previous projects, all the students, sitting in their groups, were busy preparing for their task. They seemed to get accustomed with PBL. This could be seen from their enthusiasm and more active participations in this project stage. Everyone in the groups was contributing to the project work. When monitoring them undergoing this project planning and preparation activity, I could hardly find a student saying nothing for the groups. Each of them showed interest to the project. However, in this third project, I could still identify students (i.e. two persons) using a few Indonesian words when speaking in the group. Interviewed after the project, these students stipulated that they were unfamiliar with the words to be spoken and their friends too, when consulted, had no idea about the English version of the words. They admitted if they were reluctant to speak to me about the words. So, instead of asking me about the words, they simply said them in Indonesian language during the discussion. But, overall, the use of words other than English was very limited in the third project.

The students were proficient in locating the information from the internet. As such, the profile of a Western university and the brochure sample could be quickly identified. Most of the groups tried to view the video profiles from several universities before they picked one. An interesting learning atmosphere could be viewed during their university selection process where each member of the groups could say their preferences. During this activity, students talked to each other in English, the condition that I expected to emerge in this PBL situation.

At the presentation stage of the following week, each group informed the class about the profile of their selected university. Firstly, they let the class watch and listen to the video and after that they provided some information about the university. One of the groups approached a different way in presenting the information where they asked questions to the class about the video they had just watched. The questions asked include ‘what is the video about? ; where is the university located; what do you think about the university size?; etc.’ The following were the five universities chosen by the groups for this project.

1. University of Melbourne at https://www.youtube.com/watch?v=kvulHO5ggeQ.
2. University of Harvard at https://www.youtube.com/watch?v=omAwAjcUdbY.
3. National University of Singapore at https://www.youtube.com/watch?v=EzGh8a8v4SY
4. University of Sydney at https://www.youtube.com/watch?v=M_kb8lhb974.
5. University of Oxford at https://www.youtube.com/watch?gl=ID&hl=id&v=o3rejzIqRn8.

University watching and discussion was considered a unique learning experience for the students involved in this project. It was good for them as they could get new information about overseas universities and as they asserted they could become much more motivated with their English learning and their university education after seeing excellent campus and learning facilities available in these western educational institutions.

Then, another good learning activity was viewed when these students, through their groups, talking about the course brochure downloaded from their selected university websites. They presented the information using some of the questions (e.g. what type of Master course does the brochure contain?; what is the entry requirement?; what is the course structure like?) which I provided in the previous meeting or week. When doing this, they were not aware if I was trying to help them practice their skimming and scanning reading skill along with their speaking through this activity. Skimming is a rapid reading in search for the main points of a reading text while

scanning is a rapid reading in search for a particular information (Vaezi, 2005). But, they soon realized once I informed them after the conclusion of their project presentations. As expected, this project was viewed by students as a challenging but rewarding learning experience. They also felt lucky to be living in this digital age since their learning especially English could be well supported with technology.

DISCUSSION

In this part of the paper, findings of this research are discussed in light of the literature. The discussion also provides the answers to the research questions, namely how well the learning of English with PBL approach using ICT is and how learners perceive their English learning experience with PBL using ICT.

ICT, as previously argued, is only a means to facilitate teaching and learning but its presence does not automatically enhance learning (Lawless & Pellegrino, 2007; Lim & Chai, 2007). It is teachers who possess pedagogical and technological beliefs and understanding who can make students' learning with ICT a meaningful and rewarding one (Lim & Chai, 2007; Marwan & Sweeney, 2010; Tearle, 2004). The findings of this study have proven this where students can undergo a more meaningful English learning after exposed to a PBL approach with ICT. With this innovation, they can practice their English skills more intensively and effectively. ICT in a PBL class does make their English learning an interesting one. This positive learning atmosphere has been highlighted in the literature which says PBL facilitates the creation of a rewarding learning experience for learners (Kloppenborg & Baucus, 2004). Through this research, I could figure out the strengths of my action teaching with PBL using ICT are due to my PBL and ICT understanding (therefore affects my pedagogical and technological beliefs and practices) and on the careful monitoring performed during teaching and learning activities. The latter one helps me so much in assuring that all learners can engage actively in knowledge construction and skills gain. This is, for instance, evident in the research data where I could identify students still speaking in Indonesian language during their project activities mainly due to their words unfamiliarity. Because of my pedagogical understanding which believes that using languages other than English in an English classroom may slow down students' English acquisition, I then stop them from doing so and help them with the English words or expressions that they are unfamiliar with. This way of language teaching has gained supports from language experts who claim that students will acquire English much faster and better if they are only allowed to speak in English in their English classes (Evans, 2000; Lucas & Katz, 1994; Wong, 2010). In contrast, "allowing bilingualism in English classroom will generally only deprive students of an excellent opportunity to use and learn English" (Wong, 2010, p. 128).

Due to my pedagogical understanding too, I encourage students to undertake peer learning activity, for example, through peer questioning and correction. I believe that this way of learning will create a collegial atmosphere where students can learn from each other. This teaching approach, according to Christudason (2003), will result in a positive relationship among learners and produce more effective learning outcomes.

This pedagogical understanding has also inspired me to keep motivating students with regard to the importance of using English intensively and utilizing ICT, especially the internet based applications, for fostering their English mastery. Researchers argue that highly motivated learners determine the success of PBL (with ICT) teaching (Barge, 2010; Stoller, 2006). The findings of this research reveal that students can undertake and complete their project tasks with enthusiasm. This is partly due to the fact that I, as the teacher, bring into the class the materials that are of the interest of the learners as well as interesting learning aids (i.e., various ICT applications). In a PBL class, learners are the center of teaching and learning. Thus, their active involvement including in the decision making process, particularly, regarding what they will learn and how they will learn it, is crucial. By doing so, they can then be more responsible, motivated and confident with their own learning (Maleki, 2005). This type of learners, in Barge's (2010) view, can act positively towards their learning due to the presence of collegial atmosphere where teachers can act as their learning and decision making partner. Obviously, PBL is not just a set of teaching approach which comprises planning, developing, reporting and assessing. In other words, its application needs to consider other influential factors such as learners' motivation, language background and confidence level.

CONCLUSION

This research aims to examine the wellness of students' English learning using PBL with ICT. It employed an action research study carried out for a six-week teaching period involving a class of 25 students as the sample. Observation and interview were used to collect the information.

This research concludes that the application of PBL with ICT in the current context can generate positive learning atmosphere where students can participate actively in the process of knowledge construction and skill

gain activities. This study believes that this success is underpinned by teacher's pedagogical and technological understanding as well as by highly motivated learners.

The results of implementation of PBL with ICT in this study ought to be viewed within the characteristic of this research in which it is carried out and facilitated with a teacher demonstrating good understanding of pedagogy and ICT use and highly motivated students. In other words, different research may generate different outcomes if guided by teachers with lower or higher pedagogical and technological belief and understanding.

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Establishing a Multidimensional Interaction in Science Instruction: Usage of Mobile Technology

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ABSTRACT
The aim of this study is to examine the effect of mobile technology use in university science instruction on students' academic achievement and self-regulation skills. An experimental study is conducted to test the use of mobile in-class interaction system (M-CIS) and to determine the change in students' academic achievement and self-regulation skills in a science class. Motivated Strategies for Learning Questionnaires, Academic Achievement Tests and Semi-structured interview forms are used as data collection instruments. In the data analysis process, descriptive statistics, covariance analysis (ANCOVA), Mann- Whitney U test and content analysis are used. At the end of the study, it is found that the use of mobile technology in science instruction sustained to be effective in increasing students' academic achievement. Besides, the M-CIS provided significant changes in teaching, instruction and learning atmosphere, as well as students' and teachers' affective outcomes.
Keywords: science instruction, self-regulation, academic achievement, mobile technology

INTRODUCTION

In today's world, technological developments are quite fast and science education forms the basis for the success of countries in competitive research and development activities (Singer, Hilton and Schweingruber, 2006). Skills that are acquired with science education make great contributions to raising students who can correspond to the requirements of the era (Abd-El-Khalick *et al.*, 2004). Science laboratories, in which experiments are done actively, are very important in developing these skills. Students acquire various skills while structuring their knowledge during activities in laboratories (Hofstein, 2004).

In learning science, laboratories help children carry out practices through experimental researches or make interpretations about the issues they learn in theoretical lessons. Making activities only with the equipments in laboratories is not sufficient for learning; students should also be able to make operations mentally by producing ideas (Berg, 1997). Students in the process of research-analyze, asks questions, make analyzes, make inferences and report the result. While doing all these, necessities for obtaining feedback about metacognitional processes occur (Larson and Keiper, 2007). Obtained feedbacks can enable students make assessments about personal learning process besides providing opportunity to constantly direct student interest towards lessons. With this proper intervention, student gets the opportunity to proceed in research activities (Flick, 1993). Obtained feedbacks also ensure student make cognitive arrangements (Lee, Lim and Grabowski, 2010).

In order to present feedback to student, firstly assessment and evaluation should be carried out during learning process.

Formative assessment, which is one of the significant tools in ensuring feedback to student, is the assessment of students about their learning during a duty or activity. These assessments aren't carried out for determining success, failure or grading a student. Formative feedback presented to student after assessment gives students the opportunity to construct his personal learning (Irons, 2007).

Mazur (1997) mentions three different methods about taking feedback from students in classroom environment. *Show of hands:* In this method, students raise hands or use answer cards marked between A-F while answering a question. *Scanning forms:* Students write their answer and self-confidence levels to the questions in these forms. Forms are individually filled in twice; one before discussing with the friend group, one after making a discussion. In this way, understanding level of students, development, and efficiency of peer instruction is evaluated. *Handheld computers*: In this method, which is called ClassTalk, technological devices such as portable laptops, handheld computers, special calculators with graphic function are used and students are required to answer Concept Tests. Teacher can project the answers in his/her computer to the board when he wants. In this method, answers are given individually and it is possible to give individual training in big classes. In order to make individual training, it is necessary to give students the opportunity to organize feedback he needs. On the other hand, according to the feedbacks obtained by teacher, the opportunity to organize personal

learning strategy and a better instruction opportunity should be ensured. Establishing an interactive classroom environment is especially important for teachers in order to make necessary organizations in instruction strategies according to student needs, and for students in order to make self-regulation in their individual learning.

As can be seen in Figure 1, an interactive classroom environment, structured by using M-CIS, gives more opportunity to have interaction among students than a normal classroom environment. In this interaction, teacher can have information about each student's learning and give personal feedback. Similarly, students can have feedback they need in the process of learning. It is also possible to establish a multidimensional discussion environment when needed. Interactive classroom environment in which multidimensional feedback correction is possible, also provides saving of time. Feedback correction in short time and multidimensional interaction present student the opportunity to learn individually besides giving teacher the chance to assess the instruction he carries out.

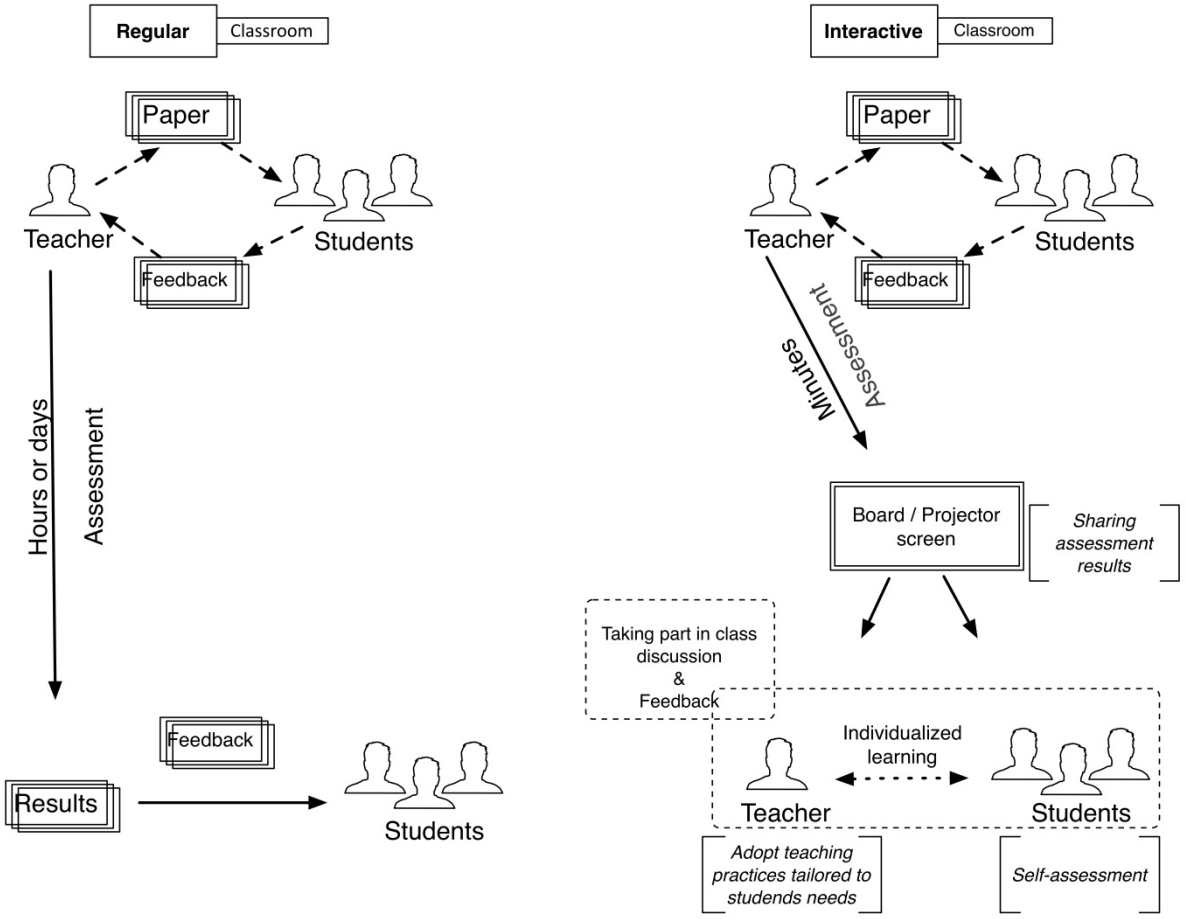

Figure 1. Traditional classroom environment and interactive classroom environment

M-CIS is developed in order to make contribution to establish an interactive classroom environment as it can be used as a learning tool in science laboratories and it has significant technologic substructure. While designing the system, ADDIE Model, which is one of the instructional design models, is used as the basis. It has five components. First, analysis phase: seek answers to a variety of questions to determine the components. Second, design phase: manage all of systematic method. Third, development phase: create instructional material. Fourth, implementation phase: an implementation plan is developed. Fifth, evaluation phase: determines the quality and effectiveness of the instructional design (Jones and Davis, 2011).

A preliminary survey was carried out about student expectations and present technologic sub-structure sufficiency before designing M-CIS (Yılmaz and Sanalan, 2011, Yılmaz, Sanalan and Koç, 2009). According to the obtained results, it was seen that students had positive thoughts about the use of mobile devices in Science classes and most of them wanted to use devices in laboratory lessons.

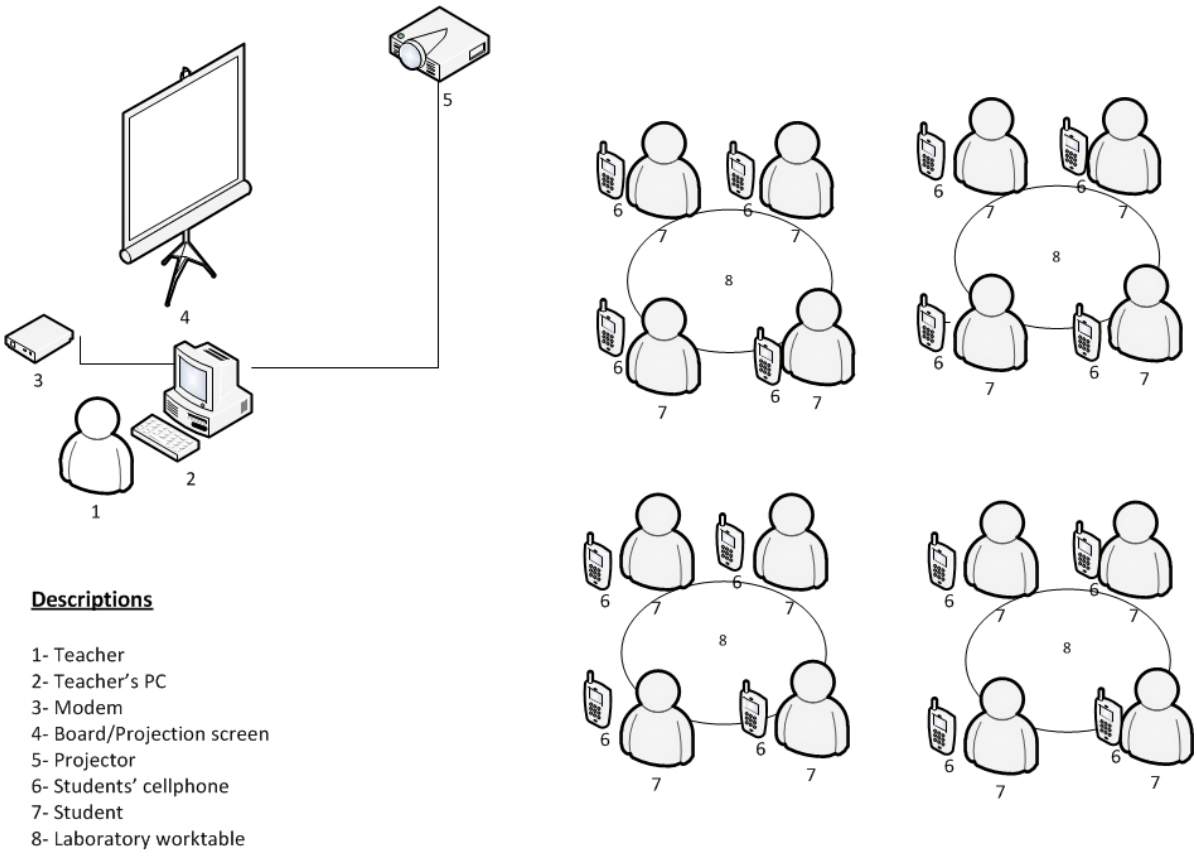

Figure 2. Laboratory classroom environment structured by using M-CIS

As can be seen in Figure 2, students sit in groups (8). While making an experiment practice, students in a group work together (7). In order to assess or direct activities, teacher (1) sends the question he prepares in his computer (2) to students by using the system. According to the questions or directions in their cell phone (6), students make studies in the group for finding the solution. They also use cell phones in order to answer the question. Answers of student groups appear in the computer of teacher. Teacher has the chance to assess experiment practices and student learning. If he wants, he can project these results on the board (4) with the help of a projector (5). In this way, correct or incorrect answers can be discussed and assessed in classroom environment. Results projected on the board give students the opportunity to see correct or incorrect answers. Students interact with the group members, they can get feedback from teacher when they need and interact with the members of other groups. Teacher can use the system through his cell phone; in this way, he can also present guidance during experiment by walking around the classroom. All of this system connection is ensured by internet (3). Data input-output and recording is made through a server.

M-CIS is an interclass interaction system. This system is basically similar to systems such as student response system (Griffin and Kopanski, 1988), listener response system (Ureel and Israels, 2013). Student response system and listener response system are common synonyms with 'classroom communication system', 'audience response system', 'voting machine', and, colloquially, 'clickers' system (Beatty and Gerace, 2009). In the researches about student response system, which has been used, synonym names with similar mobile technology, for different purposes in education.

Classroom response system (CRS), a kind of mobile technology which is designed to support classroom communication, interactions in university classrooms is evaluated by Fies and Marshall (2008). They have explored the answer to that question 'What are the motivations in the decision to use a CRS?' First, checking attendance: 'system made it easier to keep track whether students were in classes. Second, pacing a lecture: 'system provides a planned or spontaneous switch lecture's prevalent one-way flow of information (instructor to student) to a segment where student'. Third, formative assessment: 'CRS as a tool to gauge understanding on the classroom level'. Fourth, formal assessment: 'collecting scores and to automatically logging'. Fifth, enhancing peer instruction: 'fostering group interaction'. Sixth, scaffolding meaning-making: 'providing learners as a guidance when they needed it'. Seventh, just-in-time-teaching: 'identifying the teachable moment within a lesson'. According to Yarnall, Shechtman and Penuel (2006), using handheld computers, to support improved classroom assessment in science, changed in teachers' goals for assessment. They said that 'Teachers became

more interested in assessment for learning, and assessment became more important to them in the context of their science teaching.' Another study was done by Brady, Seli, & Rosenthal (2013). They found that clicker use produced significantly higher performance outcomes on undergraduate educational psychology course. Kay & LeSage (2009) have reviewed of the literature about benefit and challenges of using audience response systems (ARSs). They found that ARSs increases in 'attendance, attention levels, participation and engagement' in the classroom environment, increases 'interaction, discussion, contingent teaching, quality of learning, learning performance' in learning, and supplies 'feedback, normative, formative' assessment. Studies on the issue showed that mobile technology was effective on learning and instruction.

The goal of this research is to analyze the effect of mobile technology use level in university education level science instruction on student self-regulation abilities and academic success. In the preliminary survey about the use of mobile technology in Science education, it was determined that the mobile technology that is proper to be used in the study is cell phone. In this preliminary survey, it was also determined that the designed M-CIS is proper for using in science laboratories actively (Yılmaz and Sanalan, 2011) On the other hand, in order to assess the contribution of the system to science education, teachers used the system in Physics, Chemistry and Biology classes. Student and teacher ideas about establishing interactive classroom environment were taken into consideration and usability of mobile technologies in science education was researched.

For this purpose, this study started with the question of "What is the effect level of the use of mobile technology in establishing a classroom environment that improves student success and self-regulation abilities?" These sub-research questions, which reflect the expectation of the research, were attempted to be answered

1. Does the use of M-CIS (Mobile classroom interaction system) increase student academic success in university science education level?

2. What is the effect of the use of M-CIS in university science education on student self-regulation abilities?

3. What are the views of science teachers and students about the use of M-CIS?

METHOD

In this study, quantitative and qualitative research methods are used depending on the researched questions. Quantitative method is used to determine the change in students' academic achievement and self- regulation skills in science instruction. Motivated Strategies for Learning Questionnaires, Academic Achievement Tests are used as data collection instruments. Qualitative method is used to get views of science teachers and students about the use of M-CIS. Semi-structured interview forms are used as data collection instruments.

Sample

The study was carried out in a mid-size Education Faculty in Eastern Anatolia. The research included a total of 164 students, chosen from 558 students in the Department of Science Instruction at the 2nd grade; the average age of students was 20.01. In the planning process made for the use of prepared system, as it was determined that the most proper laboratory class was General Biology Laboratory class when class teacher and the state of student system use was taken into consideration, 2nd grade students were chosen. 66.5% of students of General Biology Laboratory class were female while 33.5% were male. Besides students, three volunteer academicians used the system in their class (Physics, Chemistry, and Biology). During an academic semester, students used Mobile Interclass Interaction System regularly, generally towards the end of lessons.

Data collection tools

In order to gather data for the study, Motivated Strategies for Learning Questionnaire, academic success test, structured interview form G1 and G2 (G1 for students, G2 for teacher) were used.

Motivated strategies for learning questionnaire (MSLQ)

The scale is developed by Pintrich and Groot (1990); it is prepared in order to determine the strategies and motivational tendencies used by students for learning. Üredi (2005) adapted the scale to Turkish with the name of *Öğrenmeye İlişkin Motivasyonel Stratejiler Ölçeği (*ÖİMSÖ); it has two sub-scales in self-regulation strategies dimension as cognitive strategy use (13 items) and self-regulation (9 items); 3 sub-scales in motivational beliefs dimension as self-sufficiency (9 items), intrinsic value (9 items) and test anxiety (4 items). Grading used in the assessment instrument was 7 points likert type scale organized between "completely proper for me" and "completely not proper for me". It was determined that the Cronbach Alpha value of scales' sub-scales was 0.84 for self-regulation; 0.92 for self-sufficiency; 0.88 for intrinsic value and 0.81 for test anxiety scale (Üredi, 2005). In another study in which the survey was used, it was determined that internal consistency coefficient (Cronbach

Alpha) was 0.68 (Akkaya, 2012).

When the reliability-validity of the scale was analyzed for this study, it was determined that test anxiety sub factor of the scale wasn't functioning. After the statistical analysis, the scale was assessed with different sub-factors. Cronbach alpha values of the sub-scale were determined to be 0.84 for cognitive strategy scale; 0.81 for self-regulation; 0.86 for self-sufficiency; 0.82 for intrinsic value. Internal consistency coefficient of the scale which has four sub-scales and 35 items was calculated to be $\alpha = 0.92$.

Academic success test

Validity: Curriculum of General Biology Laboratory is viewed with course instructor to prepare the indicator chart. Question pool is prepared from Secondary School Student Selection and Placement Exam, Student Placement Exam, and Open High School Exam. Two lecturers' views are used to check relevance of questions and indicator chart based on General Biology Laboratory curriculum. For pilot study, 37 questions achievement test is prepared.

Reliability: After the reliability analysis for the success test including a total of 30 items, it was determined that alpha internal consistency coefficient was 0.62. The value of 0.50 and over is accepted to be reliable for tests including few items. It is expected that reliability coefficient is 0.80 or over for tests including fifteen or more items (Şencan, 2005). So, it was determined that success test used in the research was reliable.

Student interview form (G1)

This form is structured interview form prepared for obtaining the views of students about M-CIS. There were 9 questions in the form prepared for determining difficulties experienced by students while using M-CIS, eases ensured by the system, the points that are beneficial for the learning process of students and friends.

Teacher interview form (G2)

This form is structured interview form prepared for obtaining the views of teachers about M-CIS. There were 12 questions in the form prepared for determining the evaluations of teachers about M-CIS use, changes he/she makes in classes, changes in instruction strategies and changes in student attitudes. The related literature (Owens *et al.*, 2007, Vollmeyer and Rheinberg, 2006, Kennewell, Tanner, Jones and Beauchamp, 2008, Yarnall, Shechtman and Penuel, 2006, MacGeorge *et al.*, 2008b) was analyzed while preparing both forms (student and teacher interview form) (G1 and G2)

Data analysis

Covariance analysis (ANCOVA), which is a statistical analysis technique used for determining the changes in student academic success because of M-CIS use, was used in the study.

Mann-Whitney U test which is a statistical analysis technique used for determining the changes in student self-regulation abilities because of M-CIS use, was used in the study. Although self-regulation scores are parametric values, as they weren't normally distributed, analysis methods used in parametric tests weren't used in this study.

Interview forms were used for teacher and student evaluations including qualitative data. Teacher interview form (G2) was used in order to obtain the evaluations of 3 different teachers giving Physics, Chemistry, Biology classes, about the system use. Student interview form (G1) was used in order to determine the difficulties experienced by students while using M-CIS, eases ensured by the system and the points that are beneficial for the learning process of students and friends. Content analysis was made in order to analyze the written data about teacher and student views. Nvivo 8.0 package program was used for content analysis.

The process of analyzing qualitative data started with transferring written documents obtained with teacher and student interviews, to the package program. In order to prepare models according to concepts and relations between these concepts, views and evaluations in each text file were classified under the name of free nodes. These free nodes were formed according to the similarities of answers. While answers of all of the questions in student texts formed 81 different free nodes, there were 30 free nodes in teacher texts. It was seen that the obtained free nodes were also grouped as; system use, effect on user, learning-instruction and learning atmosphere. It is thought that expert opinion is necessary in order to ensure reliability and security while preparing themes for nodes. This is why, opinions of four different academicians in educational sciences department were taken before creating models with nodes. Each academician made nodes-theme matching, independent from one another. As a result of the common evaluation, necessary arrangements were made, obtained free nodes were combined, and tree nodes were obtained. So, it was possible to explain the obtained views with a model. The obtained data was explained with 6 different models as equipment, usability, affective

reactions, learning, instruction and finally learning environment. Teacher and student evaluations were analyzed together, models were visualized through related program. Reference numbers about the concepts were also given in these prepared models. Thus, it was attempted to determine the concepts in which teacher and student views gained importance. On the other hand, it was attempted to present the importance of each model in total teacher and student views, related with these reference numbers.

FINDINGS

In this section, statistical analysis made for finding answer to the questions determined in order to assess M-CIS use in improving the self-regulation abilities and student success in science instruction, is presented and the results are given in an order. Interpretations are made in line with the information obtained from tables and graphics about the analysis of results of each question.

Findings about determining the change in student academic success

When the experiment and control groups' statistical values were analyzed in order to present the change in student success based on M-CIS use, it was seen that point averages were close. Results of descriptive statistics are presented in Table 1.

Table 1. Descriptive statistics about success test

	Pre-test			Post-test		
Groups	M	SD	N	M	SD	N
Experiment	13.75	3.183	142	16.21	4.976	125
Control	14.59	3.363	138	15.10	3.740	124
Total	14.16	3.294	280	15.65	4.431	249

When test points of experiment and control groups in Table 1 were analyzed, it was seen that they were not equal. While making data analysis, tests that have missing data weren't used in assessment. It was seen that there was difference between pretest and last test means of experiment and control groups. In order to see if this difference was statistically meaningful, ANCOVA test was necessary. Intergroup interaction test results about ANCOVA test are presented in Table 2.

Table 2. Success test intergroup interaction test

Dependent variable: Post-test						
Source	Sum of Squares	Df	Mean Square	F	p	η2
Model	917.77	2	458.88	28.57	.000	.189
Pre-test	840.90	1	840.90	52.36	.000	.176
Group	110.32	1	110.32	6.870	.009	.027
Error	3950.52	246	16.059			
Total	65890.00	249				

When Table 2 was analyzed, it was seen that academic success test pretest points and group variables together explain 18.9 % of the change in academic success last test points, and the ANCOVA model that defines this is meaningful ($F_{(2;\ 249)} = 28.575$; $p \leq 0.05$). When eta-square values were analyzed, it was seen that academic success test explains 27% of the changes in posttest points in academic success, independent from pretest points. At the same time, academic success test pretest points are a significant predictor of last test points. Pretest explains ($F_{(1;249)} = 52.363$; $p \leq 0.05$); and explains 17.6% of changes in last test scores. When differences between groups' academic success according to M-CIS use was analyzed, it was seen that; $F = 6.870$; $p \leq 0.05$. This result shows that there is a meaningful difference between groups. Marginal means in Table 3 should be analyzed in order to determine the group which the difference is in favor of.

Table 3. Estimated marginal means*

Dependent Variable: Post-test				
Group	M	SD	95% Confidence Interval	
			Lower Bound	Upper Bound
Experiment	16.319	.359	15.612	17.025
Control	14.985	.360	14.276	15.695

*Pretest mean calculated as cofactor: 13.75

At the end of ANCOVA, in order to determine the group that the difference is in favor of, estimated marginal means was taken into consideration instead of the means in descriptive statistics results. When Table 3 was

analyzed, it was seen that group mean value for the experiment group is $X_{(experiment)}$= 16.319 while the group mean value for the control group is $X_{(control)}$= 14.985. This result shows that M-CIS make significant difference in student academic success.

Findings about determining changes in student self-regulation abilities

Motivated Strategies for Learning Questionnaire (MSLQ) was used in order to analyze the change in self-regulation abilities of students. At the end of unidimensional general evaluations and analyses, it was determined that there was no difference between experiment and control groups. As the scale is basically made of 4 sub factors, MANCOVA was thought to be used in order to determine the changes in these two factors in experiment and control groups. But it was seen in normal distribution tests that, data didn't normally distribute. This is why, Mann-Whitney U test, which is one of the non-parametric tests, was used for analysis. Descriptive statistics results about sub factors are presented in Table 4.

Table 4. Descriptive statistics for motivated strategies for learning questionnaire (MSLQ) sub factors

Sub factors	N	Mean Rank	SD	Min.	Max.
Cognitive strategies	247	50.27	7.432	23	63
Self-regulation	247	47.50	7.721	25	63
Self-efficacy	247	39.61	7.175	20	56
Internal values	247	47.21	7.462	19	63

As can be seen in Table 4, a total of 247 scale points were evaluated. According to point order, there was difference between sub factors. Results obtained at the end of order on the basis of these values are presented in Table 5.

Table 5. Motivated strategies for learning questionnaire (MSLQ) sub factors order statistic values

Sub factors	Groups	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	p
Cognitive strategies	Experiment	122	119.19	14541	7038	-1.046	0.296
	Control	125	128.69	16086			
Self-regulation	Experiment	122	126.92	15484	7268	-.636	0.525
	Control	125	121.15	15143			
Self-efficacy	Experiment	122	125.86	15354	7398	-.404	0.686
	Control	125	122.19	15273			
Internal values	Experiment	122	126.52	15436	7317	-.549	0.583
	Control	125	121.54	15192			

*p≤ 0.05

When Table 5 was analyzed, it was seen that there was difference between experiment and control groups' order mean values in sub factors dimension according to order means. In three sub factors, order means of experiment group were higher than the control group. In order to see if this difference was meaningful, order values were taken into consideration and Mann-Whitney U test was made; the results showed that there was not meaningful difference between the experiment and control groups in terms of the sub factors of Cognitive strategies, Self-Regulation, Self-efficacy, Internal values (See. Table 5).

Qualitative analysis results about M-CIS use

In this section, analysis results of statements obtained at the end of students and teacher interviews about M-CIS use in science instruction are presented. Models that explain data were created with the help of concepts and relations obtained from these analyses. When the data obtained from teachers and students were analyzed, it was seen that the same theme was in both students' and teachers' statements. This is why, teacher and student view analyses are made by using the same themes. Themes were branched at the level of relations and modeled in the shape of tree. In order to determine the weight of models in students and teachers' views, reference numbers of concepts that form the theme are given.

Affective reactions

It was seen that system use caused differences in affective field dimension of teachers and students. According to this, concepts about the statements of attitudes and reactions acquired by individuals and values after using the system were associated with affective reactions theme. Model about affective reactions is presented in Figure 3.

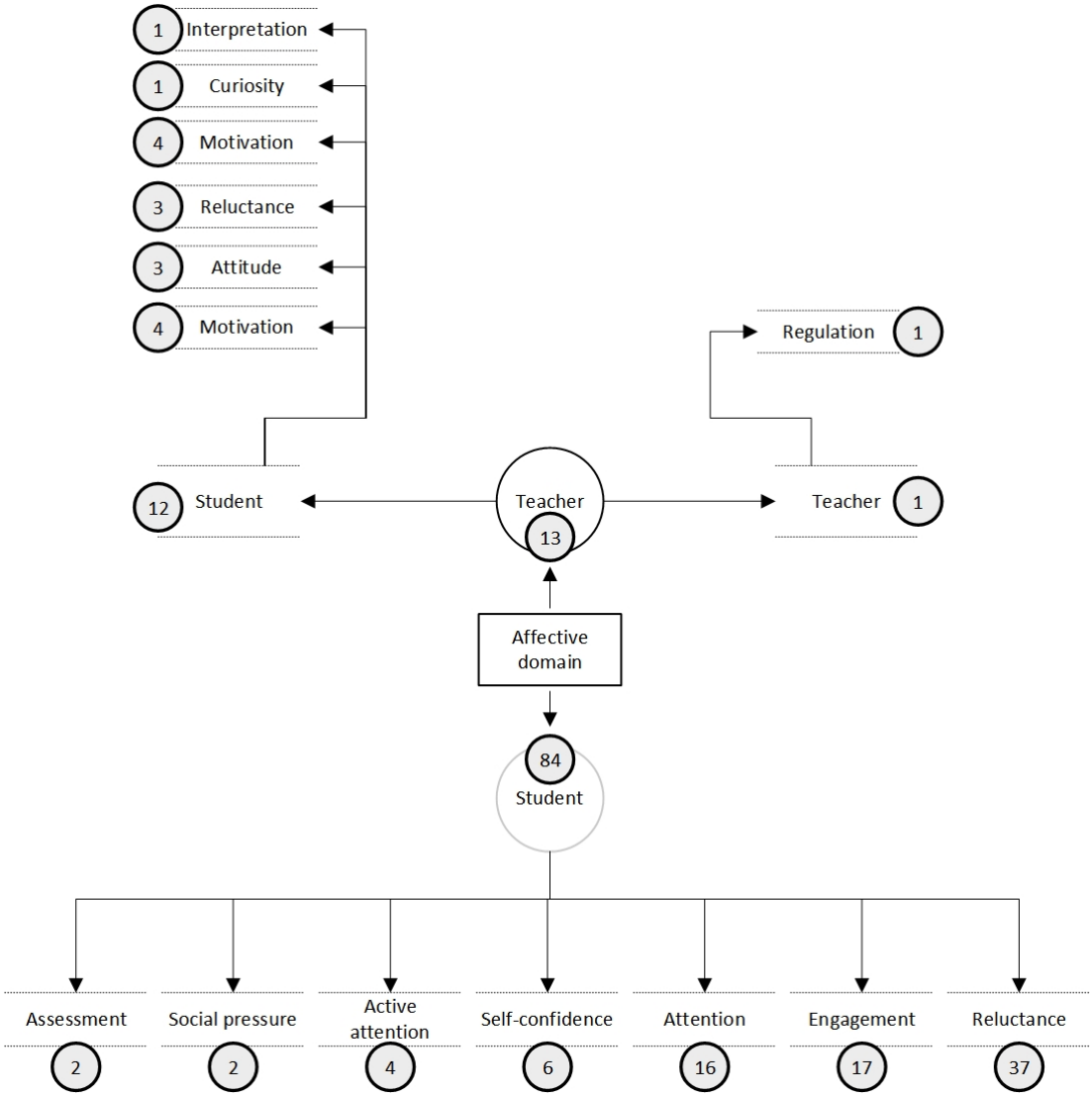

Figure 3. Affective reactions (domain)

Figure 3 includes student and teacher affective reactions towards M-CIS use. When Figure 3 was analyzed, it was seen that M-CIS use was evaluated according to a total of 97 references including 13 teachers and 84 students. 12 out of 13 references stated by the teachers, were the reactions of students while one was the affective reaction towards himself. According to these observations, teachers stated that they saw improvements in interpretation skills of students, students listened classes with a bigger attention, and the program was effective in reluctant students' attendance to lessons and increased positive attitudes. Teachers said that the biggest change occurred in terms of motivation. Students, on the other hand, stated that their attention in lessons increased, they could be more active, and the system made positive contributions to overcome their reluctance in social environment.

Learning

Views stated in learning dimension are the concepts including statements about learning new information, ensuring permanent knowledge and ensuring success in learning. Model about the learning theme is presented in Figure 4.

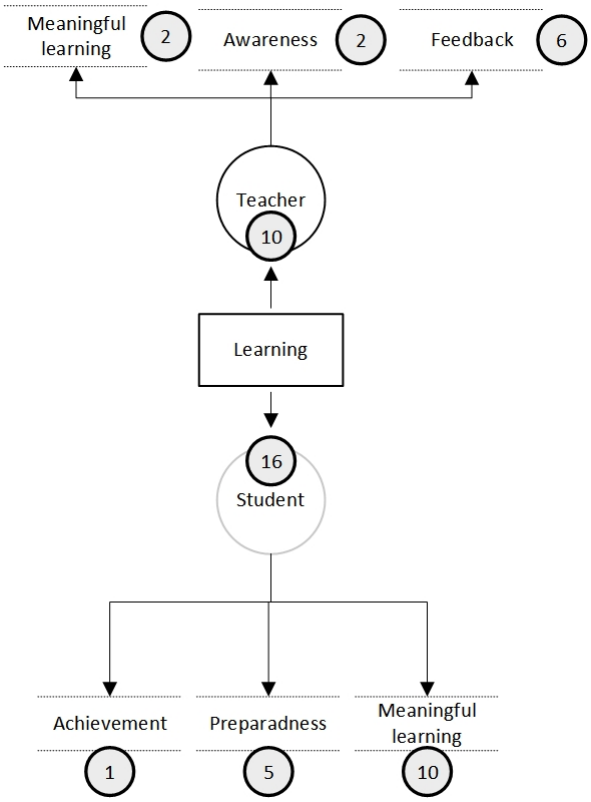

Figure 4. Learning

When Figure 4 was analyzed, it was seen that there were a total of 26 references determining the views about learning; 10 teachers and 16 students were these references. Teachers stated that as the system use helped having meaningful learning and permanent knowledge and as students had information about their learning situation, there was a high level of awareness in learning. On the other hand, they said that the system ensured obtaining feedback which is a very important need in learning.

Learning environment

Concepts such as attendance, interaction and feedback, which describe the differences in learning environment observed by teachers and students, were discussed under the heading of learning environment. The model about learning environment theme is presented in Figure 5.

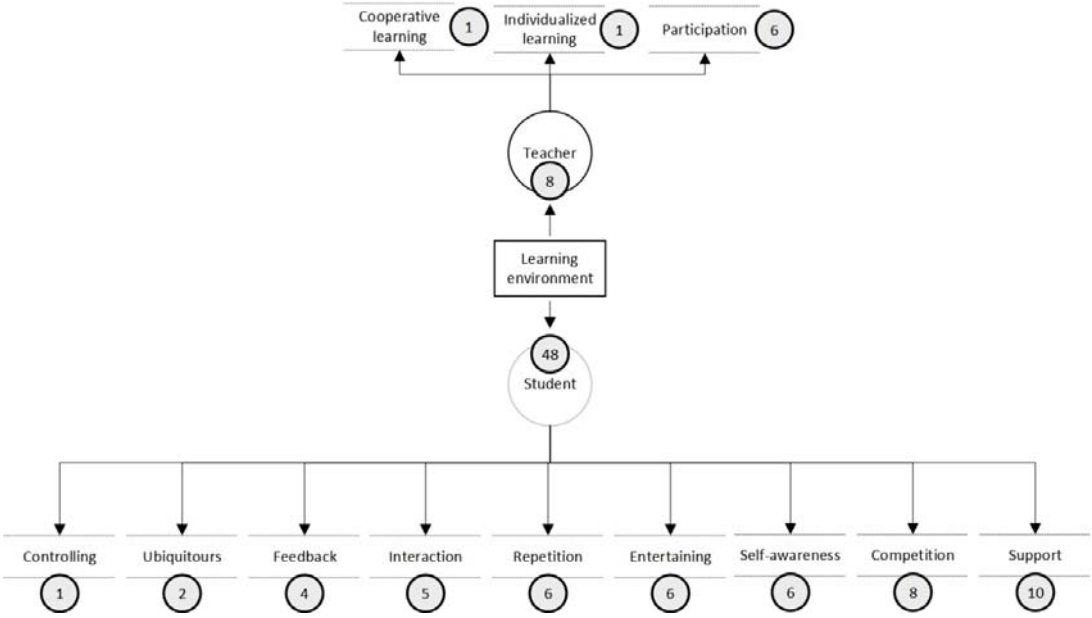

Figure 5. Learning environment

When *Figure* 5 was analyzed, it was seen that there was a total of 56 references determining the views about learning environment; 8 teachers and 48 students were these references. Teachers stated that system use gave the opportunity to cooperative learning and individualized learning in the learning environment. Students stated that with the use of the system, control was ensured better in the learning environment, there was no difference between sitting in the front row and sitting in the back, so they had the chance to participate the lessons actively. Students also said that the lesson was entertaining, because of having feedback, they had the chance to discuss in classes and they had the opportunity to share their ideas, namely interact.

Instruction

Concepts such as instruction strategies, asking question strategies, assessment and evaluation, which describe the differences in instruction observed by teachers and students, are discussed under the heading of instruction theme. The model about instruction theme is presented in Figure 6.

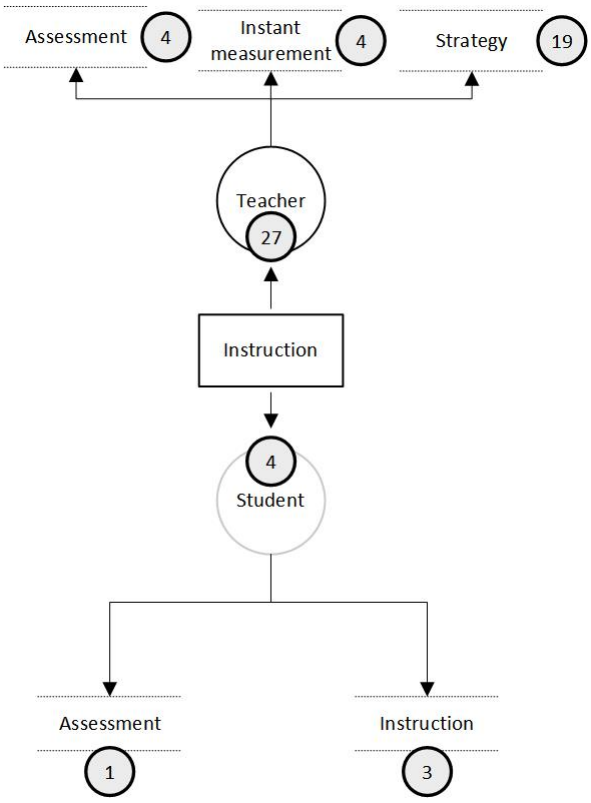

Figure 6. Instruction

When *Figure* 6 was analyzed, it was seen that there was a total of 31 references determining the views about instruction; 27 teachers and 4 students are these references. When the concept of strategy, which has the most references, was analyzed, it was seen that; teachers stated that, with the system use they were aware of their instruction, they could instantly assess instruction process and thus they could make changes in instruction strategies or asking question strategies when needed.

DISCUSSION

Results and suggestions about determining the change in student academic success

In this research, in which mobile technology use in developing student success and self-regulation abilities in science education was investigated, when the findings of the sub-research questions about determining the change in student academic success were controlled according to pretest points, it was seen that there was a meaningful difference between the points of experiment and control groups. Experiment group students who used M-CIS were meaningfully more successful than the students who didn't use the system. This result shows that M-CIS use increases student success.

Results obtained from the qualitative data of the research support this hypothesis. Student and teacher views about academic success are presented in the model explained with learning theme (Figure 4). Concepts of permanency, feedback, awareness, preparation, success in the model show that the system used in increasing academic success is efficient. Students said that system use contributed to their success. They stated that they prepared for the class and their learning was more permanent. Teachers had the same view about permanent

learning ensured by the system use (Figure 4).

These results are in parallel with some of the studies in the literature. There is no study about M-CIS in the literature. But there are studies about student response system (SRS) whose technology is similar and is used as in-class communication technologies. King and Joshi (2007), determined that there is an increase in the performance of students who regularly use SRS system, and they got higher marks in exams. In their research, Nicol and Boyle (2003) used SRS in order to support discussion environment in science classes, ensuring feedback about concept tests and for supporting peer group discussion environments. At the end of the interviews with students, they determined that all of the students learnt science concepts better with instruction that is supported with the system. Caldwell (2007) stated that the use of SRS is effective in student anxiety level; success point obtained with the use of SRS is higher than the success points obtained in learning without SRS use. It is seen that in-class instruction technologies have positive effects on increasing student academic success (Mareno, Bremner and Emerson, 2010, DeBourgh, 2008, Crossgrove and Curran, 2008).

At the end of the success test, it was determined that M-CIS use contributes to increasing student academic success in science education. When this result is taken into consideration together with student and teacher views, it can be said that the system can also be used in science education for improving student success and self-regulation abilities. The designed system can be used in increasing academic success in science education. Besides this, this study, which is carried out in university science education should also be carried out in secondary school and high school levels. In this way, the designed system's effects on different education levels can be surveyed and evaluated.

Results and suggestions about determining the change in student self-regulation abilities

In this research, in which mobile technology use in developing student success and self-regulation abilities in science education is investigated, when the findings of the sub-research questions about determining the change in student self-regulation abilities were analyzed, it was seen that there was not a meaningful difference between the points of experiment and control groups. According to this result, it is not possible to say that M-CIS use has an effect on student self-regulation abilities. When the obtained findings are analyzed, it can be said that there are two basic reasons of this result. Firstly, data do not normally distribute. A better, more precise result can be obtained when an analysis is done with a data set obtained from a sample that represents the population better. Secondly, although it is commonly used, MSLQ may not be sensitive enough to measure the small changes in self-regulation abilities. So, although M-CIS use caused change in self-regulation abilities of students, this result couldn't be observed in the frame of sample and scales included and used in this research. Especially when affective reactions model (Figure 6) was analyzed, it was seen that students are more interested in classes and actively attends lessons. As students had the opportunity to see and control their correct and incorrect answers, and had the chance to correct feedback and they could make self-evaluation. It was seen that, as they were not under a social pressure while improving their learning, their self-confidence increased. As observers, teachers also stated that students were more motivated and interested in lessons and they had positive attitude towards system use.

Feedback is significant in order to make self-regulation. Feedbacks obtained during learning activities ensure students be aware of their correct and incorrect knowledge. As these feedbacks give opportunity to observe and evaluate oneself, it ensures internal feedback. These feedbacks are effective in making self-regulation during learning (Butler and Winne, 1995). Obtaining feedbacks during learning activities through system use can be effective in improving self-regulation abilities.

Student motivation and self-regulation are closely related and effective elements in academic success (Cleary, Gubi and Prescott, 2010). High motivation of student ensures carrying out responsibilities, give opportunity to make new attempts and use new strategies in terms of self-fulfillment (Zimmerman, 2002). Chosen proper new strategies and high motivation help students understand the information he/she gets better (Vollmeyer and Rheinberg, 2006). When student and teacher views were evaluated, it was seen that the system increased student motivation. The detailed research about this issue is presented in the next section under the heading of "*Evaluation results of student and teacher views about M-CIS use in science education*".

Results obtained from MSLQ, used in order to determine the change in student self-regulation abilities according to M-CIS use is not enough to evaluate the effect of the system. This is why; new experimental studies will be beneficial for determining the effect level of the system. While it is difficult to have a precise result about the effect of system through experimental studies, when qualitative data according to student and teacher views are analyzed, it is possible to say that the system is effective in student self-regulation. It is predicted that, taking these views into consideration in new studies about the use of the system in science education, will be beneficial

for having a pedagogical content that is proper for system use and will make positive contributions to solving problems in instruction.

Evaluation results and suggestions about student and teacher views on the issue of M-CIS use in science education

When the views of students and teachers about the use of the system were evaluated, it was seen that M-CIS is a system that can be a solution to various problems in science education.

Students responded positively to have opportunity to make self-evaluation about correctness and incorrectness about information they obtain. Zimmerman (2002) says that self-evaluation is one of the most important factors in self-regulation. Each student has a different basic knowledge level and different learning model and this is the basic factor that determines difference in learning abilities (Zimmerman, 2002). Self-evaluation during learning is significant in this sense. The opportunity of self-evaluation through M-CIS use can be seen as a significant easiness in this sense. Self-evaluation of all of the students in a class can especially be important in improving self-regulation abilities. New studies on the level of this effect can be done.

Students said that with the use of M-CIS they could be active in class. They said that the biggest effect that enabled them be active in class is that they could state their personal opinions about questions and they were aware of the thoughts of other students. This result shows that when students have the opportunity, they become active in class. The use of Student Response System, which has a similar technologic substructure, was also made in order to ensure active engagement of students. Caldwell (2007) stated that student response system is used in order to ensure in-class coordination and student engagement in big classes. In small classes, it is easier to manage students and ensure active engagement. But as there are mostly big and crowded classes, it is significant to ensure the engagement of all of the students. It is seen that M-CIS use can be a solution to remove this problem.

Students stated that they think that group and personal success increased with the use of the system. This view is in line with the result of experimental study. When the results of ANCOVA (Table 3), which is made in order to determine the change in student success according to M-CIS use, were analyzed, it was seen that system had positive effect on academic success. These results show that M-CIS is efficient in increasing student academic success. New studies on this issue should be carried out. On the other hand, the effect of the system on other lessons should also be researched.

When the reference numbers about student and teacher views were taken into consideration, it was seen that the highest number of references is in the concept of self. Characteristically, shy student stated that they abstain from saying something in normal classroom environments and they become more passive as they are concerned about the reactions of their social environment. According to them, the use of this system helped them overcome this difficulty. Similarly, students who are normally shy stated that they couldn't always actively participate in lessons, but with this system, they could state their ideas much more comfortably. The most significant feature of the program about removing reluctance is that it enables every student state his/her view easily and his/her identity isn't known in this process. The student who states his/her opinion is not recognized by the other; he/she can answer questions and write his opinions. Some of the students stated that system use decreased their reluctance besides enabling them state opinions in other lessons, which increased self-confidence. In a good learning environment, learner should be active. The problem of reluctance is also accepted to be significant by students. It is thought that using M-CIS can be a way to overcome this problem.

Teachers think that there was an increase in student motivation with the system use. They said that, especially when they observed how students answered questions by discussions in their group, they saw that their motivations significantly increased. Motivation is a significant factor that affects self-regulation, it is basically related to success possibility, anxiety, interest and urge. While student's success possibility, interest and urge level increases during high motivation, anxiety level decreases. Motivation, which is also effective on learning output, is also effective in reaching a goal in terms of self-regulation ability (Vollmeyer and Rheinberg, 2006). When the change in student academic success according to M-CIS use was analyzed, it was seen that academic success of students who used the system was higher than the academic success of the ones who didn't use. It is thought that this contribution of M-CIS is not directly resulted from the system itself, it is resulted from motivational strategies which are effective in terms of learning output and self-regulation. This is why, student and teacher views should be taken into consideration and the effect of M-CIS on student motivational strategies should be researched in new studies.

Teachers stated that the feedbacks they get were very beneficial for them. Teachers, who said that they evaluated

students learning according to learning output, stated that they could understand whether or not students understood the topic through their answers, and they could realize when there were misconceptions because of the question itself. When questions of teachers are misunderstood by students, answers can be wrong accordingly. In such cases, it is difficult to know the resource of the problem without using M-CIS. As the system presents all of the student answers to teacher, he/she can distinguish the exact resource of the problem and ensure necessary feedback. It is thought that detailed evaluation of the use of the system in terms of instruction dimension will be beneficial.

A teacher stated that the system was effective in increasing dialogue among students, so, group learning increased. Mazur (1997), who made various researches on the issue of peer instruction, stated that discussions among students are effective in learning science concepts. In his researches, he found that student answers given after making a discussion in group are mostly more correct than the answers of other students. It is seen that M-CIS is effective in establishing discussion environment among students. It is thought that using M-CIS with peer instruction or different instruction methods will be more effective in determining the place of the system in instruction.

Teachers stated that the system gave them the opportunity to have information about their instruction. Feedbacks obtained during instruction activities are important in order to evaluate instruction. Teachers who use M-CIS have the chance to determine if students understood what is told; so they stated that they could evaluate their instruction. Obtained feedbacks are important in order to make necessary changes in instruction strategies or question asking strategies. In a instruction environment in which the proper strategy is used, it is difficult for students to make sense of what is told. Similarly, teachers ask similar type of questions in order to evaluate what is learnt or students may not answer the questions as they couldn't understand what is being asked. It is thought that the designed and used system can be beneficial in solving these problems.

As a result, it was seen that M-CIS use is not only effective in increasing academic success in science education; it also has the potential to solve many problems in learning and instruction environment. Besides that, new studies should be done by preparing new application designs that are proper for different laboratory or theoretical classes. Wider sample groups should be used in new applications and new studies should be carried out on the issue of instruction science at secondary education level. Similar studies should be done for lessons besides science lessons.

It is thought that multidimensional interaction opportunity ensured by M-CIS in education can form a basis for new approaches that has been increasingly becoming significant in science education. One of these approaches is constructivist approach. The goal of this approach is to form instructional activities in a way that learners understand and learn concepts deeply and meaningfully. In order to ensure meaningful learning, it is necessary to know the concepts and misconceptions of students. In this way, teachers can organize instruction strategies according to possible misconceptions. A teacher who wants to do that should know the learning or misconceptions of all of the students about the topic. But in a laboratory environment full of students actively making experiments, this is quite difficult. As this evaluation is not sufficiently done on time in classes, it is impossible to reorganize instruction strategies according to the necessity. When a teacher asks a question through M-CIS about a topic told in the class, he can see that students are in fact insufficient in that topic and make necessary changes in instruction strategies. Teacher can have the opportunity to determine misconceptions during lessons and have information about how much is a topic understood at the end of the class.

M-CIS also supports a learning environment organized according to project and research based approaches. With this approach, which improves thinking and interpretation abilities in the frame of cause and effect instead of memorization, it is attempted to have an efficient and permanent learning besides learning through experience. Similar with the constructivist approach, social environment is significant while constructing learning. In a project, every student takes part in resulting and group study is significant. An important result obtained in this study is that students want to use M-CIS as a communication channel. They stated that developing a system that enables them establish connection with teachers or friends not only in classes, but also outside learning environment will be beneficial. It is thought that this will support students in terms of making group studies. It is believed that using M-CIS as a communication interaction platform will be effective in project and research based learning approach. This is why; the level of this effect should be researched.

Concept instruction gains more importance every day in science instruction. Although there are some techniques for determining misconceptions during an instruction process or for determining misconceptions that already exists before an instruction process, it is impossible for teachers to understand misconceptions of all of the students during a lesson about the topic he teaches. When a teacher asks a few questions at any time and evaluate

the answers, it can enable him determine some misconceptions. M-CIS which ensures this in the best way, can present information about misconceptions of students in a short time. On the other hand, it is predicted that while presenting these information to teachers, the system can enable identifying misconceptions including all of the students in a class without losing a lot of time.

It was determined that M-CIS, which is designed to create classroom environments that are proper for developing student academic success and self-regulation abilities in science education, was highly successful in creating the targeted classroom environment. This is why; new studies on the issue are significant in terms of making contribution to science education and evaluating the use of the system in other disciplines.

Note: *This study is taken from the doctorate thesis*
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Factors Related to Faculty Members' Attitude and Adoption of a Learning Management System

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ABSTRACT
Learning Management Systems (LMS) play a crucial role in organizing the course contents. However, some instructors use LMS in their classes while some do not. This study aimed to discover the factors in relation to the instructors' attitude toward LMS and adoption of LMS in their course. A survey was administered to 62 instructors to follow up the use of LMS after they attended the training. The respondents were assessed for their attitude towards LMS, perceived ease of LMS use, perceived usefulness and their actual use of LMS in their course. The results reveal that the respondents of the study had a high overall attitude towards LMS. Perceived ease of LMS use and perceived usefulness were found to have a significant positive correlation with their attitude. In addition, the more the instructors perceived ease of LMS use, the more intensively their beliefs about the usefulness of it increased. However, it was found that attitude toward LMS, perceived ease of use and perceived usefulness were not correlated to actual use of LMS. Furthermore, there was not any significant difference in the respondents' attitude toward LMS in terms of gender and subject domain. The responses to open-ended questions were revealed in terms of difficulties they had when using LMS.
Keywords: instructor's attitude, LMS use, educational technology, perceived usefulness, ease of use

INTRODUCTION
Nowadays, online learning has been more in a form of formal and group learning. Instructors can put their materials on their web and communicate with students using emails. Among newly developed Web 2.0 applications, a learning management system is a promising tool for transforming face-to-face courses to online instruction. According to Laster (2005), the term Learning Management System (LMS) is a self-contained webpage with embedded instructional tools that permit faculty to organize academic content and engage students in learning. It enables course sites to be created (Sclater, 2008). Most educational institutions especially at university level have been using an LMS to provide students with a space for online learning. A perceived benefit of using an LMS is the ability to instruct online using a variety of modalities to meet learners' diverse needs (Mullinix & McCurry, 2003). LMS can provide a challenge for instructors with differentiated instruction. An LMS permits faculty to incorporate multimedia elements including audio recordings, music, video, text, interactivity, and sequencing (Klemm, 1998). Furthermore, as stated by Mullinix and McCurry, the potential uses of an LMS to improve the teaching and learning process include increased access to course content and improved communication among professors and students. As noted by O'Quinn and Corry (2002) who support Mullinix and McCurry's findings, a web-based course expands the learning time because content is readily accessible. Previous studies found that educational technology like LMS can support the instructional process; it assists faculty in managing courses and organizing content to engage students and decrease planning time (Ayers & Doherty, 2003; Jafari, McGee, & Carmean, 2006; Oliva & Pawlas, 2005).

Basically, LMS can be categorized into three main types: study skills tools, communication tools, and productivity tools. Tools for study skills include the authoring modules to create activities or materials for learners. In general this category of tools covers quizzes, online materials presentations, assignments, and tasks. The quiz module has such many functions as a question database, feedback, scoring and tracking of students' progress. The second tool category in an LMS is communication tools. This category includes the means of communication available for instructors and learners. Such communication tools enable the learners to interact with their classmates or with their instructors. The most commonly available communication tool is announcement. This tool is used to give all learners any new information about the course, including the latest news and upcoming events. Usually, this tool is presented on the first page after the students log in to the LMS. Another common communication tool is discussion board. This is a forum of communication where both instructors and learners can post their messages and read the comments from others. In conclusion, the instructor has the authorization to upload content to the site, organize the materials that reflect the course, open discussion groups, and manage the information which includes the option to delete inappropriate content from it.

Nowadays, two kinds of LMS are employed by faculty members in higher educational institutions. Some use departmental web sites (Britain & Liber, 1999) while the others use commercial Learning Management Systems (LMSs). The commercial LMSs might not work well with learners since they are usually designed for the use in distance education in general. The context of Second Language Acquisition (SLA) is rather different from that in other subject domains. It needs an LMS that accommodates "not only input and output of the character set of the target language, but also some other learning tools such as discussion boards, vocabulary activities, grammar clinics, online dictionaries, and writing draft books, feedback and assessment tools; all organized around the learning activities and communicative practice in all four language skills (Sawatpanit, Suthers, & Fleming, 2004). When an LMS is applied in any language courses, it can be more than course management. It is like a space or a platform of language improvement.

According to Saricoban (2013), one of the most important aspects of language instructors in the educational setting is to become familiar with ICT, which equips them with the techniques and strategies for using computers in their classrooms. Despite the benefits of integrating an LMS in the teaching course, many faculty members lack knowledge of effective ways of using an LMS to enhance teaching. There has been reluctance in adopting it as a teaching tool. As Gautreau (2011) states, many faculty members are not motivated to use LMS for a variety of reasons. The reasons will vary depending on demographics and certain factors that are important to faculty. For instance, many studies indicate that attitude towards technology are key factors in the adoption and use of technology, specifically an LMS, by faculty (Lawler & King, 2003; Nasser, Cherif & Romanowski, 2011; Rogers, 1995). In addition, Teo (2009) points out that instructors' attitude and willingness to embrace technology has a great effect on students' success in learning with technology in the classroom. Instructors act as drivers in the effective integration of technology, both for teaching and learning in educational settings.

Theoretical Framework

The research model in this study was based on the Technology Acceptance Model (TAM) developed by Davis (1985) which is a theoretical framework for predicting the early adoption of new computer technologies that can be used in various situations and in different contexts (Teo, 2009). Davis devised three factors impacting user acceptance of a new computer technology which this research focused on. The first factor was Perceived Usefulness (PU); the second was Perceived Ease of Use (PEOU); and lastly the Attitudes toward Usage (ATU) of a new system (Davis, 1989). PEOU is defined as how easy the user perceives the new technology is to use (Park, 2009). Perceived Usefulness (PU); however, is defined as the user's belief that the technology will improve their performance (Lee & Lee, 2008). The attitude toward technology (ATU) resulting in behavioral intention on whether to use or not use the technology is another determining factor to be explored (Nov & Ye, 2008). The model proposes that perceived ease of use and usefulness of new technology affects attitudes toward the technology, which is an antecedent to behavioral intentions to use it. In many studies, relationships were found among these factors. For example, perceived ease of use had a significant influence on attitude towards usage (Chang et al., 2012; Park, 2009) and perceived usefulness (Shroff et al., 2011). Perceived ease of use was found to indirectly impact intention to use through increased perceived usefulness (Lee et al., 2011; Sek et al., 2010). Perceived usefulness was a direct determinant of intention to use (Liu et al. 2005). Similarly, Ng, Shroff, & Lim (2013) found that attitude towards usage evidenced a direct relationship to behavioral intention to use.

Another factor which was taken into account in this study is gender. It was found that males and females experienced the online learning environment quite differently. Some scholars reported that females demonstrated negative attitudes and less confidence in using technology (Anderson & Haddad, 2005; Dhindsa & Shahrizal-Emran, 2011; Li & Kirkup, 2007). While a study found that females have been demonstrating better use of computer-mediated platforms like Blackboard and have been outperforming males academically (DeNeui & Dodge, 2006), another one found no significant difference in engagement in a discussion forum between males and females **(**Machado, 2011). Since this study collected data from instructors who had attended the training course of LMS from different faculties, the issue of teaching field or subject domain they possessed should be taken into consideration.

With the widespread use of LMS to support teaching and learning in today's classroom, the present study was designed to explore the factors that were assumed to have an impact on the attitude toward usage and actual use of LMS of instructors in a private university. Since the main issue to be emphasized in the current study was willingness to adopt new technology, the following model was developed to explain considerable factors as seen below:

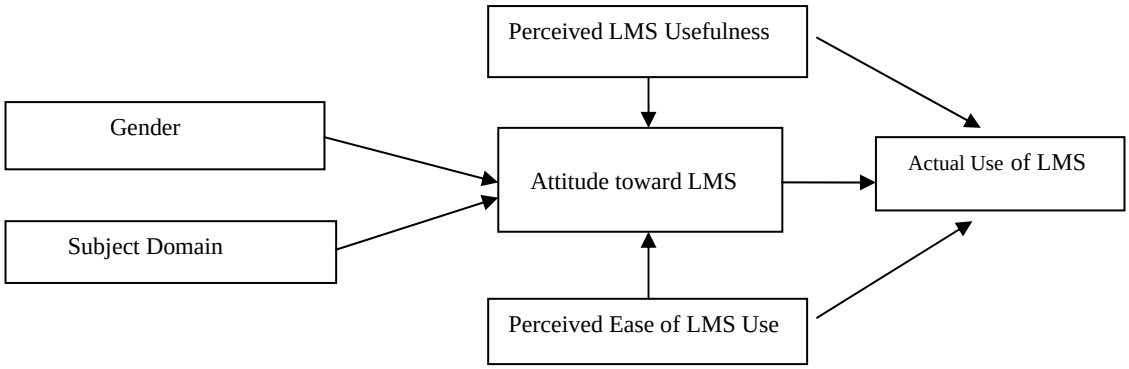

Figure1. The Research Model

Research Questions

The study aims to answer the six research questions as follows:

1. What are the instructors' attitude toward LMS, perceived ease of use, and perceived usefulness?
2. Are there any differences in the instructors' attitude toward LMS between two groups: males and females?
3. Are there any differences in the instructors' attitude toward LMS between two groups: those teaching language courses and those teaching in other subject domains?
4. Are there any relationships between the instructors' attitude toward LMS, perceived ease of use, perceived usefulness, and their actual use of LMS in their course?
5. What are the difficulties faced by the instructors in using LMS?
6. What are the main reasons why the instructors did not use LMS in their course and which technology they chose instead of LMS?

Research Hypotheses

H1: Gender has an effect on attitude toward LMS.
H2: Subject domain has an effect on attitude toward LMS.
H3: Perceived usefulness is related to attitude toward LMS.
H4: Perceived ease of LMS use is related to attitude toward LMS.
H5: Perceived ease of use is related to perceived usefulness.
H6: Attitude toward LMS is related to actual use.
H7: Perceived usefulness is related to actual use.
H8: Perceived ease of use is related to actual use.

METHODOLOGY

Respondents

The respondents in this study consisted of 62 instructors from a private university in Thailand. When an LMS (Moodle) was first introduced to our university in 2013, the Computer Center of the university organized the training for all faculty members. Since it is the policy of our university that instructors make use of technology in their teaching, this study was, therefore, conducted to follow up the use of LMS by instructors in the first semester of 2014 academic year or after one year of training. All respondents signed consent forms, and they were assured that all data would be confidential.

Instrumentation

The instrument of this study was a questionnaire comprising three main sections. It was designed by the researcher after an extensive review of the related literature. The first section contained personal data concerning age, gender, teaching field, educational level, and years of teaching experience. Section Two consisted of 21 items that measured "perceived ease of use" (8 items), "perceived usefulness" (5 items), and attitude toward LMS (8 items). The questionnaire item responses were constructed on a five-point Likert scale from strongly agree (=5) to strongly disagree (=1) for three subsections comprising "perceived usefulness", "attitude" and "perceived ease of use." However, the subsection of "actual LMS use" provided two response of "yes" and "no." The third section of the questionnaire asked the respondents to respond to two open-ended questions. The first question asked those using LMS about the difficulties they faced. The second one asked those who did not use LMS about the reasons why they did not use it and which technology they used instead of LMS.

Validity and Reliability of the Instrument

The initial draft of the study instrument was written in English. It was then translated into Thai as the respondents were native speakers of Thai. In order to ensure the validity of the questionnaire, only the Thai version was handed out to a group of five referees specializing in the fields of instructional technology and education. Taking their comments into consideration, those changes deemed essential were made. Some items were added and others removed. Finally, there were 21 Likert scales items in section 2 which were processed with 40 non-subject instructors to estimate the reliability of the questionnaire. Internal consistency measures were computed using the Cronbach's alpha method for the questionnaire. Consequently, the reliability of this questionnaire was 0.79, indicating a high level of internal consistency. Therefore, the study could be continued with the real group of instructors.

Data Analysis

Data were statistically recorded and analyzed by SPSS/Windows program. Personal information of the participants was calculated for frequency and percentage. To answer the first question, means and standard deviations were analyzed to find out the instructors' attitude toward LMS, perceived ease of use and perceived usefulness while independent samples t-tests were utilized to answer the second and third research questions. Pearson Correlation Coefficients were used to answer the fourth research question. This was done to find relationships between the instructors' attitude toward LMS, perceived ease of use, perceived usefulness and their actual use of LMS in their courses. An open-ended question included in the questionnaire were read, coded, re-read, and categorized into bins by question (Miles & Huberman, 1994).

FINDINGS

PART I: THE RESPONDENTS' INFORMATION

Of all respondents, 30 instructors teach English languages while 32 are instructors in other subject domains. They were asked to reply to the questionnaire. It was found that out of 62 instructors surveyed, 13 of them used to work with the old version of LMS. There are 26 males and 36 females. With regard to their qualifications, most of them (n = 45) are on the master's degree level, whereas some of them (n = 10) have a bachelor's degree and the rest (n = 7) have a doctoral degree. Moreover, 12 instructors have long teaching experience (more than 10 years) while 28 have moderate experience (6–10 years), and 22 have short teaching experience (less than 6 years). The survey shows that 41 instructors have used an LMS while 21 instructors have not engaged in using an LMS in their current courses.

PART II: RESPONSES FROM THE QUESTIONNAIRE

Research Question 1: What are the instructors' attitude toward LMS, perceived ease of use, and perceived usefulness?

Table 1 shows the overall mean score of attitude toward LMS which was at high level (Mean = 4.16). The first highest mean score fell on item no. 2 (LMS enables the materials to be organized in a structure planned by the instructor), followed by item no. 3 (LMS makes communication more convenient), and item no. 4 (LMS provides a space where learning can take place independently). The lowest mean scores were on items no. 7 (LMS increases motivation for learning English language).

Table 1: Mean and Standard Deviation of Attitude toward LMS

Attitude toward LMS	Mean	SD	Level	Order
1. The use of LMS provides the instructor with many different tools to assess learning.	4.08	1.24	high	5
2. The use of LMS enables the material to be organized in a structure planned by the instructor.	4.74	.70	very high	1
3. The use of LMS makes communication more convenient.	4.44	.50	high	2
4. The use of LMS provides a space where learning can take place independently.	4.40	.49	high	3
5. The use of LMS makes learning easier.	4.35	.48	high	4
6. The use of LMS increases interaction among students and instructor.	4.06	.74	high	6
7. The use of LMS increases motivation for learning English language.	3.42	1.18	moderate	8
8. The use of LMS produces new models of teaching and learning.	3.82	1.05	high	7
Total	**4.16**	**.25**	**high**	

Table 2 demonstrated the overall mean score of instructors' perceived ease of LMS use which was at a high level (Mean = 4.04). When considering each item, it was found that the three activities they perceived easy the most were posting messages on forum, uploading or removing files, and looking at students' attendance repot. These three items were at a high level. The lowest mean score was on contacting students through emails in LMS.

Table 2: Mean and Standard Deviation of Instructors' Perceived Ease of LMS Use

Perceived Ease of LMS Use	Mean	SD	Level	Order
1. uploading or removing files	4.34	.48	high	2
2. posting and replying messages on forum	4.48	.50	high	1
3. chatting with students	3.66	.92	high	7
4. creating exercises or quizzes	4.13	.71	high	5
5. editing the course content	4.19	.60	high	4
6. looking at students' attendance report	4.27	.45	high	3
7. putting a link to website sources	4.00	.77	high	6
8. contacting students through emails	3.15	1.04	moderate	8
Total	**4.04**	**.34**	**high**	

Table 3 demonstrated the overall mean score of instructors' perceived usefulness of LMS which was at a high level (Mean = 4.00). When considering each item, it was found that the three items instructors perceived useful the most were providing the course content, communicating with the learners, and sending homework. These three items were at a high level. However, using LMS to test the learners was perceived at a moderate level; this item had the lowest mean score (Mean = 3.48).

Table 3: Mean and Standard Deviation of Perceived Usefulness of LMS

Perceived Usefulness of LMS	Mean	SD	Level	Order
1. communicating with the learners	4.27	.63	high	2
2. providing the course content	4.31	.56	high	1
3. testing the learners	3.48	1.08	moderate	5
4. checking the learners' participation	3.76	.67	high	4
5. sending homework	4.19	.57	high	3
Total	**4.00**	**.32**	**high**	

Research Question 2: Are there any differences in the instructors' attitude toward LMS between two groups: males and females?

An independent t-test analysis was employed to examine a significant difference between two groups of instructors in their attitude. The results revealed that there was no statistically significant difference in attitude between the two groups at the level of .05. This means that male and female instructors were not different in their attitude as demonstrated in Table 4. So, the hypothesis 1 stating that gender had an effect on attitude toward LMS was denied.

Table 4: A Comparison of Mean Scores of Attitude toward LMS Classified by Gender

Gender	n	Mean	S.D.	df	t	p
Male	26	4.23	.21	60	1.613	.112
Female	36	4.12	.28			

Research Question 3: Are there any differences in the instructors' attitude toward LMS between two groups: those teaching language courses and those teaching in other subject domains?

An independent t-test analysis was employed to examine a significant difference between two groups of subject domains comprising the instructors in the language teaching field and those in other fields. The results revealed that there was no statistically significant difference in attitude between the two groups at the level of .05. This means that instructors did not differ in their attitude as demonstrated in Table 5. So, the hypothesis 2 stating that subject domains had an effect on attitude toward LMS was denied.

Table 5: A Comparison of Mean Scores of Attitude toward LMS Classified by Subject Domains

Subject Domain	n	Mean	S.D.	df	t	p
Language Teaching	30	4.19	.21	60	.786	.435
Other Subject Domains	32	4.14	.29			

Research Question 4: Are there any relationships between the instructors' attitude toward LMS, perceived ease of use, perceived usefulness, and their actual use of LMS in current courses?

The primary purpose of this study was to examine the relationship among certain factors regarding LMS actual use. Several analyses were, therefore, conducted, and the findings revealed that the two factors namely perceived ease of use and perceived usefulness were related to attitude toward LMS. Attitude toward LMS was positively correlated with how much they perceived LMS easy to use ($r = .530$, $p < .01$) and how much they perceived LMS useful ($r = .300$, $p < .05$). That is, the more they perceived LMS easy to use and the more they perceived LMS useful, the more they had positive attitude toward LMS. Therefore, the hypothesis 3 and 4 were accepted.

The results also indicated that perceived ease of use was positively correlated with how much the instructors perceived LMS useful, $r = .457$, $p < .01$. This means the more they perceived LMS easy, the more they felt its usefulness. As such, the hypothesis 5 was accepted.

Out of 62 instructors surveyed, 41 have used an LMS while 21 have not engaged in using an LMS in their current course. An investigation was further undergone to see whether certain factors were related to the actual use of LMS. The results reveal that correlations were not found between the use of LMS in current courses and the three factors namely attitude toward LMS ($r = .131$, $p > .05$), perceived ease of use ($r = .099$, $p > .05$), and perceived usefulness ($r = .240$, $p > .05$). As a result, the hypothesis 6, 7, and 8 stating that attitude toward LMS, perceived usefulness and perceived ease of use were related to actual use were rejected.

Table 6: Intercorrelations among Variables

	Ease of Use	Usefulness	Actual Use
Attitude	.530**	.300*	.131
Ease of Use		.457**	.099
Usefulness			.240

*Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

PART III: RESPONSES FROM OPEN-ENDED QUESTIONS
Research Question 5: What are the difficulties faced by the instructors using LMS?

The first question asked the instructors to indicate any difficulties they were encountering when they used the system. Out of 41 instructors using LMS, the majority of them (n = 34) had no difficulty working with it. After the training, they were quite able to use the system. This may conclude that LMS was perceived by the majority of them as easy-to-use. However, seven of them identified some problems they were facing which comprised complicated functions of LMS, students' learning behavior and restriction of LMS use. First of all, four of them stated that the system is too difficult to operate. Low computer literacy might be the cause. They suggested that not only the instructors, but students also needed special training too. In addition, two instructors perceived that some students did not pay much attention to the downloaded materials in LMS; it was like a big burden for them. They were not responsible for the self-study that was assigned. The last issue which was raised by one instructor always using it in his class was limitation of LMS use. For instance, the discussion board was not convenient in case a lot of explanation was needed. However, despite all of these difficulties, they still used it.

Research Question 6: What are the main reasons why the instructors did not use LMS in their course and which technology they chose instead of LMS?

Based on the finding, 21 instructors replied that they did not use LMS. The second open-ended question asked these instructors the reasons why they did not use it in their course. The majority of them (n = 16) found LMS rather inconvenient when compared to other kinds of technological tools. For example, they preferred to use LINE, Facebook, blog and Twitter when they wanted to send homework, put up announcements, and communicate with students. Only four of them perceived complexity of the system, so they did not want to implement it in their course. Only one instructor did not see any benefits of using LMS in her course. This was not because the complexity of the system, but she preferred to have more face-to-face meeting than online communication in LMS.

DISCUSSION
The first discussion is about attitude toward LMS which was at a high level. One of the causes may have been from the potential of Moodle which can be effectively used for uploading materials and communication among

instructors and students. The replies from the open-ended question also supported that not many instructors encountered difficulties. Apart from that, there are many other elements which might affect their attitude such as subject contents, communication, and learning tasks. Although they did not have positive toward LMS, they needed a learning tool to help in the teaching process. For instructors who had no choice with other technologies, the use of LMS was an answer which enabled them to manage classes, making instruction easier.

The second discussion was on gender and teaching domain. Male and female instructors did not differ in their attitude toward LMS. Moreover, they had the same attitude no matter what subject they were teaching. A possible explanation for this result comes from the policy of the university that urged all faculty members to use technology in their courses. The use of computer technology as a tool for learning was fully supported by most of educational institutions, not only our university. The training may be helpful to make them know more about how to use the new system like LMS. The finding was in contrast to many studies (Anderson & Haddad, 2005; Dhindsa & Shahrizal-Emran, 2011; Li & Kirkup, 2007) which found that females demonstrated negative attitudes in using technology.

The next issue which should be discussed is about perceived ease of use which is found to have an influence on perceived usefulness. The finding was consistent with previous studies in that perceived ease of use had the strongest significant influence on perceived usefulness (Adwan et al., 2013; Shroff et al., 2011). We may conclude that comfort with LMS usage enables instructors to approach it. Then they perceive the benefits of it. The more they are comfortable with LINE, the more they perceive its usefulness. LMS is not a difficult tool after they are trained to use it. It is rather user-friendly. It allows users to put learning materials, chat or send messages whenever and wherever they are, so it can be applied to create interesting classroom activities. This result is supported by Jafari, McGee, and Carmean (2006) who state that LMS assists faculty in managing courses and organizing content to engage students and decrease planning time.

Another interesting finding revealed that perceived ease of LMS use and usefulness had a significant positive correlation with their attitude.This is probably because LMS are user-friendly technology. Only basic knowledge of technology is required. So, after instructors get training, they can make use of LMS in their course easily. Instructors find it convenient and accessible to learn materials anywhere and anytime. In the same vein, instructors recognize that LMS can facilitate language teaching and learning since they can upload the information about the course. LMS is one of the effective tools for communicating with students. Students' posting messages on discussion forum will be exposed to classmates. When they perceive it useful and easy to use, they feel positive about it. The current findings were found to be in accordance with those of the previous studies in that perceived ease of use had the strongest significant influence on attitude towards use (Chang et al., 2012; Park, 2009).

The last issue for discussion is on attitude toward LMS which was not correlated to actual use of LMS. The present finding was similar to that of Al-Senaidi, Lin, & Poirot, (2009). It is possible that users might use technology even if they did not have positive attitude toward it. This might be due to the fact that most of the courses were promoted to use technology tools to facilitate learning. Instructors have adapted themselves to the course redesign for quite some time. There are various tools they are using in their classes such as Facebook, Twitter, and LINE. So, even though they have positive attitude toward LMS, it doesn't mean they will adopt it in their classroom. The result was in accordance with the open-ended responses showing that instructors preferred to use other kinds of technology like LINE, Facebook, and Twitter in teaching and learning process. However, the current finding was found to be in contrast with many studies stating that attitude towards technology are key factors in the adoption and use of technology, specifically an LMS, by faculty (Lawler & King, 2003; Nasser, Cherif & Romanowski, 2011; Rogers, 1995).

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For Effective Use of Multimedia in Education, Teachers Must Develop their Own Educational Multimedia Applications

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ABSTRACT
This paper makes the strong claim that for multimedia to have any significant effect on education, the educational multimedia applications must be designed by the teachers of those classes. The arguments supporting this claim are presented in the headlines: curriculum, software, hardware and evaluation. The paper begins with an introduction discusses what is a multimedia and a multimedia authoring tools and describes some typical areas of multimedia application development. Finally the paper ends with the action plan and concludes that we must and need as educator to create our own multimedia applications if we really want to make use of the multimedia applications as an effective tool in education.
Keywords: Education, Learning, Multimedia applications, Software**,** authoring tools

INTRODUCTION

Since educators first began to use computers in the classroom, researchers have tried to evaluate whether the use of educational technology has a significant and reliable impact on student achievement (Clark, 1994; Kozma, 1994; Tennyson, 1994). Searching for an answer, researchers have realized that technology cannot be treated as a single independent variable, and that student achievement is gauged not only by how well students perform on standardized tests but also by students' ability to use higher-order thinking skills such as: thinking critically, analyzing, making inferences, and solving problems (Means, Blando, Olson, Middleton, Morocco, Remz, & Zorfass, 1993). Judging the impact of any particular technology requires an understanding of how it is used in the classroom and what learning goals are held by the educators involved, knowledge about the type of assessments that are used to evaluate improvements in student achievement, and an awareness of the complex nature of change in the school environment. Whether technology should be used in schools is no longer the issue in education. Instead, the current emphasis is ensuring that technology is used effectively to create new opportunities for learning and to promote student achievement. Educational technology is not, and never will be, transformative on its own, however. It requires the assistance of educators who integrate technology into the curriculum, align it with student learning goals, and use it for engaged learning projects (Carlson 2002). Darling-Hammond and Berry (2005) suggest that "For widespread change to occur, teachers need to incorporate the opportunities of the emerging technological infrastructure into their overall curricular thinking"(P.199). The role of the classroom teacher is the crucial factor in the full development and use of technology in the schools (Trotter, 1999).

When educators use the accumulating knowledge regarding the circumstances under which technology supports the broad definition of student achievement, they will be able to make informed choices about what technologies will best meet the particular needs of specific schools or districts. They also will be able to ensure that teachers, parents, students, and community members understand what role technology is playing in a school or district and how its impact is being evaluated. Finally, they will be able to justify the investments being made in technology.

MULTIMEDIA

According to (Sethi, 2005); (Mayer, 2001) Multimedia refers to the integration of two or more different information media within a computer system. These media can include text, images, audio, video, and animation. Vaughan (2011) defined multimedia as a combination of digitally manipulated text, photographs, graphic art, sound, animation, and video elements.

In this context multimedia can be thought of as a combination of text, graphics, sound, animation and video delivered by some form of computer. When the user has some control of what is presented it becomes interactive multimedia. Multimedia does not have to be interactive, for example a tutorial may just involve the student pressing enter to go on to the next screen in a linear fashion. The tutorial would become interactive if the student affects the tutorial, for example if their answer to a question determined which screen came up next (Vaughan 2011).

Before producing any application you should be very clear about why you wish to produce it and what you expect to gain from it. Spend time finding out what other courseware is already available in your subject area. There may be suitable courseware already available or similar courseware may be available that you can modify. Modifying an existing program or using a tutorial shell will greatly reduce the programming effort required, and may provide you with a good quality user interface that has already been through a testing and evaluation cycle with students.

MULTIMEDIA AUTHORING TOOLS

Any software, or collection of software components, that authors can use to create or modify multimedia content for use by other people, is a multimedia authoring tools (Sethi, 2005). Vaughan (2011) defines authoring tools as "These software tools are designed to manage individual multimedia elements and provide user interaction" (Vaughan 2011, p.2). In the development of educational software, an authoring system is a program that allows a non-programmer to easily create software with programming features. The programming features are built in but hidden behind buttons and other tools, so the author does not need to know how to program. Generally authoring systems provide lots of graphics, interaction, and other tools educational software needs. Sethi (2005) classified in three categories based on the metaphor used for sequencing or organizing multimedia elements and events.

1. Card or page based tools
2. Icon base, event driven tools
3. Time base and presentation tools

Depending on the educational multimedia application which is to be developed, what information is to be conveyed, who the audience will be, and how much interaction there will be between the application and the user, an appropriate tool can be chosen. Educational multimedia applications can be subdivided into four typical educational multimedia application areas:

- Text-Based applications
- Interactive applications
- Web applications
- Mobile (Smart) phones applications

Text-Based Applications

Many multimedia applications provide efficient navigation through a large resource of primarily text-based information. These applications need to be searchable so that relevant information can be found easily and quickly. Development tools, which cater to this type of application generally, provide hypertext capabilities. Hypertext is similar to regular text, except that it contains information pointing to another point in an application. Microsoft Windows Help is an example of a hypertext, searching program. Some form of an overview, table of contents, or map of the information available in such an application helps the user to navigate efficiently. These applications can also often handle embedded images, sounds, and movies, which make them true educational multimedia applications.

There are specific tools which provide good development environments for text-intensive applications. Microsoft's Multimedia Viewer is a sophisticated information viewer with multimedia, hypertext, and sophisticated search capabilities. Adobe Acrobat is another text-based package which is hypertext-capable, but has limited search capabilities. Both of these packages provide an overview of the content, to guide the reader through the maze of information, and allow importing existing word processor documents. All multimedia applications are capable of storing text and moving through quantities of it, but some tools are specifically designed to work more efficiently with large volumes of it.

Interactive Applications

The majority of educational multimedia applications fall into the category of interactive, graphical applications. These applications are fully capable multimedia tools which can handle all media formats, as well as providing interactivity with the user. It is also offer a very high level language or interpreted scripting environment for navigation control and for enabling user inputs This is often desirable in an education setting as it provides the ability to allow specific feedback to a user, keep track of results, and customize the application to a specific user as a function of responses. Although most applications provide these capabilities, some are better suited to complicated, interactive applications than others.

Authoring tools, which cater to this type of application generally, included programing future, commands and functions provided in the scripting language. IconAuthor from AimTech Corporation, Macromedia Director, Macromedia Flash from Macromedia, the Apple Media Tool Programming Environment from Apple, and

Course Builder from Discovery Systems are professional-quality, sophisticated multimedia packages, but are also quite expensive. Development packages like SumTotal Systems Multimedia ToolBook, and Claris Corp's Hypercard are very capable development tools which cost significantly less. The goals of the multimedia project must provide the specific criteria for choosing between several development tool alternatives. This often requires first-hand experience with the development environment to assess the tool's capabilities and example applications

Web Applications

A new area of educational multimedia applications is emerging with the purpose of providing information to an audience over a wide geographical area. This is in part being made possible via the Internet in conjunction with new content management system (CMS). These systems compose an information distribution system providing services to 10-20 million people from commercial and academic organizations. Browsers are capable of retrieving information from all over the world via the Internet in the form of text, graphics, sounds, and movies.

One of the important capabilities of the CMS is its support of hypertext, which allows users to maneuver quickly from one page to another with the click of a button. There is an enormous wealth of information available on the Internet, and contributing to this body of information is, in essence, providing multimedia access to information. One of the serious drawbacks of this web technology is its lack of organization. There is a tremendous amount of information available, but finding information you are interested in can be difficult. If a multimedia application is to be implemented with a geographically diverse, academic audience as its recipients, this technology is very suitable.

Information is made accessible on the World Wide Web using a mark-up language called HTML (Hyper Text Markup Language). This language provides the common protocol for providing rich-formatted text, embedded graphics, sounds, movies, and hypertext. More recently there has been the development of image map, and forms fill-out technology. Image mapping allows selected regions on an image to contain link which, when clicked, take the user to another document. The fill-out forms function allows user feedback through fields, buttons, and drop-down menus. This information is relayed to the originating server where it is subsequently processed. To provide documents on the Internet with these capabilities requires setting up a World Wide Web server, and composing documents in HTML. One of the tremendous benefits of this system is that a user can gather information free of charge, as long as Internet access exists. The cost to the information provider is the hardware cost of the server itself, and the time devoted to creating and updating HTML documents. This is quickly becoming the standard method for providing many types of information to a wide-area audience.

Mobile (Smart) phones Applications

Gale research group define mobile phone as an electronic telecommunications device that can make and receive telephone calls. It connects to a wireless communications network through radio wave or satellite transmissions (Gale Research, 2008, p. 658). Nowadays, in addition to telephony, mobile phones support a wide variety of other services, such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), multimedia applications, gaming and photography. Mobile phones are also used to play all types of multimedia, e.g. play sounds, view images and watch videos. Mobile phones that offer these and more general computing capabilities are called smart phones. Mobile Applications are the software that runs on a mobile device and performs certain tasks for the user of the mobile phone. Applications may include Games, Web Browser, Camera, Media Player, Social Networks, Calendar, Calculator, Image Viewer, etc.

There are many Mobile multimedia authoring tool enables non-programmers to build and to create educational multimedia presentations for the different handset devices: Nokia, Samsung, LG, RIM and Apple devices (iPhone/iPad).

Emantras, a company that develops online and mobile educational tools, has officially launched Mobl21, a platform for creating, managing and distributing educational content to the web and mobile devices. Mobl21 is an educational application created to facilitate mobile learning by complementing current learning methods. Available as a mobile app, desktop widget or web application, Mobl21 provides users with access to customizable learning material, which can be accessed anywhere. Mobl21 targets individual students and teachers, as well as institutions like colleges and universities. Each account allows users to create educational content like study guides, flash cards or quizzes, then manage the content to specific groups and, finally, publish it to mobile devices or social networks. Another example of a Mobile multimedia authoring tool is Wapple Canvas. It is a design and publishing platform, enabling the development of highly functional, creative and scalable educational mobile websites.

WHY DO WE NEED TO CREATE OUR OWN MULTIMEDIA APPLICATIONS?

For most of us working at small educational institutions (Schools, colleges, educational centers) where resources are few, money is scarce, time is limited, and professional multimedia developer team is virtually an impossible feat. "The development of educational multimedia inevitably requires the commitment of substantial amounts of time and money. Both are typically in short supply in educational institutions." Albion (1999, p.9).

In the absence of a limited number of skilled team members, we have to make a decision: should we dismiss designing multimedia applications altogether, or should we undertake the difficult challenge of acquiring some of the basic multimedia skills. Research has shown that Different students learn better in different ways; there are visual learners, tactile learners, and auditory learners. Also, different subjects and topics are often more understandable when taught in different ways. The use of several media of instruction facilitates the movement of information from short-term memory into long-term memory (Pashler, McDaniel, Rohrer, Bjork, 2008). Some students do well with the tried and true method of direct instruction, but the majority of students do not. To reach the majority of students, the teacher needs to create a variety of learning experiences. Thomas B. Corcoran (1995) puts it this way "To meet these new expectations, teachers need to deepen their content knowledge and learn new methods of teaching. They need more time to work with colleagues, to critically examine the new standards being proposed, and to revise curriculum. They need opportunities to develop, master and reflect on new approaches to working with children "(p.2).

The first and most simplistic way is to use technology and multimedia applications to supplement classroom instruction. Technology and multimedia applications will help meet these demands is by allowing students to interact with information within a different medium. An educator involved in multimedia applications development faces two significant problems. The first is why we need to use and create multimedia applications? And the second involves how can we design multimedia applications? I should say right away that I will not be discussing this second problem here. The strong claim of this paper is that for multimedia to have any significant effect on education, the material taught must be designed by the teachers teaching these classes. The arguments supporting this claim are presented below.

Curriculum

The first and most obvious issue for creative work in multimedia is how to integrate such work into the present structure of the national curriculum.

According to Bloom's Taxonomy, as children move through the hierarchy of learning, their studies should progressively move towards developing higher level thinking skills (Anderson, Krathwohl, David, 2001).

According to Andresen & Brink (2013) Multimedia applications can facilitate this process when integrated within the existing curriculum. The days of spending hours mulling through over a dozen hard-copy books looking for information for a research project are left behind our day. With Multimedia applications, students can shift their focus from acquiring information to the task of hand - synthesis, analysis and presentation of information. Both roles of the teacher and student have changed dramatically over the last 25 years. In the traditional model of education, the teacher was responsible for disseminating information to students. The students' primary responsibility was to consume and retain as many of the facts and figures as they could. "Teachers get new competencies and new roles in a multimedia-learning environment. Besides having a broad knowledge base, teachers have to offer pedagogical guidance and supervision by inspiring, motivating and guiding students in their search for knowledge "(Andresen & Brink , 2013, p.13).

The most successful students were those who could memorize and regurgitate information in a variety of format writing papers, oral reports and tests. However, we have recently discovered that these types of skills do not always prepare our students for their professional lives. For a student to be successful in today's job market, they must be able to assess and analyze information, not merely memorize. Businesses are looking for independent thinkers, not mindless robots. Educational Multimedia applications are not, and will never be, transformative on their own. It requires the assistance of educators who integrate Multimedia applications into the curriculum, align it with student learning goals, and use it for engaged learning projects. As instructors, we must realize this fact and adjust our curriculum accordingly.

Software

One barrier to multimedia integration is the difficulty many teachers face in finding and using appropriate software for instruction (Glenn, 1997). Teachers at novice or apprenticeship stages of technology integration may need guidance in locating multimedia software and Internet sites to support the school's learning goals, either because they are unfamiliar with these media or because they feel overwhelmed by the profusion of

software on the market and sites on the Internet. Teachers may lack some personal skills and time to make good decisions about what particular applications or sites have the potential of reinforcement the learning goals. (Glenn, 1997). This can make multimedia integration a frightening prospect.

According to (Glenn, 1997) Finding and using the right software or courseware for instruction is a difficult task. The number of high-quality multimedia applications has increased, and there is a wider variety; however, it requires an understanding of how it is used in the classroom and what learning goals are held by the educators involved. Whether educational multimedia should be used in schools is no longer the issue in education. Instead, the current emphasis is ensuring that multimedia is used effectively to create new opportunities for learning and to promote student achievement. There are numerous multimedia applications designed to meet the special needs of diverse learners, but most of the commercial educational multimedia applications until now don't easily lend themselves to a constructivist approach. The layered design frameworks proposed by Taylor (1997) argue that:

> Most user, multimedia designer, and educators would agree that all the multimedia applications in the market represent very difficult types of applications. However, most people would probably have a difficult time cogently explaining why they are different and, more importantly, the implications of these differences both for effective use and for future design practice." (Taylor, 1997, p. 215).

How can we decide which applications are appropriate for a specific group of learners?

Another problem is that commercially available software is owned by PC manufacturers or its distributors and is protected by Countries copyright laws and international treaty provisions. Most software licenses specify that the original purchaser of a software program may make one archival copy solely for back-up purposes. It is illegal to make extra copies of a program for use by students or other teachers within a school or district, unless specific written permission from the publisher or copyright holder is obtained. Most of the education institutions have limited fun to purchase such software In order to promote ethical use of educational software; educational institutions need to develop there owns educational software.

Evaluation

In the interests of ensuring that resources are used to best effect it is important to ensure that both the processes and products of multimedia development are evaluated (Albion 1999). Researchers (Draper 1996, M. Kennedy & McNaught 1997) have indicated that a formative, iterative design process, which involves students, produces more useable and effective IMM. Draper (1996) argued that, one important use of evaluation is while it is being developed: testing it on learners while there is a still resource for modifying it. He points out that "The most realistic, and so most helpful, formative evaluation would use real students in their normal learning situation" (p. 61). It is in general best to base evaluation on actual learning by representative students who really want to learn". He also points out that formative evaluation increase the time for the whole cycle of production, testing, and modification. Most of the commercial multimedia applications depend on the summative evaluation, and that evaluation is not expected to have any direct effect on the applications itself by telling the authors how to improve it. This is not the case with multimedia developed by a teacher.

Hardware

There are several educational multimedia applications for all the computing platforms (Windows - PC, Macintosh, and UNIX.) Generally it is best if the application is created on the same platform it will be used on. This eliminates problems, which tend to arise during the conversion of applications from one platform to another. Some multimedia developers provide software for several different platforms. The ability for multimedia applications to be transferred to a different platform varies. With some tools this function can be performed automatically, while with others, an additional piece of conversion software is required. Of course a more costly and capable machine is required. From this perspective the key IMM investment is not in equipment, but in the knowledge and skills of staff to make use of what is available. (Vaughan 2011)

Several financial decisions need to be made concerning the computer system, and extra hardware needed to produce a multimedia project. The hardware requirements of the computer system being used for development will be determined by the sophistication of the application being developed. If the full range of multimedia types (images, sounds, animations, and movies) are to be included, a more costly and capable machine is required. On the other hand, projects which provide exclusively text-based information can be implemented on a system requiring fewer extras, and therefore will be less expensive. I absolutely agree with Fred Riley (1995) when he stated that:

> This is particularly the case in the academic sector where the provision of microcomputers for staff and students is a significant item of expenditure and one, which the institution is not likely to want to repeat every 2 or 3 years. For this reason courseware developers should think very carefully about which multimedia elements to incorporate into applications and only include those which have significant value. (Riley, 1995, p. 6).

ACTION PLAN

The educational institutions staff, administrators, teachers, and parents and community members can take the following steps to promote developing educational multimedia applications within the academic community at educational institutions:

- Professional development for technology use should be an integral part of the school technology plan.
- Initial inclusion in the technology plan ensures that professional development is considered an essential factor in using technology to improve teaching and learning.
- The multimedia development effort on educational institutions should be consolidated and organized to increase the efficiency with which applications can be developed, and to share technical and artistic knowledge among staff members and students.
- Staff members should be made aware of the capabilities of multimedia tools within the learning environment and should be encouraged to use them, and guided in their use.
- Staff members should be educated on the importance of selecting an appropriate multimedia development tool, the challenge of incorporating various media into a production, and the balance, which is necessary between the content, presentation, and programming of an application.
- Communication between academic institutions should be improved to facilitate the sharing of multimedia applications, which have been and are being developed, to avoid repetition of application creation, and to distribute computer-based learning knowledge more widely.
- Educational institutions should find additional financial resources.

CONCLUSION

Educational institutions must recognize that the world has changed. Educators and students have needs that our current delivery system is not meeting. We face financial constraints that will not quickly disappear, as well as both global and private competition. Doing more of what we are currently doing will not solve these problems. To survive these challenges, we must find new ways to deliver education to our students. Developing our own multimedia applications can contribute to solving some of these problems, if we really want to make use of multimedia applications as an effective tool to enhance learning.

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Integrating Computer-Assisted Language Learning in Saudi Schools: A change model

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ABSTRACT
Computer-assisted language learning (CALL) technology and pedagogy have gained recognition globally for their success in supporting second language acquisition (SLA). In Saudi Arabia, the government aims to provide most educational institutions with computers and networking for integrating CALL into classrooms. However, the recognition of CALL's efficacy does not translate into easy acceptance and integration in English as a Second Language or English as a Foreign Language (ESL/EFL) classrooms in Saudi schools, particularly where teaching of both English language and information and communication technologies (ICT) is subject to religious and cultural constraints. There are other barriers that impede native Arabic speakers from learning English. Accordingly, the research question addressed in this paper is an exploration of the overt and covert factors that affect CALL use and integration in Saudi Arabian secondary schools. A case study approach using mixed methods was employed to interview and observe a sample of teachers and school inspectors in urban and rural secondary schools. Results were supplemented with an online questionnaire and analysed using both descriptive statistics and thematic analysis.

The findings lead to recommending a model to address the covert and overt issues identified, and provide systematic support for integrating CALL into Saudi Arabian English language classrooms.
Keywords: CALL, English language teaching, Saudi Arabia, second language acquisition

INTRODUCTION

The Saudi Ministry of Higher Education (2011) in Saudi Arabia is aware of the need for its citizens to be at an educational and linguistic par with peers in leading nations in order to actively participate in international dialogue, employment, and trade. The government has announced various initiatives to address the problems of uneven education and prepare its citizenry for employment opportunities in international corporations (Oxford Business Group, 2010). However, the most pressing issue is to improve the ability of Saudi students to communicate in other languages. No exchange of dialogue, trade or employment can be successful unless Saudis can communicate with others around the world and, to do so, they need a high degree of proficiency in English.
Khan (2011) and Oyaid (2009) argue that Information Communication Technology (ICT) is an essential element of education, especially in the field of language learning and teaching. Computer-assisted language learning (CALL) technology and pedagogy have gained recognition internationally for their success in supporting second language acquisition (SLA) (Lambropoulos, Christopoulou, & Vlachos, 2006). According to Mahdi (2013), the Saudi government is committed to providing most educational institutions with computers and networking for CALL.

There has been considerable research into barriers to the use of technology and current technology acceptance models (Anderson, Groulx, & Maninger, 2012). Several models such as the technological pedagogical content knowledge (TPACK) model and the technology acceptance model (TAM) have been created to improve and understand the use of technology (Alsofyani, bin Aris, Eynon, & Abdul Majid, 2012). The research leading to the development of the TPACK and TAM models provides a foundation for analysing technology acceptance in English language classrooms.

Integrating CALL into schools requires planning and effort, particularly given the cultural and attitudinal barriers to its adoption (Al-Kahtani, & Al-Haider, 2010)(Al-Kahtani & Al-Haider, 2010). This research investigated the barriers to incorporating CALL in EFL classrooms and the expectations surrounding the use of such technologies. The aim was to create a model for integrating CALL more comprehensively based on identifying the needs of the Saudi educational context. Exploring the main factors affecting CALL use was the initial step to

understanding the extent of CALL's integration, and thus a basis for developing a model for supporting the Ministry of Education's implementation of this pedagogy.

LITERATURE REVIEW

Integrating computer-assisted language learning (CALL)

The continuous and rapid developments in ICT and education, along with changes in the pedagogy of SLA, have led to many changes in CALL, its implementation and integration. Several typologies of CALL development have been undertaken (Bax, 2003; Warschauer, 1996; Warschauer & Meskill, 2000) with the latest version by Bax (2003) identifying the eventual objective of CALL as 'normalisation'.

Discussing the future of CALL, Bax (2002; 2003) suggests the concept of 'normalisation' as a central aim for CALL practitioners to strive for. He notes that the state of normalisation will have been achieved when computers are an integral part of every lesson and other aspects of classroom life,

> *like a pen or a book without fear or inhibition, and equally without an exaggerated respect for what they can do. (p.23)*

He goes on to say that he believes that the new agenda for the future should involve planning for normalisation and then moving towards it by taking the following steps:
a) Identifying the criterial factors which normalisation requires;
b) Auditing the practice of each teaching context in the light of these criteria;
c) Adjusting our current practice in each aspect to encourage normalisation.

To achieve normalisation in any educational context, numerous factors need to be considered. These differ from context to context, of course, but might include improvements in the size, design, and location of the technology, as well as reorganisation of other physical aspects of the educational setting, timetabling and so on.

Lankshear and Knobel (2007) note that young learners in the developed nations have a new attitude to life that is fundamentally different from conventional attitudes, and is enhanced by a sense of reality that extends to virtual space. Blogging, online chatting, online gaming, iPods, smartphones and instant messaging are all normal activities. According to Warschauer and Meskill (2000), these digital tools promote the socio-cognitive pedagogy for CALL by emphasising the value of communicative and interactive instruction in authentic contexts.

Numerous studies have shown that the mere availability of technology does not guarantee its effective use and integration in education. Yet the material availability of the technology and access to it are prerequisites for its incorporation into classroom activities.

Teachers' attitudes towards technology and their skills in using it are also crucial in determining instructional choices for normalising CALL (Kreijns, Van Acker, Vermeulen, & Van Buuren, 2013; Elsaadani, 2013). According to Sardegna (2015) The top three factors affecting participants' computer use were limited facilities, time, and computer knowledge.

Zaid (2011) and Oyaid (2009) stated that provision of resources, motivation and training issues are among the key challenges still faced by introducing CALL in Saudi Arabia. Covert barriers to use include negative attitudes toward the internet and CALL.

Moreover, Al-Amr (1998), and Saqlain, Al-Qarni, and Ghadi (2013) mentioned that the easy availability of images of women, and discussion of taboo subjects (such as dating and sexuality) have led some Saudis to believe that the internet promotes anti-religious and anti-cultural morality.

Pelgrum (2001) and Al-Kahtani (2007) have classified barriers to CALL as material/overt and non-material/covert. These barriers are somewhat different in the international and Saudi contexts, as illustrated in Table 1.

Table 1: Barriers to CALL

Barrier	International Context	Saudi Context (Al-Kahtani, 2007)
Material / Overt	1.insufficient number of computers or copies of software	1. accessibility, i.e., difficulties in accessing the internet, computers, technical support. 2. training – this is a major issue as both teachers and students require specific skills.
Non-material / Covert	1.teachers' insufficient ICT knowledge and skills, 2. the difficulty of integrating ICT in instruction, 3. insufficient teacher time	1. negative attitudes of teachers toward the internet and CALL.

The restricted Saudi educational setting.

Educational policies in Saudi Arabia are under direct government regulation (Oyaid, 2009). National curriculum, syllabi and textbooks are identical across the country. The management of education is controlled through two main organisations, namely, the Saudi Ministry of Education (MOE) and the Ministry of Higher Education (SMHE). The MOE is responsible for the country's educational policy. Education is mandatory for all children from six to fifteen years and most study in government schools (Oyaid, 2009). The MOE introduced a ten-year plan in 2004 to reorganise its schooling system, introducing state projects for ICT in schools, along with teacher training and improvement to achieve the essential skills (Saudi Ministry of Education (MOE), 2004).

The new curricula aim is to assimilate ICT in education and cultivate students' skills and encourage creativity and analytical thinking to fulfil the needs of all students" (Tatweer, 2008). Integrating ICT and education is the new official mantra in developing a modern educational system that will enable Saudi Arabia to be on an educational par with other technologically advanced nations. Oyaid (2009) argues that the uncertainty and ambiguity of high-level ICT policies hampers CALL integration.

CALL in Saudi Arabia and the Arab world.

ICT was introduced in the Saudi education system in the 1990s, and has expanded in the last 20 years. Initially, it was used merely as an administrative tool but by the mid-1990s, computer studies were introduced as part of the secondary school curriculum (Alshumaim, & Alhassan, 2010).

Studies in Saudi Arabia and the Arab world more generally have found that there was a marked improvement in writing skills when the learners used computers versus traditional methods (Alsouki, 2001). Al-Qomoul (2005) found that using an instructional software programme for English language learning greatly enhanced students' performance in comparison to traditional methods. Likewise, Al-Abdel (2009) substantiated the efficacy of CALL in improving Jordanian secondary learners' reading comprehension abilities. Bataineh and Bani Hani (2011) piloted a study examining the probable effect of a CALL programme on Jordanian sixth-grade learners' success in English. The results showed that language acquisition is greatly affected by the means of instruction, as there is noticeable variation between the successes of traditional and CALL instruction, in favour of CALL.

METHODOLOGY

A pilot study with a small sample size (24) of Saudi teachers and MOE inspectors in region Q was undertaken to explore the extent to which CALL has been adopted, and to identify barriers to its integration into secondary school language classes.

Quantitative and qualitative data were collected through an online questionnaire and semi-structured interviews with 22 English teachers and 2 MOE school inspectors. Interview findings were triangulated with the questionnaire results and classroom observations in both rural and urban secondary schools. Semi-structured interviews included questions around themes such as comfort in using new technology, availability and access to CALL, the effects of the internet, and personal attitudes toward CALL use.

Survey data were collected electronically through the "SurveyMonkey" platform and transferred to SPSS version 21 where descriptive statistical analyses were performed. Free text questions were analysed using thematic analysis (recognition of patterns and recurrent themes), a framework outlined by Braun and Clarke (2006). The findings were then tested against existing models for CALL integration and technology acceptance and collated to form an emerging model for CALL integration in Saudi Arabia.

FINDINGS

Demographic Data

The majority of EFL teachers were male and ranged from 25–40 years. At least 70% of the respondents were older than 30. Most teachers had at least six years of teaching experience and just over 76% were employed in city schools; 82% held a Bachelor's degree. Despite some respondents holding a Master's degree, there was no significant correlation between education and age.

Computer access in schools

Over 80% of respondents reported having no internet access in their classroom, while slightly under half (45.5%) reported that students had access to a computer laboratory. Just over a third reported that students had access to Wi-Fi technology at the school and just under a third had a data projector in their classroom. The range and extent of technology available is indicated in Figure 1.

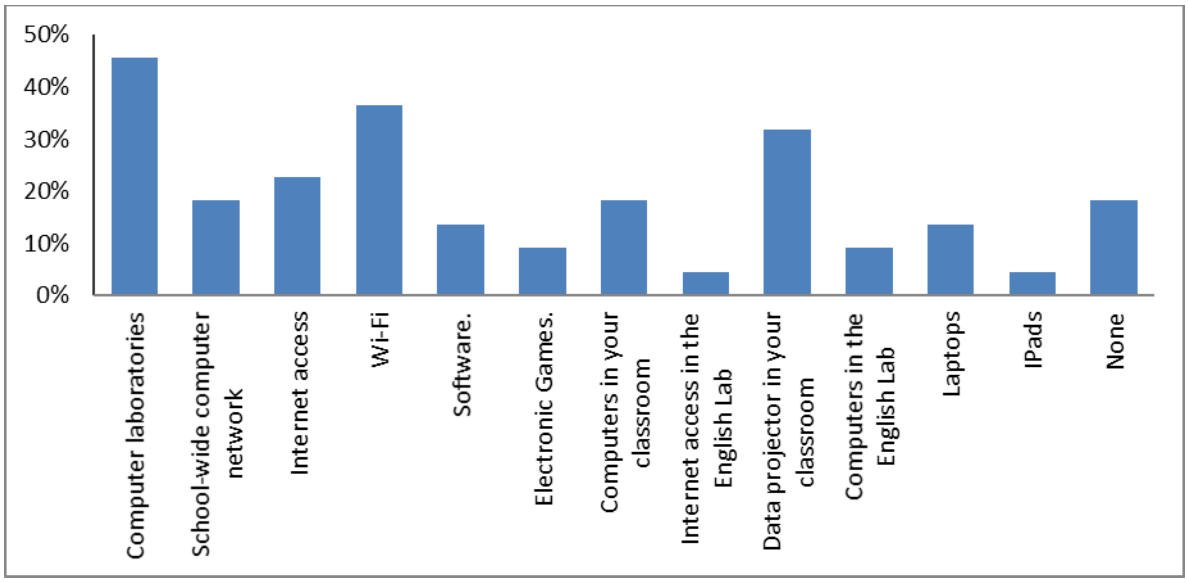

Figure 1: Information on ICT equipment available at the schools

Over 70% of respondents reported that they used the computer to prepare material in their classroom. Close to a third (31.8%) reported using the internet to communicate with their students. The availability of computer facilities for students after class time was low with less than 30% of respondents reporting accessibility. In addition, just over 20% of respondents expected students to use any available computer facilities. Finally, a number of other factors were reported as limiting the use of CALL including lack of computers, lack of training and lack of technical support. Cross-tabulation of data revealed that city schools had greater access to ICT than rural schools, a trend which was true for all ICT amenities. Location of the school greatly influenced ICT access.

ICT training

Slightly over 36.4% of respondents had undertaken any form of ICT training. Of this group, slightly over a quarter completed training prior to their service as an English teacher (27.8%), another quarter had completed in-service training (27.8%), and the remaining proportion had had both pre-service and in-service training (44.4%). Notably, close to half of respondents (45.5%), who had undertaken ICT training, did so at a private training centre but less than half (45%) had completed any training within the last three years. Of those without any ICT training (63.6%), nearly three quarters cited 'lack of MOE encouragement' for not doing so. Cross-tabulation of data showed that most of the trained teachers were under 30 years old. Again, location had an impact on training, with more city teachers having training than their rural colleagues.

Computer skills

Teachers' computer skills were very disappointing, with half to two thirds being unfamiliar with basic ICT skills. Making educational CDs, using emails for communication, distributions, chatting, and so on were all activities out of reach for most EFL teachers, and especially those in the rural schools.

Ministry support

Respondents were asked to rate the amount of support provided by their school / the Ministry to help them use CALL in their teaching. Table 2 provides a summary of the results.

Table 2: English teachers' self-reported ratings on MOE support

Statement	Not at all (%)	Slight (%)	Moderate (%)	High (%)	Total (n)
Technical support	50.0	27.8	16.7	5.6	18
Financial support 1: grant projects	66.7	16.7	5.6	11.1	18
Training support	56.3	31.3	12.4	0.0	16
Leadership	44.4	38.9	11.1	5.6	18
Financial support: support, awards for and award to innovative teachers	66.7	16.7	5.6	11.1	18
Planning	58.8	11.8	11.8	17.6	17

Teacher's' attitudes

Teachers' attitudes toward CALL were ambivalent, with most recognising the efficacy of it as a training tool but still fearing its impact on Saudi culture and their future as EFL teachers. Location did have some impact on the attitudes of teachers; rural teachers were more worried about cultural damage and being replaced by computers.

Table 2: English teachers' attitudes about using ICT in teaching and learning the English language

Statement	Strongly Agree (%)	Agree (%)	Not sure (%)	Disagree (%)	Strongly disagree (%)	Total (n)
CALL is not better than any other traditional teaching.	23.5	0	41.2	11.8	23.5	17
CALL could help enhance the quality of language teaching and learning.	41.2	23.5	17.6	5.9	11.8	17
CALL will enable language teachers to address their students' individual needs in a better way.	23.5	23.5	23.5	17.6	11.8	17
Computers and IT-related technologies will replace language teachers in the future.	31.3	31.3	18.8	18.8	0	16
Computers will allow students to access possible culturally incorrect contents on the internet.	29.4	47.1	5.9	5.9	11.8	17

Qualitative Findings

Classroom observation

Two EFL classrooms were observed to gain an insight into the actual classroom practices adopted by teachers. Both classes were observed four times over a four-week period; both were in city schools and had 22 to 25 students. Only one class (at school A) had a data projector and computer for the teacher's use only in the classrooms, while the only computers in school B were in the computer lab, and were only used by the computer science teachers. Both teachers used only PowerPoint slides for EFL teaching; one already had a data projector and the other used his personal laptop and projector. The class in school A used PowerPoint frequently, two to three times a week – whereas the teacher in school B used PowerPoint only two to three times in a term. The teachers primarily used grammar translation methods for teaching. There was no use of technology by students inside the classrooms in either school. Moreover, there was no motivation by the schools' principals to encourage teachers to use the technology.

Teacher interviews

Analysis of the two English teacher interviews revealed some preliminary themes. Teachers claimed that when they used slides or short movies, the students were more interested and learned more easily. However, these were the only ICT activities used in class. There was no other CALL use in teaching. They mentioned that there were no suitable CALL English programs/software for students.

Both teachers noted that most of their students had smartphones or tablets yet neither used ICT to contact their students outside school, nor did they assign any CALL exercises for lack of suitable programs.

Interviews with inspectors

Two inspectors from the MOE were interviewed about their opinions on CALL integration in secondary schools. Both inspectors were dissatisfied with the state of CALL. Both agreed that the main fault lay with the MOE itself for being unable to provide the necessary hardware and training.

Although the inspectors agreed that CALL was an extremely efficient teaching tool, they accepted that the MOE did not specifically provide ICT to EFL classrooms and were more interested in the integration of ICT within education more broadly. The inspectors asserted that most teachers preferred traditional teaching methods and, although a few teachers did recognize the importance of CALL, they were hampered by lack of hardware and software.

Requirements cited for CALL integration by the inspectors included a clear plan to integrate CALL, computers and new ICT equipment, teacher training, technical support and a new measurement form to encourage teachers to use CALL. These elements comprise part of the emerging model for CALL integration in Saudi Arabia proposed below.

It is clear that the MOE has not yet established any parameters for CALL in English departments. And because basic performance measurements neglect CALL, there is no motivation for teachers to integrate it. This leaves supervisors with no tools to enforce CALL adoption in classrooms.

DISCUSSION

Findings from the pilot study have established many factors that are hampering the integration of CALL in Saudi secondary schools. Some factors are covert, such as the negative attitudes held by some teachers and lack of motivation at the MOE. Despite some fears regarding wrongful usage, many teachers use personal laptops to access multimedia. As most teachers noted that almost all students had smartphones or tablets, a lack of technological engagement in general cannot be the reason for the lack of engagement with CALL. There is also a definite lack of high-level incentives for the MOE and, to some degree, the school administration to integrate CALL more effectively.

Further covert issues elucidated by Al-Rojaie (2011) include lack of pedagogical knowledge and sufficient training in both teaching English and ICT. Furthermore, we find that CALL in EFL classrooms is not encouraged by the MOE insofar as teachers have to follow a strict format that does not include CALL but focuses on passing examinations. As one teacher noted, there are no digital or e-books to follow and there is no school website where students can log on and learn/communicate. These two constraints, in addition to the overt factors, have led to the negligible adoption of CALL.

This study also found that the overt factors, e.g., lack of computers and software detailed by Al-Kahtani (2007) and Pelgrum (2001), are among the reasons for failure to integrate CALL. Despite teachers and students having personal access to ICT – smartphones, tablets and laptops, they are unable to integrate CALL because of both overt and covert constraints. Far from providing ICT to all schools, the MOE is unable to maintain computers in the schools that do have such facilities. Furthermore, there is no effort being made to provide suitable software to teachers or enable them to search for or create their own programmes through training and removal of contextual constraints. These constraints are not linked to lack of funding or interest at the top level; it was established earlier that the SMHE (2011) is making a concentrated effort to improve EFL in Saudi Arabia. As such, the study has found the need to further investigate the discrepancy between the proposed ideals of encouraging EFL/CALL and its implementation. It is propose that a model for CALL implementation should be developed which will ease CALL integration at the ministerial, administrative and school levels, bringing it eventually to the students' home as well as classroom. The study also found that three elements should be consider before introducing CALL to Saudi schools, namely religious issues, cultural issues and political issues.

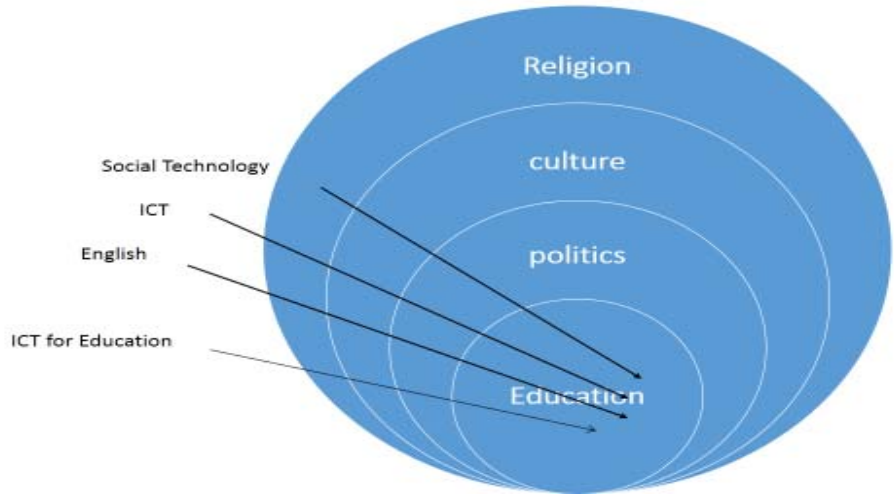

Figure 2: The three main elements that should be addressed before introducing any new technologies in Saudi Schools

CONCLUSION

Findings from the pilot study have indicated that the following emergent model may be useful in addressing the covert and overt issues identified (Figure 3). This model will be further tested, developed and refined during a subsequent study to ascertain its value in removing the barriers to CALL and providing support for integrating CALL.

This model includes the barriers discussed above that affect CALL adoption. These will be explored further with the aim of identifying possible solutions to mitigate them and making the model suitable for integrating CALL in the Saudi context.

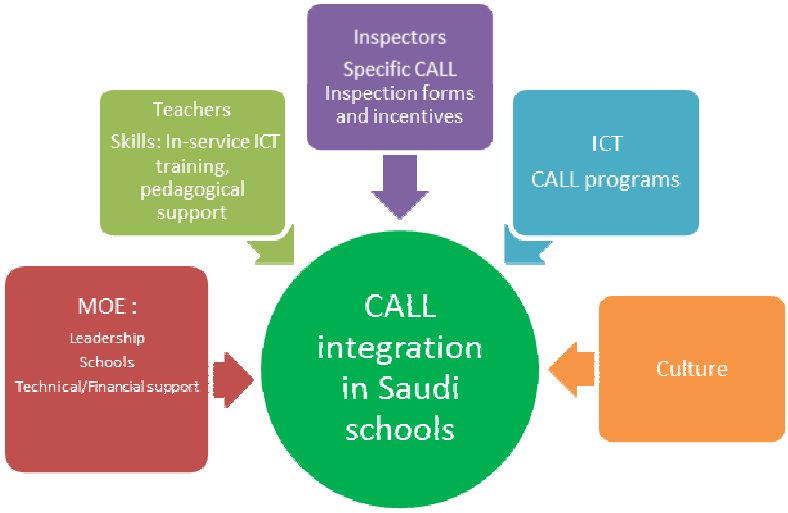

Figure 3: Integrating CALL in Saudi schools: An emergent model

Implementation of the proposed model will require several steps. The first is to provide specific plans and identify the organisational processes necessary to providing computers and software to schools. Second, Saudi Arabian educational policy makers need to be made aware of the importance of co-ordinating training efforts to make them more accessible to teachers and allay their fears of being replaced by CALL. Third, teachers' pedagogical role in CALL environments needs to be re-focused away from being 'dispensers of knowledge' to being knowledge facilitators. Not only computer education but also pedagogical training is necessary to instil confidence in EFL teachers and motivate them toward incorporating CALL into their pedagogy. Culture is also one of the factors that should be addressed before integrating CALL.

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Integration of Technology Enhanced Learning within Business Organizations: Which Strategy to Choose?

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ABSTRACT
The article discusses a responsible and a responsive strategic organizational approach for a smooth integration of technology enhanced learning (TEL). A response to external and internal contingencies and an involvement of different stakeholders into the development and implementation of the so-called eLearning strategies is one of the approaches which may facilitate TEL integration within different types of organizations. A survey carried out in 2014 in sought to investigate how employees perceive and accept organizational strategies and organizational approaches to TEL integration. Research results helped to identify the most sensible areas for eLearning strategies developers and to highlight responsible and responsive approaches for TEL integration. The framework parameters for TEL integration discussed and analysed in the article may serve as a scientifically approved benchmarking tool for organisations which are in the process or planning to integrate TEL.

INTRODUCTION
Technology enhanced learning (TEL) does not have a commonly accepted precise definition. According to Kirkwood and Price (2014) the term Technology Enhanced Learning is used to describe the application of information and communication technologies to teaching and learning, also to describe the broad approach to using technology to support teaching and learning processes, design and delivery, to enhance learning. These authors argue that explicit statements about what the term is understood to mean are rare and it is not evident that a shared understanding of what constitutes an enhancement of the student learning experience has been developed in higher education. Lucas (2013) states that technology enhanced learning has the potential to transform education and to raise the level of education globally. TEL is inclusive of and is broadly synonymous with e-learning, distance learning, online learning, multimedia learning, internet based training, web based training and etc. However, TEL is a broader concept than e-learning, and it refers to the use of electronic media and information communication technologies (ICT) in and for education.

The level of the application of technology enhanced learning in various organizations is a result of many multidimensional external and internal factors. Researchers analyse these factors from different perspectives: environmental challenges (Bottomley, 2000; Schneckenberg, 2010; Wagner, Hassanein, Head, 2008), which include changes in society, economy and social sphere; changes which might be classified as learners' level challenges, such as intrinsic and extrinsic motivation (Ellis, Hubble, Applebee, Peat, 2006; Robles, 2013); challenges related to institutional (organizational) infrastructure, support, policy (Bottomley, Spratt, Rice, 1999; Boezerooij, 2006; Schneckenberg, 2010), etc. Accordingly, researchers analyse these factors from different theoretical paradigms: connectivism, social cognitive theory, constructivism theory, motivation theory, contingency theory, stakeholders' theory and many others.

Boezerooij (2006) suggests that one of the theories dealing with the explanation of the relationships between organisations and their environments is contingency theory. According to Donaldson (1995) the contingency theory holds that the most effective organizational structural design is in those cases when the structure fits the contingencies. A similar approach is suggested by Bottomley (1999) and others who consider external factors or contingencies should be taken into consideration, therefore visions how organizations should cope and meet with these contingencies should be reflected in their strategies. External factors affecting changes in private enterprises are related to the development of communication technologies, thus exhibiting stronger reliance on the use of technology in everyday activities. Global processes such as globalisation of economic systems, globalisation of high skilled force, expansion of ICT, digital taylorism (Brown, Lauder, Ashton, 2011) make organizations reconsider their strategies.

In line with these discussions, two key research questions were raised: 1) what is a responsive and a responsible organizational approach to integrate TEL into an organization? and 2) what are the main parameters for a successful TEL integration into business organisations? To answer these questions, the following tasks were formulated:
1. To analyse various TEL integration approaches into business organisations.
2. To identify how TEL integration framework parameters are perceived by companies' employees.
In this research paper the authors argue for a responsive and responsible strategy of TEL integration into business organisations, which is based on seven quality parameters.

TEL STRATEGIES

Many TEL (or eStrategies, eLearning strategies) integration approaches refer to Rogers' (2003) model for the diffusion and adoption of innovations (Schneckenberg, 2010). However, other models for a more effective integration of technology enhanced learning could be explored. These models or approaches are not necessarily linked with the development of specific eStrategies but rather with a deeper understanding of e-learning processes. For example, Chang & Guetl (2007) discuss the development of an eLearning ecosystem. Following the idea of an ecosystem, they elaborate the concept named a "learning ecosystem" (later the concept narrowed down to eLearning ecosystem), which consists of three basic components: 1) specifics of the learning communities and other stakeholders in an eLearning ecosystem, 2) restricted learning conditions of e-learning ecosystem; 3) specifics of the learning utilities in an eLearning ecosystem. By taking the holistic approach this has allowed to assess and/or develop learning strategies in small and medium-sized enterprises (SMEs).

Five elements of successful TEL strategy were defined by Young (2007) and these elements involve Tools, Training, Processes, Supports, and People. It is necessary to choose the right tools that help design, develop, and solve eLearning solutions. Learning content depends on learners' demands and levels of knowledge, thus learning providers must be well prepared methodologically and be able to apply the learning organization procedures.

While developing an organizational learning strategy, a company should closely connect learning to and align it with work tasks specific to job roles and should relate to business objectives, processes, and workflows (Trondsen, 2004). The main advantages of this connection can be measured by improved productivity and business outcome, improved relevance and use of learning content and resources, and a greater focus on learner and work context, improving worker satisfaction. According to Moore (2007) any eLearning strategy must include methods for designing and deploying learning solutions, change management, communication planning, performance support solutions, and knowledge management services and technologies.

Numerous theories and models serve as a basis for organisations to develop their strategies responding to ICT innovations and technology enhanced learning integration to their practices. One of widely applied approaches is a stakeholders' analysis. A stakeholders' analysis was originally introduced by Freeman (1984) as a tool for managers to proactively engage their external environment in view of the rapidly changing global marketplace (Moustakas & Oliveira, 2012). Other researchers (Bhuasiria, Xaymoungkhoun, et al., 2011) try to identify critical success factors for eLearning in developing countries. In their research they try to combine several theories such as social cognitive theory, information system success model, technology acceptance model (which is adopted from the theory of reasoned action). The latter theory (or model) is one of the widely applied theories for technology enhanced learning integration within an organisation (Davis, 1989; Bhuasiria, Xaymoungkhoun, et al., 2011). The technology acceptance model has four main constructs such as perceived usefulness, perceived ease of use, behavioural intention to use, and actual system use). Attempts to find strategic approaches for technology-driven educational innovation within organizations have been widely discussed in recent years (Bottomley, Spratt, Rice, 1999; Boezerooij, 2006; Schneckenberg, 2010). Nonetheless, all authors finally argue for one common objective: to develop strategies, or the so-called eStrategies (Schneckenberg, 2010), as institutional innovation frameworks which guide organizations to undertake measures to sustainably integrate ICT into their activity processes.

All these approaches to TEL strategies are mainly based on the effectiveness of eLearning, however, a new approach based on responsiveness to internal and external contingencies and responsibility to the company's employees (learners) allows researchers and practitioners to introduce more elements which should be taken into consideration while integrating TEL:
1. Strategy and governance implies that an organization should assess its vision and mission.
2. The strategy of organization should be oriented towards TEL of different target groups and stakeholders and supported with action plans of integrating TEL into institutional activities.

3. The strategy of organization should be supported with resources of integrating TEL into institutional activities.
4. There are existing monitoring processes of TEL integration within an organization.
5. Management decisions are made to assure TEL integration (technical staff support, processes, funding, etc.).
6. Development of TEL policy is learner centered and personalized in terms of existing knowledge, skills and competences.
7. There is a plan for continuous revision of staff teaching/learning plans.
8. And finally, top management is responsive to bottom-up initiatives.

These aspects fall into the following seven categories and they make the so-called TEL integration framework parameters: 1) Strategy and management; 2) IT Infrastructure; 3) Curriculum and didactics (or learning enablers); 4) Staff continuous professional development; 5) Support system; 6) TEL Quality assurance; 7) Marketing and business.

METHODOLOGY

In 2014 a national survey on technology enhanced learning approaches in Lithuanian business organizations was carried out. The research methodology was based on the contingency theory and stakeholders' theory, which deal with organizations' needs to respond to internal and external challenges and learning demands through developing TEL strategies, which should be implemented with active involvement of the main stakeholders. The research was limited to one group of the organizations' stakeholders – employees.

Research data was collected using quantitative research method – an online questionnaire. This type of research method was chosen due to the fact that it was intended to collect as much as possible information about organizations' employees while securing anonymous relation and avoiding influence for the respondents. In total 348 respondents participated in the survey.

A quantitative questionnaire was constructed distinguishing variables from the theoretical analysis. Data was collected in May-June 2014. The collected responses were coded and input into SPSS program for further analysis. The analysis was performed using an appropriate method of statistical analysis, employing MS Excel and SPSS (Statistical Package for Social Sciences) version 22. The data was summarized using descriptive statistics, parametric and non-parametric tests and reliability counting. Hypothesis were tested using significance level α=0,05. Data analysis was performed using descriptive statistics (frequencies, percentages, graphical representation), parametric statistics (analysis of variance ANOVA), counting of reliability (Cronbach α, Guttman split-half coefficient).

For the analysis of research data, a response index was counted. For each block (criteria groups) of questions a summative index was counted as a sum of respondent's responses to seven criterions groups. As each respondent answered 10 questions with values 1-5, the boundaries of index change 10-50 were assessed. For each respondent seven indexes were counted that reflected each respondent's responses. In further analysis the following constructed indexes were used.

Research instrument was designed to have 7 blocks with 10 questions in each. Each block corresponds to the framework parameter for TEL integration discussed earlier:

- Strategy and management;
- IT Infrastructure;
- Curriculum and didactics;
- Staff continuous professional development;
- Support system;
- TEL Quality assurance;
- Marketing and business.

To comply with the research validity all research directions are based on theoretic analysis. The inner compatibility is secured through Cronbach α value. A Cronbach α value for the whole questionnaire is 0,978 – a very high inner compatibility index, acceptable for analysis. Inner compatibility of the separate parts of the questionnaire is presented in Table 1.

Table 1. Cronbach α indexes for different parts of the questionnaire

Parts	Cronbach α
Strategy and management	0,913
IT Infrastructure	0,920
Curriculum and didactics	0,923
Staff continuous professional development	0,901
Support system	0,932

Quality assurance	0,932
Marketing and business	0,834

High Cronbach α values of separate parts of the questionnaire indicate that there is a good inner compatibility of the questionnaire. Additional questionnaire compatibility was tested using split-half method: first part Cronbach α = 0.961, second part - Cronbach α = 0.958. The correlation of the two parts is 0.869, Guttman split-half coefficient is 0.930 (good compatibility is indicated by value higher than 0,8). [Table 2]

Table 2. Division by sex, age, work experience and education

	Value	Percent
Sex		
Women	81	52,3
Men	74	47,7
Age		
18-31 years	65	41,9
32-42 years	60	38,7
43 +	30	19,4
Work experience		
Up to 4 years	63	40,6
4-9 years	58	37,4
10 + years	34	21,9
Education		
University	152	98,1
College	3	1,9

More than half of the respondents were women (81 respondents or 52.3 %). The youngest respondent was 23, the oldest – 62, mean - 35,28 (standard diversion 7,87), lowest job experience – 1 year, highest – 22 years, mean – 6,21(standard diversion 5,11). Absolute majority of the respondents had higher education (153 respondents out of 155).

FINDINGS

General intentions to implement TEL should be first reflected in organization‘s strategic goals and documents, while the top management as well as all other levels of employees should have a clear vision.

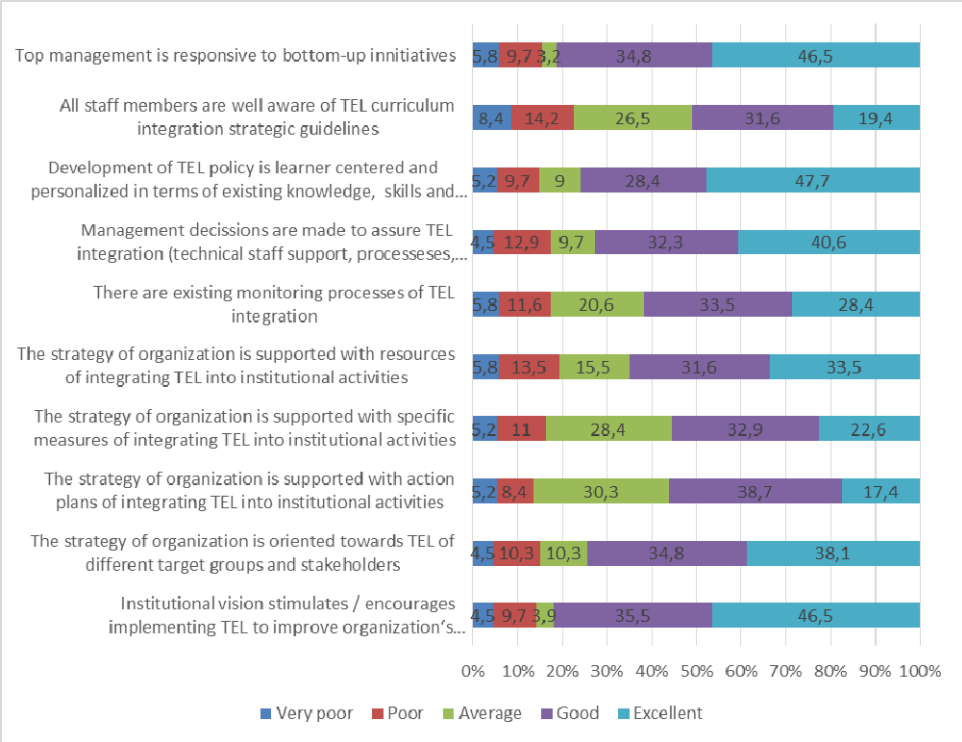

Figure 1. Percentage distribution answers on strategy and management

Research has shown that not all strategic statements are valued evenly. Responses indicated that top management do react to employee initiatives and that TEL policy in organizations is oriented towards individual learner knowledge and skills - about 70% of respondents agree with this (Picture 1). Over 60% indicate, that institution's vision supports implementation of TEL.

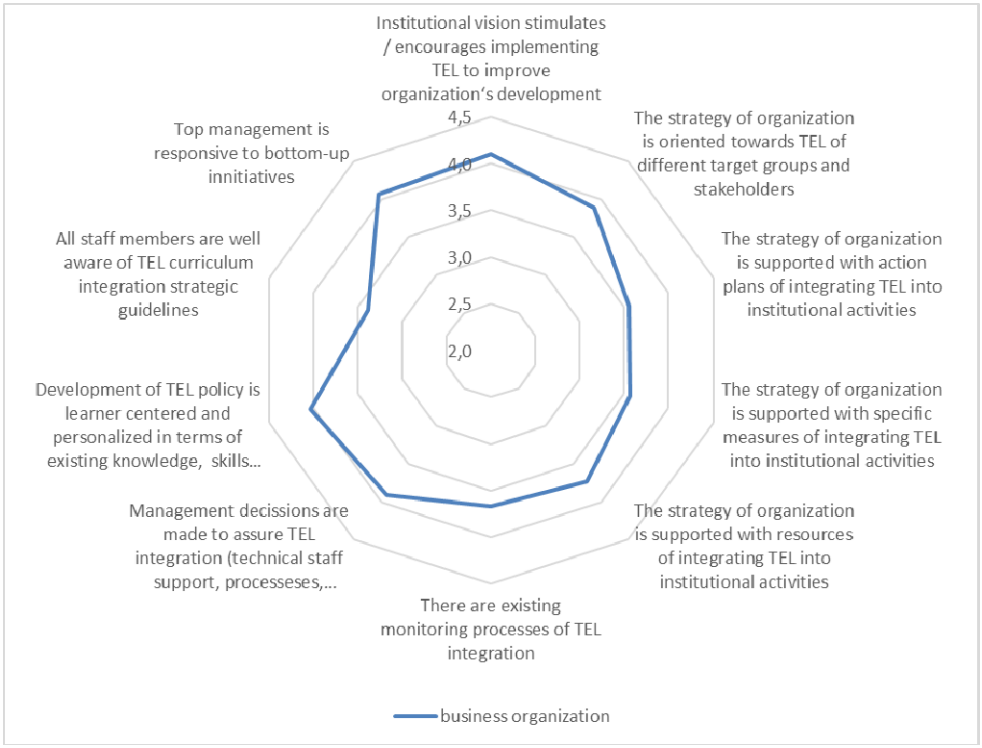

Figure 2. Mean of responses on strategy and management statements compared

However, the respondents are not sure that TEL implementation processes are foreseen and that organizational strategy includes action plan to implement TEL – a mean of 3,39 - 4,10 relating to different statements was expressed in business organizations.

All statements related to ICT and TEL infrastructure were assessed positively; 8 out of 10 statements were assessed as „good" and „excellent" by over 50% (Picture 3), but there is no statement with over 60% assessment.

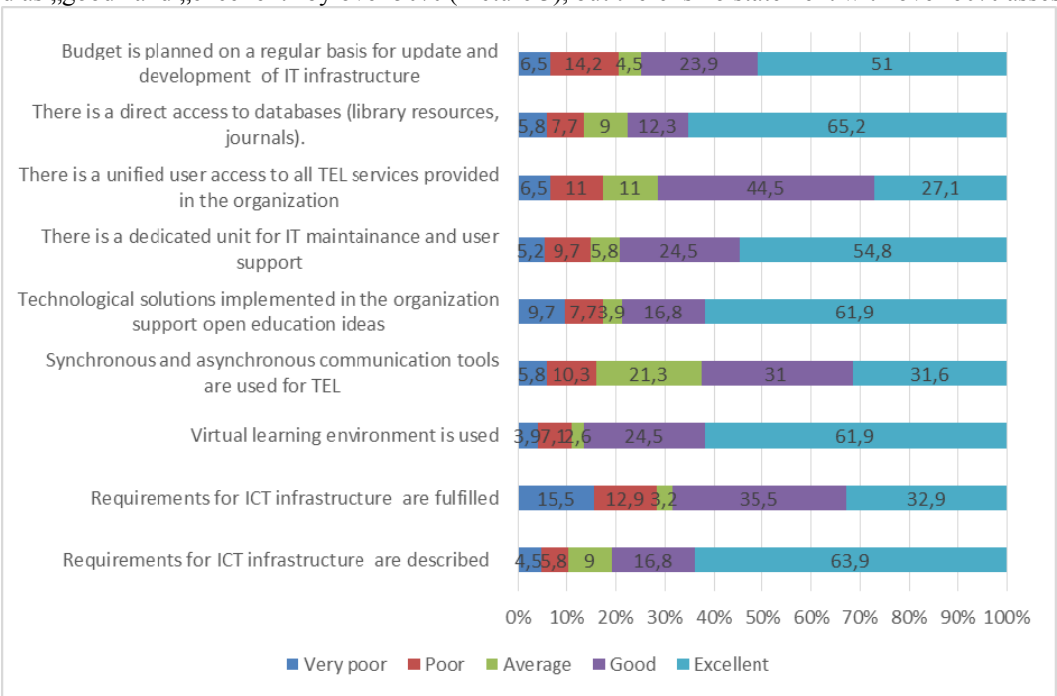

Figure 3. Percentage distribution answers on IT Infrastructure

The statements about clear requirements for ICT infrastructure and virtual training environment links to data bases are assessed positively. The lowest assessments are for the questions regarding ICT and user support unit in the organization.

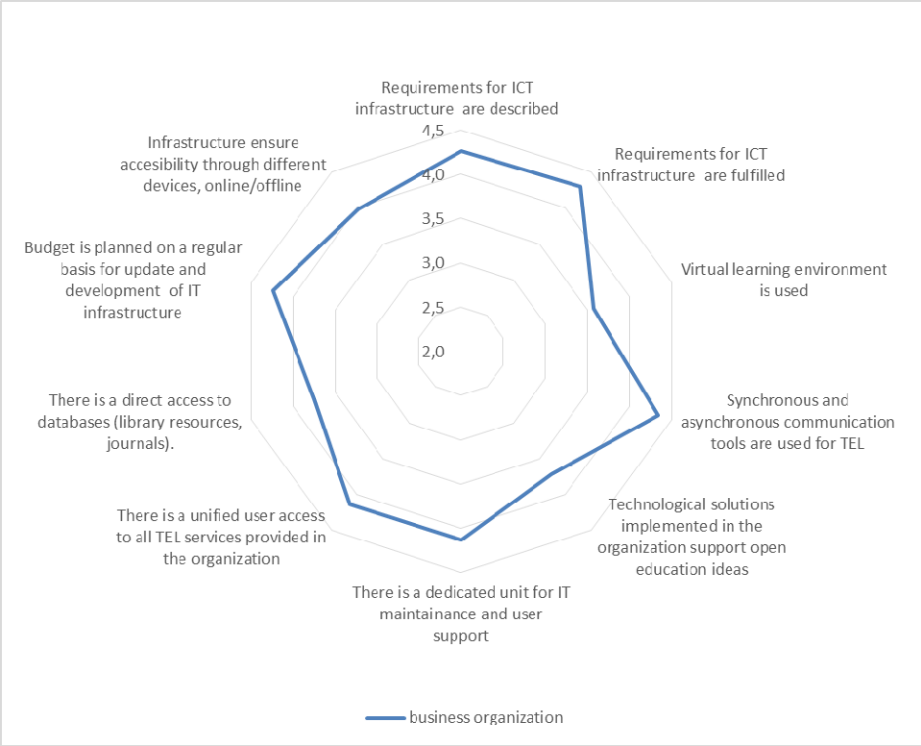

Figure 4. Mean of responses on IT infrastructure

As participating business organizations work in IT sector, their assessments are naturally the highest in all statements (Picture 4). However, these organizations gave the lowest assessment for the employment of virtual learning environment. The assessments of business organizations vary from 3,57 to 4,34. Therefore, this is an indication that additional attention should be paid to implementation and application of virtual learning environments.

Learning enablers are very important in TEL. This group of criterions is understandable for the respondents and is assessed the most positively.

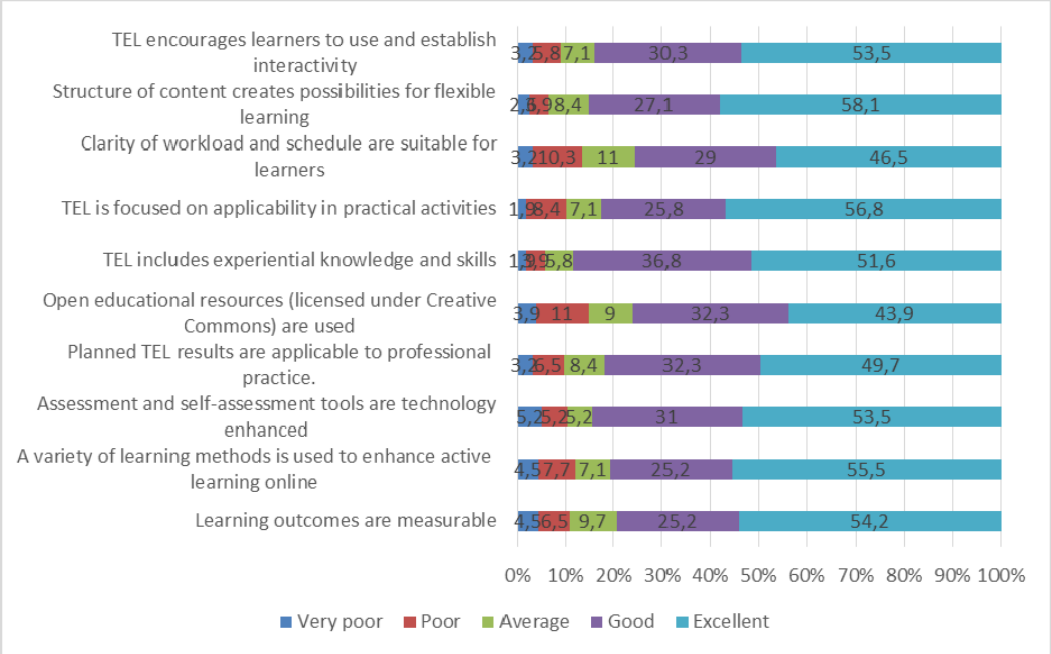

Figure 5. Percentage distribution answers on learning enablers

The analysis of respondents' assessments for the statements of learning enablers demonstrates that positive assessments exceed 70% (Picture 5). 88.4% of respondents agree that experiential knowledge and skills are important in TEL process. Over 70% of respondents also agree that TEL fosters application of various learning methods, inclusion of Open education resources (OER – free access textbooks, documents, video materials), that TEL is concentrating towards practical learning results, that TEL curriculum opens possibilities for open and flexible learning and supports learner cooperation.

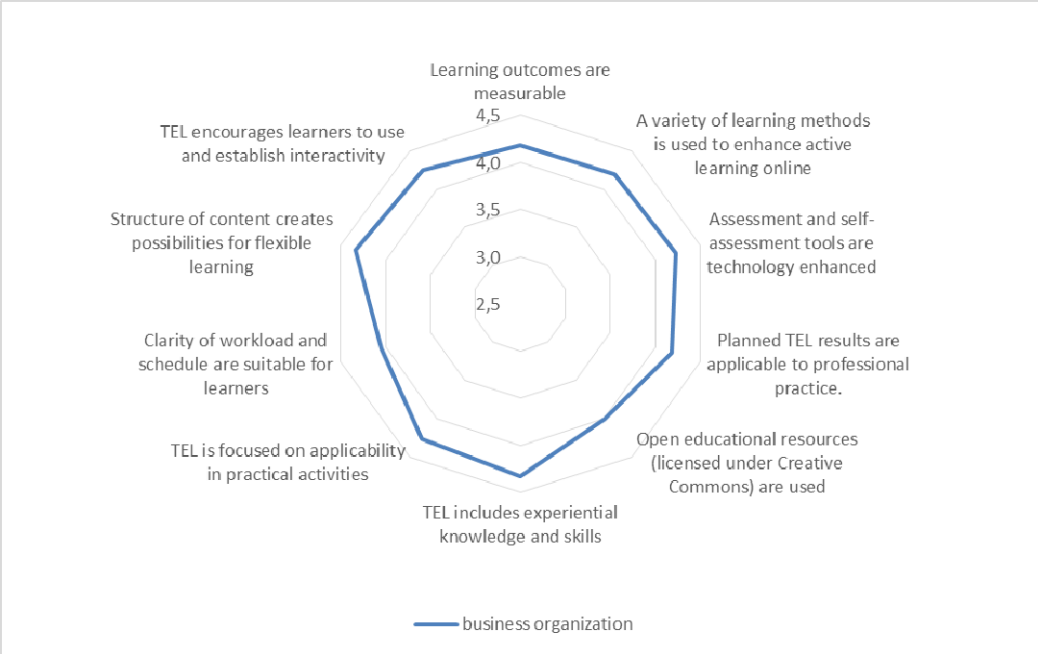

Figure 6. Mean of responses on learning enablers

Assessment of learning enablers demonstrate that business organizations are more inclined towards experiential learning approaches (Picture 6), which tends towards using variety of learning methods and interactivity. The most problematic area is related to assessment, particularly using assessment tools in TEL, clarity of workload and schedule.

In the context of new emerging technologies and their integration in organizations, continuous staff development is one of the crucial aspects when implementing TEL.

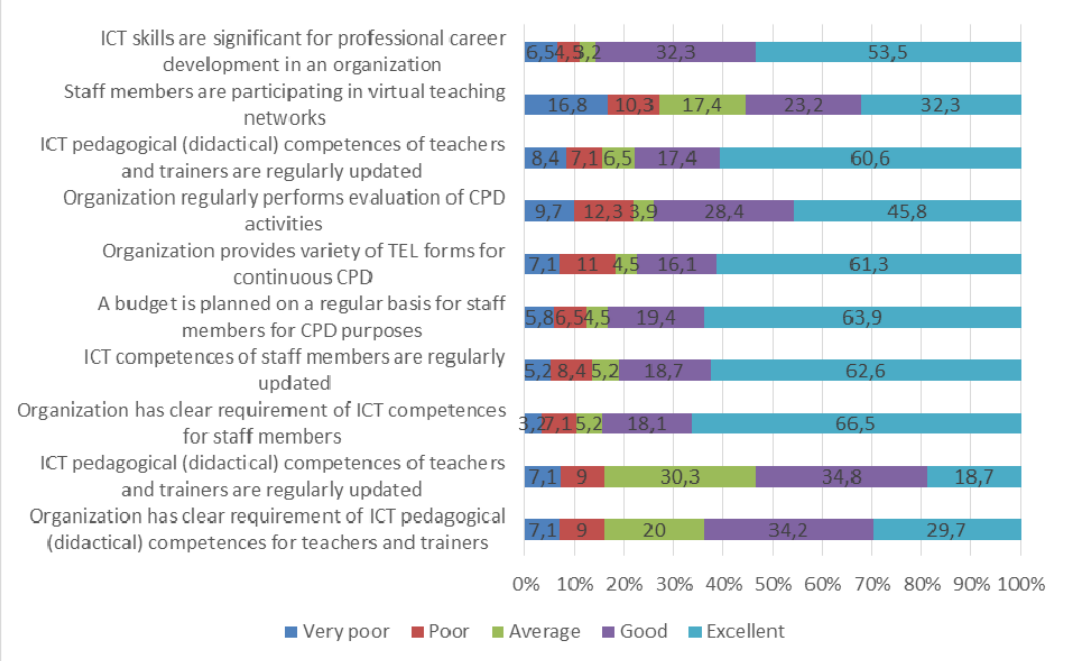

Figure 7. Percentage distribution answers on staff continuous professional development

It is expected that employees would know their possibilities in order to keep the process under control. There are also high requirements for trainer qualifications. The employees should have possibilities for development of their knowledge and skills in technologies. As illustrated in Picture 7 the process of professional development is active, and thus, the most positive assessments were given to the statements about ICT skills importance for employee career in the organization and that there is a variety of TEL curriculum forms for continuous professional development (workshops, workplace learning). It is also worth noticing that even though didactic competences were assessed rather high, quite many employees indicated that ICT didactical competences of the teaching staff are not regularly updated (53,5 proc.).

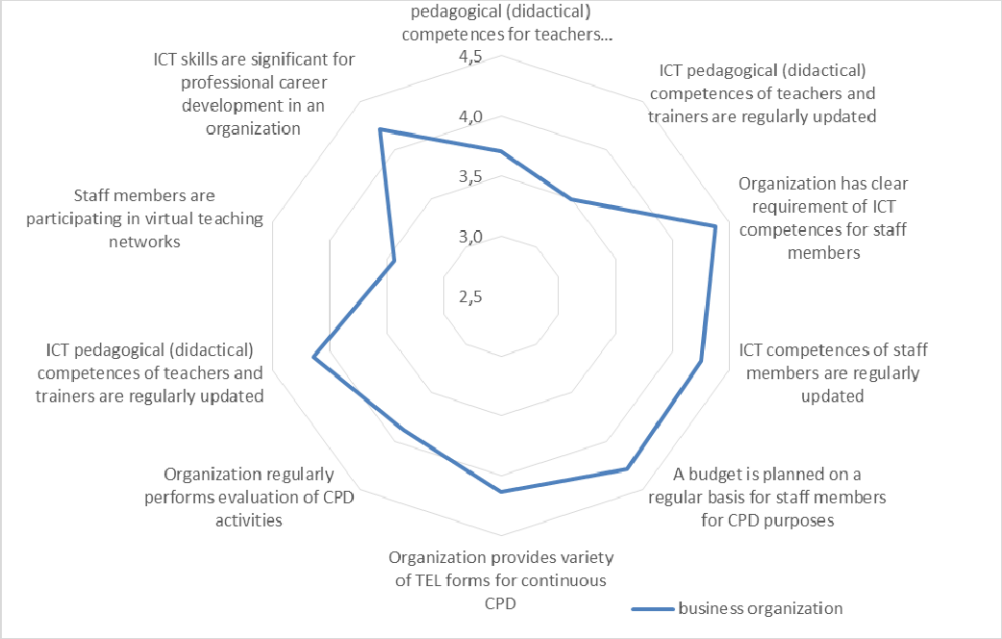

Figure 8. Mean of responses on staff continuous professional development

It is interesting to notice that the mean of business organizations‘ assessment of the existing requirements for didactic competencies differs insignificantly (Picture 8). The field that needs improvement is participation in virtual professional networks. Today‘s possibilities to improve one‘s competencies through joining virtual professional networks are very good, bet they are underestimated.

User support is necessary to all participants of the process in all phases of TEL. However, assessment of statements regarding TEL support systems varies.

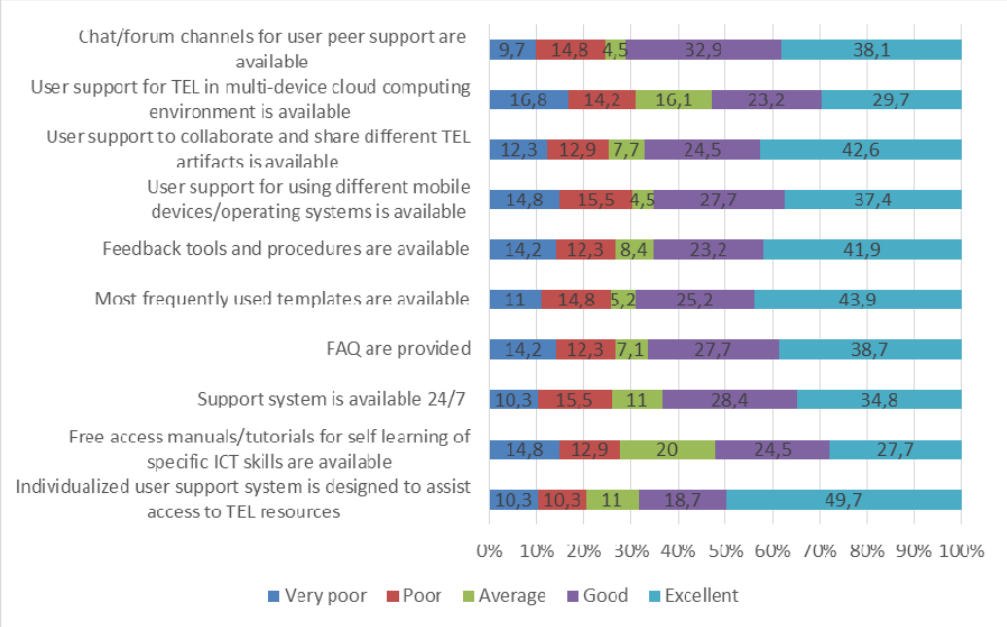

Figure 9. Percentage distribution answers on support systems

The statements regarding the existing e-forums for mutual support and prepared document templates for employee learning convenience are assessed very positively: about 70% of responses „good“ and „excellent“, whereas, the statement regarding support in learning through mobile devices and operating systems was positively assessed only by 50% of the respondents (Picture 9).

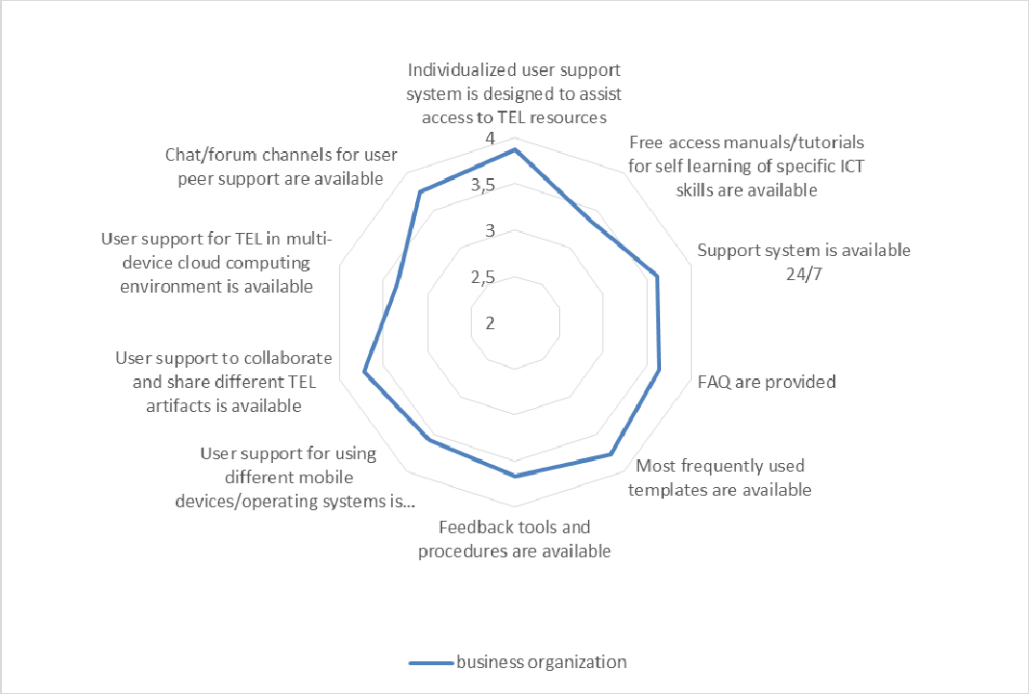

Figure 10. Mean of responses on support systems

The analysis of means demonstrates in time when technologies develop at very fast rates, users would like to employ different technological decisions in learning as well. Yet, the application of TEL is not as fast, so the assessment of the statements „ user support for TEL in multi-device cloud computing environment is available “ as well as “free access manuals/tutorials for self -learning of specific ICT skills are available” were the lowest in relation to other statements.

Quality assurance factor in applying TEL is crucial and overlapping with many other earlier described factors – company‘s strategy, didactic skills of employees, infrastructure, etc. There are several statements in the research that help to determine the elements of quality assurance for TEL.

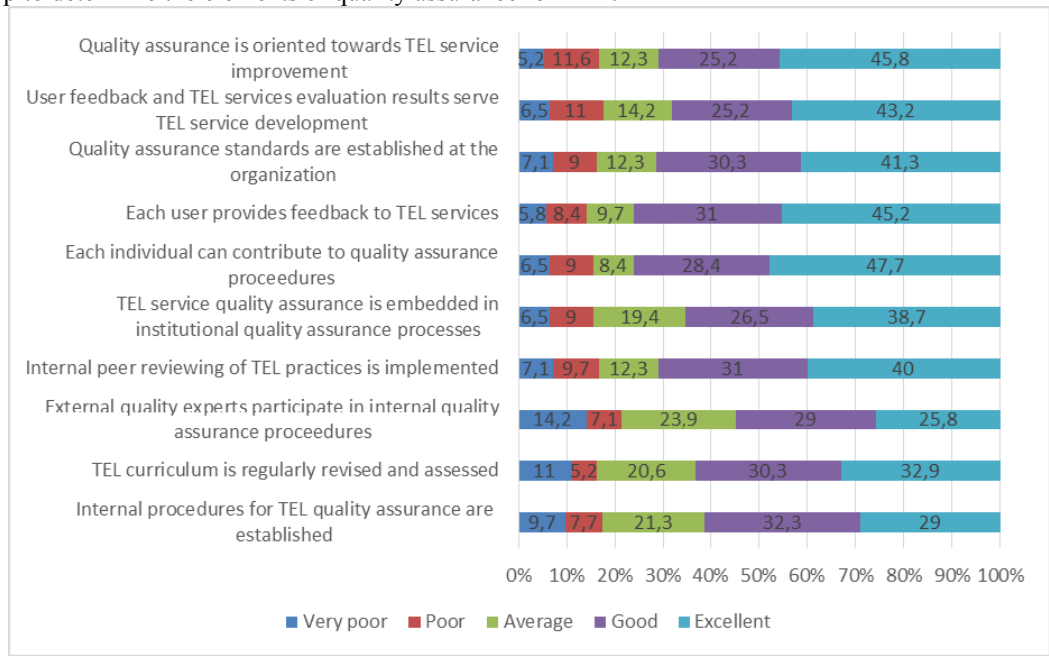

Figure 11. Percentage distribution answers on quality assurance

TEL quality assurance is one of the very crucial parts of TEL process. Only one statement assessment does not exceed 60% in „good“ and „excellent“: the lowest assessment belongs to the statement about external expert participating in quality assurance (Picture 11). The most of positive assessments belong to statement that each member of the organization may contribute to the quality assurance procedure and that TEL content is peer-reviewed. These statements were supported by over 70% of the respondents.

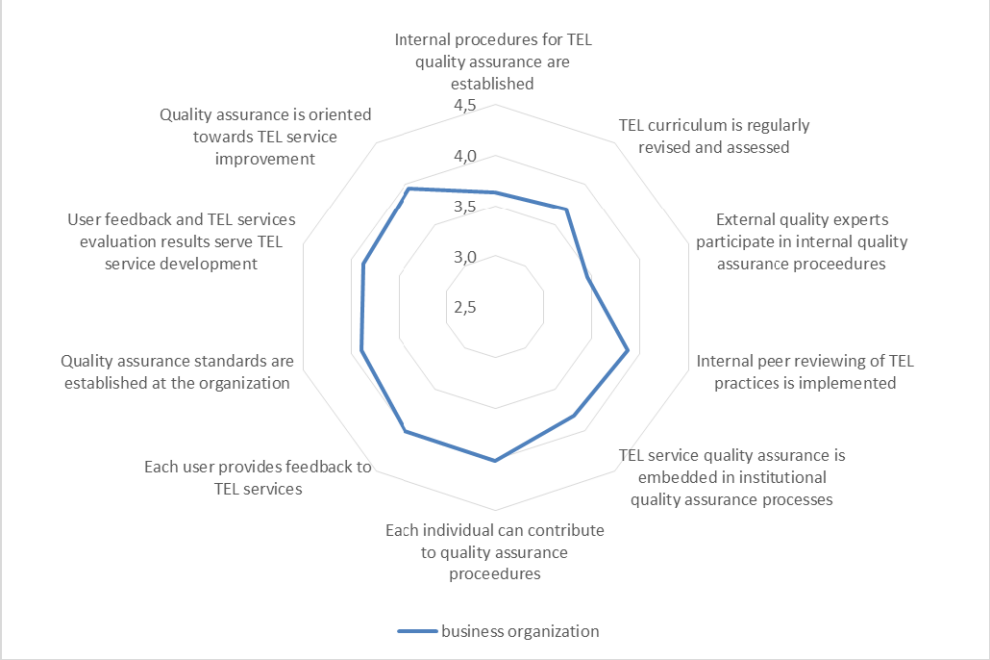

Figure 12. Mean of responses on quality assurance

Even though the general index shows that business organizations have very high quality assurance assessments, their quality assurance means are not exceeding 4 out of possible 5 (Picture 12). This indicates that there are high requirements for quality assurance, and it is not so simple to implement TEL in organizations. It is possible that differences appear due to the fact that in IT companies the result is client oriented and the other processes are less supervised.

Internal and external publicity of TEL processes management also belong to very important aspects of successful TEL integration into organizations.

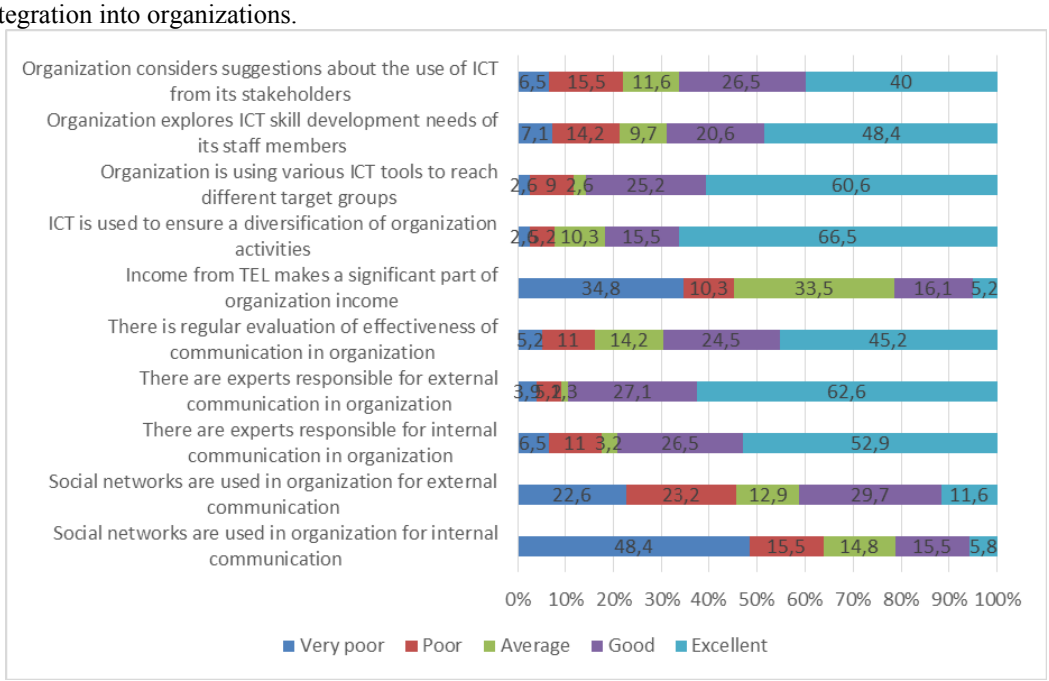

Figure 13. Percentage distribution answers on marketing and business

The assessment of internal and external communication is varying. Scarce number of respondents indicated that income from TEL contribute sufficiently to increase the organization‘s profit, as well as only 20% of respondents agree that social networking is used for internal communication. However, over 60% of respondents agree that ICT is used to secure fluent organizational functioning.

The statements that organization is using different ICT for different target groups, that there are specialists responsible for external communication, are valued positively. Social networks are used less often and the respondents indicate that the quality of communication is not assessed regularly.

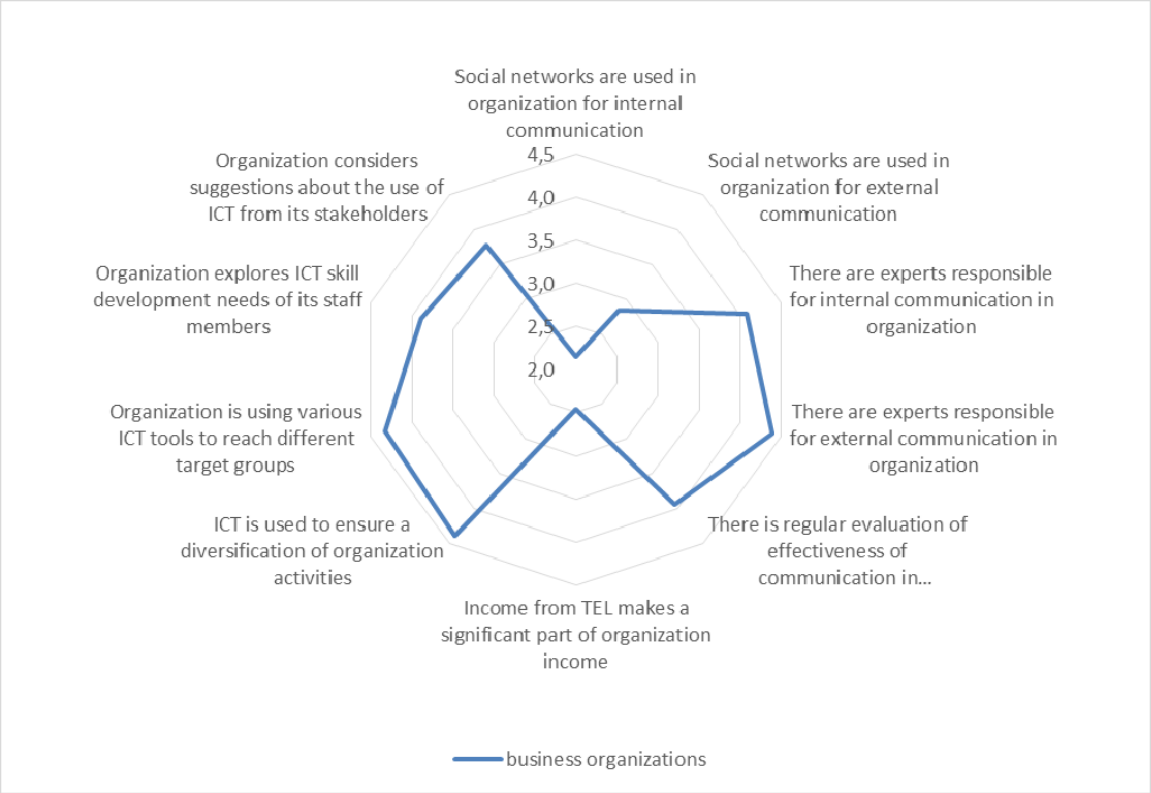

Figure 14. Mean of responses on marketing and business

The assessment results for this group of criterions is rather unexpected. In business organizations it is not assumed that TEL is increasing profits, nor that social networking is used for internal communication. However, marketing actions include ICT to ensure diversification of organization activities. The mean values for business organizations fluctuated from 2,15 to 4,39.

It is possible to conclude that the majority of highest statement assessments were provided by employees of business organizations. However, it is also important to point out that not all employees know the strategic provisions of their organizations regarding TEL, do not often use virtual learning environments, up-skilling is not always controlled, learning environments are not always accessible by different devices, there is no inner quality assurance inside of an organization. These may be treated as the main barriers for TEL integration.

The analysis of summarized research results included only analysis of summarized index means for each index group. The comparison of the evaluations of 7 parameters indicates that business organisations hold that such elements as staff continuous professional development; learning enablers (curriculum and didactics) are both important and quite well developed. More attention should be paid to the improvement to support systems, IT infrastructure, marketing and quality assurance of TEL.

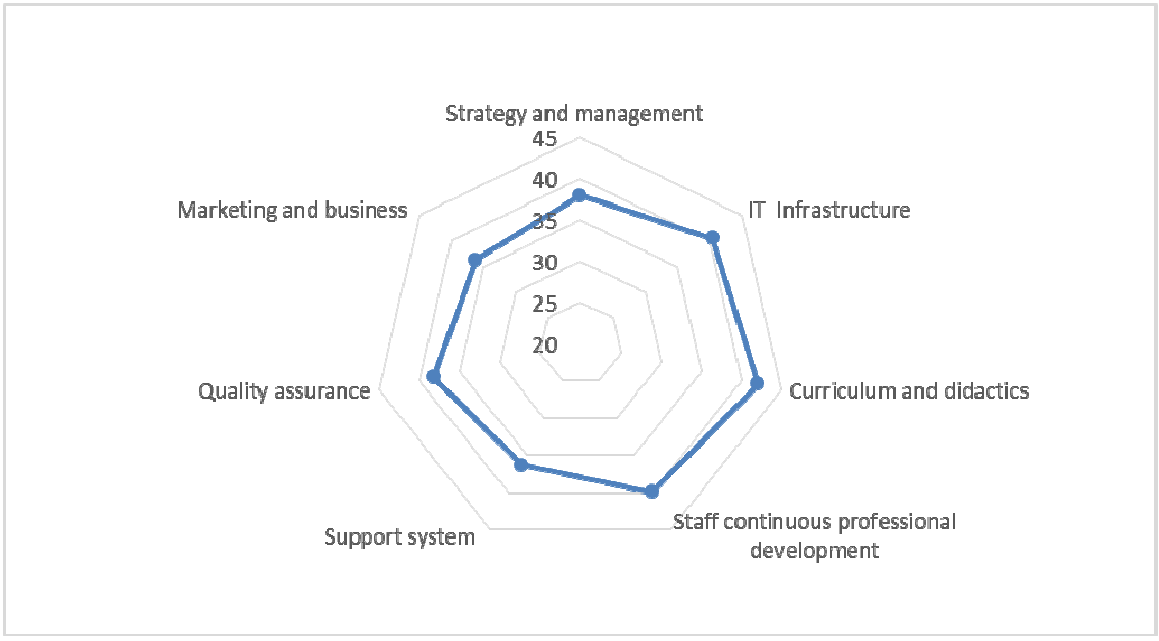

Figure 15. Differences in evaluation of 7 TEL integration framework parameters (indexes)

Differences in the assessments according to the age groups reveal that in most of the cases higher assessments were indicated by the youngest age group of 18-31 respondents (Picture 16).

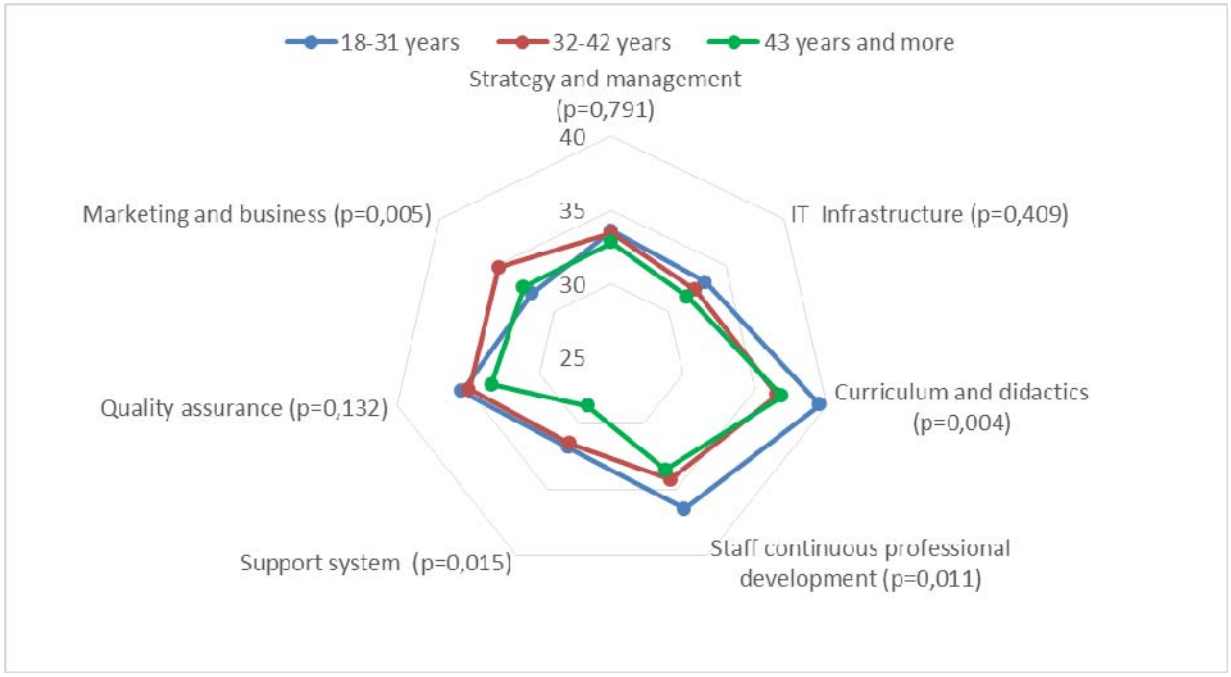

Figure 16. Differences in evaluation according to age groups (indexes)

This may be explained by the fact that younger respondents are more active in using and applying IT at work. Therefore, TEL application is assessed very positively, varying between 31 and 40. However, the assessment of marketing among young respondents was the lowest – 31.93, and differences with the other groups are statistically significant (p=0.005). In this case the middle-aged group gave the highest assessments, yet respondents 43 and older gave the lowest assessments. The exceptionally low assessment was given to the TEL support systems in organizations (the index of the oldest respondents' group is 28.68). The assessment of strategy, IT infrastructure and quality assurance did not demonstrate differences among age groups (p>0.05).

The comparison of responses according to gender demonstrates that men give higher assessments in all criterions, however, in assessing ICT their assessments were dramatically higher. Such parameters as TEL curriculum quality assurance and marketing criterions were assessed with minor differences in different gender

groups (Picture 17). Statistically significant are differences of IT infrastructure (p=0,000), curriculum and didactics (p=0,032) and support systems' (p=0,037) assessments.

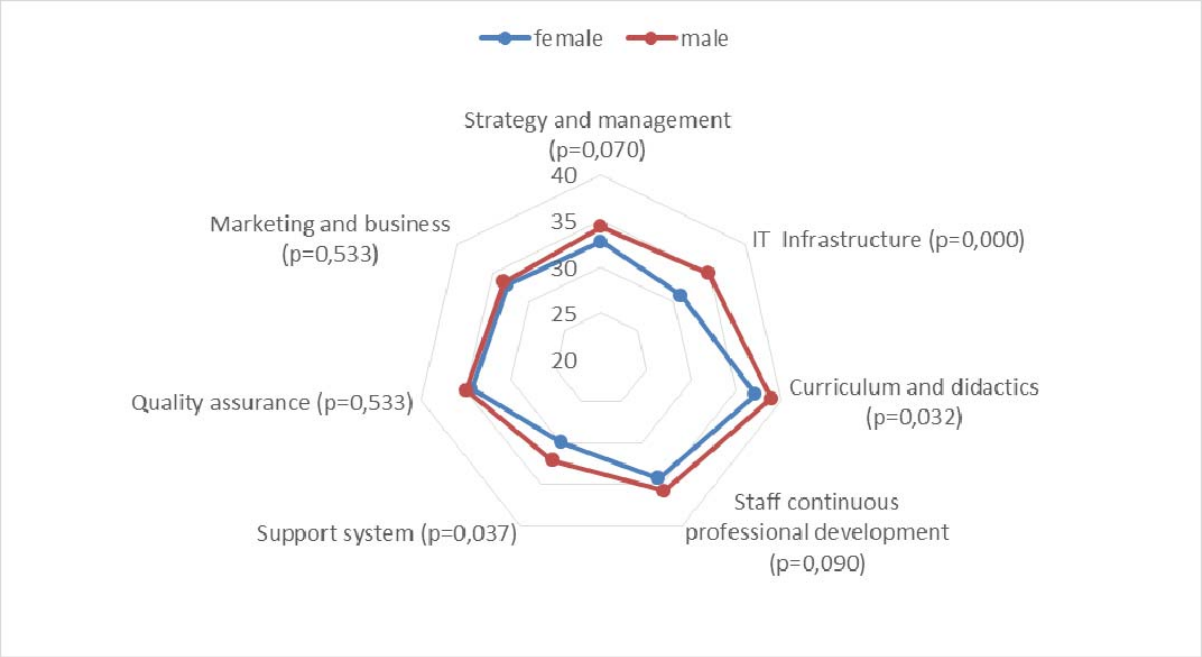

Figure 17. Differences in evaluation according to gender (indexes)

It is possible to summarize that general tendencies demonstrate the highest assessments in implementation of curriculum and didactics, professional development and quality assurance. The major difference of opinions demonstrated in assessment of IT infrastructure: in business organizations, men and younger respondents assessed this field higher than older respondents and women. The assessment of support systems was also assessed the lowest in most cases.

CONCLUSIONS

The conducted research allowed to validate the proposed framework for a more responsive and responsible integration of TEL within business organisation. As presented in the beginning of this article the framework construction is based on the contingency theory, which talks about the need to apply and integrate strategies as an organisation's response to external and internal contingencies. Even though the framework also takes into consideration the methodological approaches presented by innovation acceptance models (Rogers, 2003), the focus of the seven parameters model is on the responsible and responsive paradigm.

A responsive and responsible approach to the integration of TEL in the organization is related to active involvement of organization's stakeholders into this process. According to Wagner, Hassanein & Head (2008), stakeholders' involvement is based on the constructivist paradigm, which stresses the importance of learning personalisation according to individual's special needs. While implementing technology enhanced learning within organizations it is vital to ensure that this process should be organized following a bottom-up principle, ensuring that the interests and needs of the main stakeholders, which the organisation has identified, are taken into consideration. As Wagner, Hassanein & Head (2008) put it, the stakeholders of eLearning are those that are affected by it. Moustakas & Oliveira (2012) specify that the stakeholders' concept refers to individuals, groups or organisations that need to be taken into account by leaders and managers contemplating any action on an issue. Wagner, Hassanein & Head (2008) consider that stakeholders should undertake certain roles or responsibilities for effective eLearning within the organisation. In other words, stakeholders' interests are important not only for the development of TEL strategies but are directly or indirectly "employed" in their implementation.

The research focused on the employees' perception of the framework parameters for TEL integration into business organisation. Several parameters are related to organisational resources (infrastructure, support, etc.). Wu (2013) notes that e-learning or TEL requires a certain standard of hardware. This idea is clearly expressed by Admiraal and Lockhorst (2009), who analysed peculiarities of eLearning in small enterprises. Based on the research results Admiraal and Lockhorst (2009, p. 745) state that "one major potential drawback of using eLearning in small firms is the technology infrastructure". Moreover, many companies, as noted, are more

concerned with return on investment than on other advantages offered by TEL. For example, one of the undiscovered areas might be related to new marketing strategies. Volungevičienė, Teresevičienė, Tait (2014) note that marketing strategies might foster TEL service provision and new organizational learning models. Improved and increased accessibility reveals new managerial capacities and possibilities to share and market TEL services.

A responsive and a responsible TEL integration is closely linked to the overall quality assurance system within an organization. Quality assurance and TEL are closely interrelated as they deal with increased motivation of employees (more training and learning, more possibilities, career prospects, and etc.). Quality assurance system also allows talking about the efficiency of training and learning.

Learning and technology are no longer considered as didactic rivals, but are increasingly treated among educators as compatible and synergizing each other. Designing learning content for TEL opens many attractive opportunities and liberties for teachers and course organizers, such as increasing technological opportunities to combine different environments and platforms, easily replicable content, avoiding time and space limitations, etc. The instructors in TEL find themselves on the cutting edge of the permanently changing requirements of new technological possibilities offered by ICT sector. Besides, those using TEL for teaching may have not experienced learning in TEL conditions themselves. Teaching in TEL requires a different mind-set for curriculum design from the teachers, whereas this and the previously mentioned factors raise high requirements for continuous professional development of the teaching staff themselves.

Volungevičienė, Teresevičienė, Tait (2014) mention he importance of social presence, understood as the degree to which learners feel socially and emotionally connected with others in virtual environment. This is also related to the social side of the support systems as users in the IT business have good IT skills to engage themselves in TEL, but a need to get answers in real time or in asynchronous ways through pre-prepared answers to frequently asked questions (FAQ) remains very important.

The research results helped to come up with the following main conclusions:
1. Technology enhanced learning integration into business organizations may have different and complex approaches, however, a responsive and a responsible approach can help develop TEL strategies which are focused on interests and needs of the main stakeholders of business organisation. Employees in this case represent a very important stakeholders group. A responsible and a responsive TEL mean that it is a learner (employee) centered and personalized in terms of existing knowledge, skills and competences. By this approach top management should be responsive to bottom-up initiatives and there should be a plan for continuous revision of staff teaching/learning plans. Responsiveness and responsibility also involve such aspects as TEL quality assurance and employees' motivation.
2. TEL integration should be supported by the so-called eLearning strategies which be followed by specific action plans and supported with the adequate ICT resources (infrastructure, technical staff support, etc.). TEL integration is directly related and should be enhanced by continuous staff professional development, support system and relevant learning curriculum and didactic approaches.
Further research in this field should help identify whether the proposed TEL integration framework could be expanded to educational institutions, NGOs, communities and other organizations.

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Mathematics and Children's Literature Linked by E-Books

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ABSTRACT
As a link between Mathematics and children's literature, the *e*-book emerges from the need to enrich the teaching and learning of mathematics through the use of content which illustrations are made by children from stories included in children's literature. In this paper we describe some educational experiments with some connection of these two areas that was implemented in Teacher Training with eight/nine years old pupils. The entire process of building an *e*-book created great enthusiasm in these students and motivated us to further develop this work. Throughout this educational experiment, children had always been available to do what they were asked with moments of great participation, as well as in the final discussions. With this educational experience we were able to build bridges with technology enhancing the learning of mathematics through imagination.

INTRODUCTION
Mathematics is a fundamental component of an individual's education, taking on a significant role in their growth as free, critical autonomous citizens from kindergarten until the end of high school. A child is a curious and interested being, so it essential to explore these two aspects in tasks implemented in the classroom from the beginning of school life (Boavida, Paiva, Cebola, Vale, & Pimentel, 2008). In the last few years there have been some less encouraging results in regards to the learning of Mathematics and, therefore, the students' hardships become evident, both in national assessment tests (Ponte, 2004) and international studies (OECD, 2013). Within this context, Mathematics is considered a difficult subject by the majority of students and almost inaccessible for many Portuguese students.

In an attempt to minimize the problem created around Mathematics, the educational community, and, in particular, the Mathematics' teachers try to understand how the students, at this early age, deal with mathematical concepts, establishing connections between Mathematics and their daily life. Evidently, this being a generation of digital natives, it is fundamental to create bonds between children and Mathematics through the use of technology. In fact, curiosity and a natural desire for using gadgets and software is transversal to all children regardless of the socio-economical background (Costa, 2007). In addition, while aiming to motivate students to study Mathematics through a method different from the traditional one, in this article we present an alternative way to bring mathematical concepts closer to children, by using children's literature as a starting point. In fact, the fast motivation and increased enthusiasm demonstrated by the students who participated in this teaching experiment have led us to propose the illustration of children's stories, leading to creating e-book comics, to be used in subsequent tasks focusing on mathematical questions.

In the next section of this article we focus on the theoretical contextualization, both in regards to the importance of children's literature in children's education in this age group (between eight and nine years old), as well as to the teaching and learning of mathematical concepts using stories written specifically for children, which the children themselves illustrated and adapted into e-books. In the next section we describe the teaching experiment developed and the methodology adopted, including some tasks which were implemented. Finally, we present some final considerations on this experiment.

THEORETICAL CONTEXTUALIZATION
From an empirical perspective, traditional teaching sees the student as a passive being (Palhares, & Azevedo, 2010), in which the role of the teacher is to transmit knowledge and the student to receive it without questioning and without participating in its construction. On the other hand, from the constructivist point of view, the student is considered autonomous and the main actor of its own development and learning (see for example , Phillips, 2000; Simons, van der Linden, & Duffy, 2000). Another important difference between the two models is the fact that in the traditional one the content is delivered without associations within Mathematics, as well as with other subjects in the school's curriculum, while constructivist teaching actively promotes interdisciplinary teaching.

Some of the topics that worry teachers and researchers, from kindergarten until university, include the advantages of using children's literature to introduce or consolidate mathematical concepts (Cotti, & Schiro, 2004; Hong, 1996), as well as students' behaviour and attitudes when digital texts are adopted (Noorhidawati, & Gibb, 2008, 2008a; Noor, Embong, & Abdullah, 2012; Shalter, 2008; Weisberg, 2011).

This article focuses on the connection between children's literature and Mathematics, by using comic style e-books created by the students, which are later explored in classroom tasks where mathematical concepts are introduced or consolidated. Despite this being a recurring topic in multiple international studies (Baily, 2006; Malathi, & Rohani, 2010; Noorhidawati, & Gibb, 2008; Woody, Daniel, & Baker, 2010; Noor et al., 2012), this teaching strategy is something completely new in Portugal.

Children's literature in education

When children go into kindergarten they already bring some knowledge acquired throughout their development, which is intimately tied with their daily family life and based on their mother tongue. In fact, each individual's learning does not start or ends in school and this has to be able to provide him/her with enriching experiences in all fields of knowledge, while obviously developing their ability to express themselves in their mother tongue, be it orally or written.

The child's natural language is the instrument that allows each individual to access knowledge and it is present in the textbooks adopted by schools, this being the main means of communication between students and teacher.

Reading children's stories in the classroom allows for moments of discussion in which children feel motivated and encouraged to actively participate in the construction of their own development (Rodrigues, 2008).

By combining children's stories with other parts of the school curriculum, the teacher can create favourable environments for the child's imagination, promoting the introduction of new concepts, the consolidation of previous studies or the construction of mental representations with use of materials they can manipulate (Mink, & Fraser, 2005).

It is also important to highlight the children's desire in the age group included in this article, between eight and nine years old, to illustrate the stories they have read or heard, or to transform them into comic books. The choice of colours and the portrayal of the characters can also be a possible way to detect family or social problems, as well as conflicts with classmates or even cases of bullying in school (Anning, & Ring, 2004; Einarsdottir, Dockett, & Perry, 2009).

Learning mathematical concepts based on children's stories

Learning depends primarily on the ability to construct bridges between previously acquired knowledge and the different contents of the various subjects of the school curriculum (Menezes, 2011), in order to create and develop new learning experiences that are intended to be significant.

In the specific case of Mathematics, the connections can be intrinsic by being established between different contents within this scientific area, but also extrinsic by combining Mathematics and the children's day-to-day activities, or Mathematics and the other knowledge fields, but having the learning of mathematical concepts as the main object.

The use of children's stories, whether original ones or adapted to Mathematics, is a strategy implemented in education in general and the teaching of Mathematics in studies in several countries, including Portugal (Menezes, Rodrigues, Ferraz, & Martins, 2009). Nevertheless, society still considers children's literature and Mathematics as two diametrically opposed fields, in a way justifying the lack of children's stories adapted to Mathematics-related topics. However, the underlying characteristics of children's stories can constitute a starting point and the motivation for learning mathematical concepts (Boavida et al., 2008). In fact, when children analyse a text of a tale or a legend they recognize the relationship between the elements of the story and mathematical concepts, immediately associating what they already assimilated with something that is completely new.

Children's stories do not necessarily need to have explicit mathematical contents, but if the teacher intends to use them as a teaching resource, he/she should first and foremost choose one that is related to the students' interests. Then, he/she should model the text and its information, creating tasks that grab their attention and generate enthusiasm in their students, in order to achieve the specific aims of developing the students' mathematical reasoning.

When establishing this relation between Mathematics and friendly literature, the teacher stimulates the children's imagination, allowing them to reconstruct reality in order to find the meaning of mathematical concepts. In fact, children's stories belong in an imaginary world which perfectly portrays ideal situations that could happen in their daily lives, allowing the child to compare reality with the imaginary (Postic, 1992), as well as establishing bridges between their daily lives and the meaning behind mathematical concepts.

Using e-books in the classroom

Nowadays technology is an integral, practically indispensable part of the daily life of every person anywhere in the world, and school cannot ignore that fact. One of the main goals of using technology in schools, and specifically in teaching and learning Mathematics, lies in the possible changes that may occur in students' motivation, enthusiasm and dedication regarding tasks of mathematical nature (Hoyles, & Lagrange, 2010).

Regardless of their socio-economic background, from an early age children show more interest in handling mobile phones, tablets, computers, consoles, which all come with a variety of software. This way, these devices grant students with the opportunity to experiment with new way of learning and interacting with the world around them, acquiring the autonomy to navigate the internet with the available tools (Costa, 2007).

An e-book is a book in digital format, which is presented like the printed edition; it is easy to read on a laptop, tablet or even a smartphone. However, the digital edition can have elements that make its reading even more alluring, such as having interactive images or including links that lead to other books, editions or websites. Note as well that it is physically impossible to transport hundreds of books. This way, by permitting the use of tablets, smart phones or computers in class, the teacher allows his/her students to access several e-books, enabling students to acquire new skills and more arguments that will contribute to better- informed and enriching discussions from the educational point of view (JISC Observatory, 2012).

This digital format is more frequently used by adults; however, according to Noor and others (2012, p.183), the e-book "has become more popular and now attracts younger users especially students". There are several studies on the use of e-book in classrooms, although most are in the context of secondary school (see for example: Baily, 2006; Malathi, & Rohani, 2010). In specialized literature we find a study on the students' perceptions through the use of e-books in pre-university education (Noorhidawati, & Gibb, 2008a) and also a study of the factors which influence the preference for e-books or not (Woody et al., 2010). Nevertheless, the use of books in this format is already being studied in some primary schools (Noor et al., 2012).

With the implementation of project *LER: Plano Nacional de Leitura* (http://www.planonacionaldeleitura.gov.pt/index1.php), which aims to encourage Portuguese students to read more frequently, books are also made available in digital format and, therefore, Portuguese children are becoming more familiarised with e-books. Our study focused on the students creating the illustrations for some of those e-books, which in turn would become a comic e-book. Based on those illustrations, the teacher created and implemented activities focusing on mathematical concepts. In a later stage, the idea of adapting children's stories in order to explicitly include mathematical concepts was also considered.

Creating an e-book is very easy, even for eight or nine year old students, like the ones in our study; all that is needed is a *Word* document, where the children's drawings are added after being digitalized and then the document needs to be converted to *PDF* (Portable Document Format). However, in case something more appealing is required, with interactive images and the introduction of voice or music, we can always use one the several software programmes available online, most of which are freeware, as long as the document does not exceed 10 pages. Evidently, with the free trials it is not possible to create e-books with many pages, but the objective was to allow the children to have an innovative experience and not to sell their work. In this case, free trial software can be used in the construction of the e-books, such as the ones found at http://flippingbook.com/ or http://pt.flipbuilder.com/.

EDUCATIONAL EXPERIMENTS IN THE CLASSROOM

This article describes a teaching experiment conducted in a primary school in the North of Portugal, with students ranging from eight to nine years old. The methodology used was quantitative and interpretive (Stake, 1995). The mathematical concepts are found within the theme "Geometry and Measurement" of the Primary Education Mathematics Programme (Ponte et al., 2007), while the implemented tasks of exploring and researching (Ponte, 2004) focused on concepts of volume, area, length, spatial orientation, plane figures and geometric solids.

The class consisted of 25 students, 10 male and 15 females, 11 of which attended the 4th grade and the rest attended the 3rd grade. Since it had been detected that most students had difficulties in both Mathematics and

Portuguese, it was considered appropriate to develop strategies involving both subjects, while implementing cooperative tasks in small groups. At the same time, we tried to encourage these students to overcome their problems in these two areas, presenting them with challenging and innovative exercises requiring complete focus, thus reaching the initial aims.

Firstly, they analysed two children's stories from the National Reading Plan, *"Florinda das sete chaves"* and *"História aos quadradinhos"* (Torrado, 2012), with the goal of introducing children's literature to Mathematics teaching and learning.

Simultaneously, students were involved in a research project of gathering and classifying aromatic herbs, much appreciated in Portuguese gastronomy, some of which they planted and watched grow in a specific locations of the school. The project culminated in the creation of an e-book where students participated by photographing the planted herbs, or searching the internet for the ones they were not able to watch grow, and the inclusion of small explanatory texts, ending with the presentation of the material gathered in the format of an e- book. This work methodology created a great deal of motivation, enthusiasm and dedication towards the project among the children, especially in regards to the e-book which they showed off with pride.

At the same time, we were informed of the visit by children's book author José Braga-Amaral, whose books include *"Segredos da Constança"* (Braga-Amaral, 2012), which is part of the National Reading Plan and includes 10 children's stories. Since the students initiated an educational approach to comic books, the school decided to surprise the author by providing him with a gift of a comic e-book based on his book's stories, created by the students' illustrations.

Firstly, the teacher read each story once out loud for the class and they all debated its context in open class. Then, students were divided into heterogeneous pairs and each was assigned a story to convert into a comic by sing their own drawings. After this phase, the comics were collect and the creation of the e-book was started, a process already familiar to the students. Note that whenever a setback occurred the teacher would guide or suggest a new process. Before they finished this project, the students were told about the e-book offering to the author and that it would be preceded by a public presentation in a party where several elements of the educational community would be present, an idea that was met with great enthusiasm. We can see on [Image 1] an example of some of the e-books pages, with some illustrations of the comic created by the students about the story *"A princesa mata-moscas"*.

Image 1: A few pages from the comic e-book created by the students (Story: *A princesa mata-moscas*)

Surprisingly, the drawings showed several shapes and geometric objects, which allowed us to use these drawing in exercises where the aim focused on mathematical topics, but at the same time were an interesting connection between children's literature and Mathematics. In this context, we now present some examples of the tasks implemented in this class. Note that for each one we present some elements: the title of the task; a brief description of the topic, including the mathematical content and the objectives we tried the students to reach; the material used; and a brief summary of how the teacher managed the class while the tasks were underway, as well as how the students committed to the activities built upon the given situations.

Note that the first two tasks refer to connecting children's literature and Mathematics, which consists of the first approach to the theme. The last two were implemented after the students had finished the e-book presented to the

writer José Braga-Amaral by the school. These tasks were produced and planned based on the comic e-book created by the students, which motivated a great deal of enthusiasm in the children as they felt their work had been validated in some way.

Task 1: *Florinda das sete chaves*
Task overview: exercise to consolidate previous knowledge; Planar Euclidian geometry or in 3-D space; area and volume measurement.

Material resources: the children's story *"Florinda das sete chaves"* (Torrado, 2012); writing material; squared paper; ink and polystyrene sheets.

Development: after reading and interpreting the story, the teacher handed out a worksheet with questions guiding the students towards the construction of *Florinda*'s house plan, identifying plane geometric figures and calculating the area of the house plan. After they successfully finished this exercise, the previously divided students built a replica of *Florinda*'s house with polystyrene sheets, painted the interior and exterior walls, and the roof, all of which was removable in order to see the inside. After they mounted all the pieces and built the 3-D representation of house mentioned in the story (see [Image 2]).

Image 2: Part of Florinda's house built by the students

Educational objectives: in the end of the exercise the students should be able to: identify geometric shapes, plane or 3-D; define and differentiate the concepts of area and volume; identify the measurement units for area and volume and finally calculate and compare the area and volume measurements.

Task 2*: História aos quadradinhos*
Task overview: exercise to consolidate previous knowledge; planar our 3-D Euclidian geometry; perimeter measurement, area measurement and volume measurement.

Material resources: the children's story "História *aos quadradinhos*" (Torrado, 2012); writing material; scissors, A4 sheets of paper; ink and polystyrene sheets.

Development: after reading and interpreting the story, the teacher handed out worksheets with questions based on the discussion between the story's heroes: a square and a triangle. At the same time, with the purpose of solving the problems, the students had to show through bends and cuts if the characters' statements throughout the discussion were true or not by using an A4 sheet of paper. On the other hand, the students were confronted with questions like: how do you calculate the area of a square? What if it is a triangle? What is the perimeter of a plane geometric shape? How do you determine the value of the perimeter? What other geometric shapes do you identify in the story? What geometric solids do you find in the story? What is the relationship between them? Finally the students finished the exercise by building a model as seen on [Image 3].

Image 3: Model with geometric solids build by the participants in the study.

Educational objectives: in the end of the exercise the students should be able to: construct models of plane figures and geometric solids from A4 sheets of paper, distinguish between terminology related to geometric plane shapes and geometric solids; identify plane and solid geometric shapes: define and distinguish the concepts of perimeter, area and volume; calculate perimeter measurements, area measurements and volume measurements.

Task 3: *O pássaro com asas de sobrancelha*
T*ask overview:* exercise to consolidate previous knowledge; plane shapes and geometric solids.

Material resources: the children's story "*O pássaro com asas de sobrancelha*" included in the comic e-book created by the students; writing material, scissors and glue.

Development: the teacher handed out worksheets to each student with questions where they had to identify and classify geometric shapes in the comic (see [Image 4]); plan the geometric solids found, as well as cut the plane elements and assemble the pieces together in order to build each of the geometric solids.

Image 4: Some pages from the comic e-book created by the students (Story: *O pássaro com asas de sobrancelha*)

Educational objectives: in the end of the exercise the students should be able to: recognize the basic geometric plane and solid shapes and solids; choose measurement units; execute estimates; create geometric constructs; draw the plan of geometric solids and, given the plan, be able to build the respective solid.

Task 4: *O segredo da bailarina*
Task overview: exercise to consolidate previous knowledge; spatial orientation.

Material resources: the story *"O segredo da Bailarina"* included in comic e-book drawn; writing material and squared paper.

Development: the teacher handed out to each student a square paper sheet and a work sheet with questions related to the story, where they had to identify the relative positions of ballerina's friends in the theatre (see [Image 5]), painting each position with different colours.

Image 5: Some pages from the comic e-book created by the students (Story: *O segredo da bailarina*)

Educational objectives: at the end of the exercise the students should be able to: describe the position of certain elements; identify directions; identify rigid movements in a plane or space; describe the localization of a given image through coordinates.

CONCLUSIONS

Throughout this experiment the children always dedicated themselves with plenty of enthusiasm and dedication to the drawings and to the development of the comic e-book. One of the most noteworthy observations has been the positive progress reached in the reading and interpretation of the proposed stories. The children's joy, disposition and concentration to solve the given problems increased substantially in the worksheets where mathematical concepts were involved and where their drawings were present.

This connection between children's literature and Mathematics had very positive repercussions in regards to how the wording in the problems was interpreted. It made it easier, since the children quickly related them to the stories they had read and the respective characters.

The educational objectives were met to their fullest and, most of the time, the students would use the comic stories and e-book to explain some concepts to those classmates who had some difficulty.

In fact, according to this study conducted with this group of children, it was noted that the level of concentration was higher and the need for the teacher's help was reduced, while the cooperation amongst the students grew throughout the classes.

It is also important to note that the lively colours and happy faces of the characters in the children's drawings confirmed the inexistence of family conflicts or even relevant social problems (Anning, & Ring, 2004; Einarsdottir et al., 2009).

Finally, we believe that in the future it would be interesting to implement children's stories in the classroom, adapted from other well-known ones, but with explicit mathematical.

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Mobile Applications' Impact on Student Performance and Satisfaction

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ABSTRACT
Mobile applications are rapidly growing in importance and can be used for various purposes. They had been used widely in education. One of the educational purposes for which mobile applications can be used is learning the right way to read and pronounce the verses of the Holy Quran. There are many applications that translate the Quran into several languages. In addition, there are applications that help usersto read the Quran, and search for a particular word or phrase in the text as well as listening to verses of the Holy Quran.

This research aims to study the relationships of behavioral factors and perceived usefulness of using the mobile application "Say Quran" for learning Quran on students' perceived performance, satisfaction and behavior. In this research a group of 118 students of the Computer Sciences and Information Systems College at Al Imam Muhammed Bin Saud Islamic University who are studying the Holy Quran course had been asked to use the application to help them on studying the Quran, then a survey had been distributed in order to collect the data. The results from this study provide evidence that there is a positive relationship between mobile application "Say Quran" and students' perceived performance, satisfaction and behavior while engaged in studying the Holy Quran.
Keywords: Arabic Speech Recognition; mobile applications; mobile learning; Say Quran, student performance, Performance, Satisfaction.

INTRODUCTION

Traditionally, education has been offered in classes where students can interact directly with their teachers, makingstudents' physical presence very important. However, the wide distribution of computers and communication technologies has made the learning process easier. Since the arrival of mobile phones in the 1980s (Huet and Tcheng, 2010), they have been widely used by people of all ages all around the world. It could be said that the whole world is becoming mobile; mobile phones are not only communication devices, butalso portable and private pieces of technological equipment.

Nowadays, mobile technologies are becoming increasingly ubiquitous and networked.Such technologies canbe used creatively in different areas. Using mobile technologies in education is a clear exampleof such innovation. Mobile devices equipped with internet connectionshave created the need for a new form of electronic learning, called mobile learning (Fu, Su, and Yu,2009). Internet-enabled mobile devices canhelp students to access learning resources and online courses, anywhere and at any time.

The mobile application industry is growing quickly. According to a recent market research report, the global mobile application market is expected to be worth $25 billion by 2015, 20.5 per cent of which will be generated by the Apple App Store (MarketsandMarkets, 2011).

Moreover, in a market research study conducted by Adkins (2013) in 2012, revenues generated in the Middle East for mobile learning products have reached $88.3 million. By 2017, these revenues willmore than double, to $205.4 million, with a growth rate of 18.4 per cent.

Many applications have been developed for mobile platforms. Over the last few years,these applications have been the focus not only of technical interest,but also marketing and business campaigns. Many applications have been developed for educational purposes (Demuynck and Laureys,2002). Browsing sites such as Android Apps at the Google PlayStore showsthe variety of learning applicationsfor subjects such as different languages;concepts related to mathematics;or programming languages, such as Quick Graph to calculate and design graph areas.In addition, one can find applications to learn about Islam and other religions (Quinn and Clark,2000).

People in Muslim and non-Muslim countries alike are keen to learn about Islam and the Qur'an. In Saudi Arabia,as in other Muslim countries, students learn about Islam atdifferent stages of their education. In addition, students of all educational levelsmust learn how to read the Qurancorrectly. Thus, having a mobile application that facilitates searching, reading, and listening to the Quran's verses would be a helpful tool for them.

With the above in mind, the objective of this study is to investigate the impact of the Say Quran mobile application (Alqahtani and Fayyoumi, 2013) as a learning tool for students enrolled at Al Imam Muhammed Bin Saud Islamic University,studying and learning Holy Quran. The impact ofthe Say Quran application is reflectedin the students' performance, satisfaction, behavior, and motivation to use the application.

The following sections presenta literature review and outline of the study's methodology. Then, data analysis and resultsare presented.The paper ends with adiscussion and conclusion.

LITERATURE REVIEW

Recently, many researchers have focused on mobile learning and its environment. Some researchers have defined the difference between e-learning and mobile learning, saying thate-learning is a learning process which is supported by digital electronic tools and media, and by analogy, m-learning is e-learning that uses mobile devices and wireless transmission (Pinkwart*et al*,2003,). M-learning functions by integrating a number of hardware and software technologies into multimedia applications to facilitate the understanding of educational content, for example, in the form of quizzes or games.A2010 study by Garajat the School of Engineering and Design, Brunel University, United Kingdom, was designed to enhance students' performance and experiences within the BSc Multimedia Technology and Design course. The research presented a number of m-learning application conceptsorganized under the subjects of administration, presentation, feedback, motivation, and innovation. The study found that implementing m-learning is sufficient for students.

Hashimand colleagues(2011)introduced a Java m-learning application tool to review and revise course materials. This application can be used either on-line or off-line. The on-line feature helped users to access learning material through a certain URL, while the off-line feature helped users to access learning content via the application, which had been installed on their mobile devices. This application mainly focused on three subject areas: science, English, and mathematics. Learners could use the application to review course materials before exams or quizzes.

Mobile Learning in Saudi Arabia

Mobile learning in Saudi Arabia has attracted a great amount of attention from researchers.Alturki's (2013) researchdeals with the use of mobile learning at KSU. The study focused on students and faculties at the university. This research attempts to ensure that King Saud University is ready to employ mobile learning as part of the education process. The study involved a sample of 50 faculties out of 40, and 100 students out of 30,000. The major method of data collection was by questionnaire. The research showed the readiness of faculties and students to use mobile learning as a method of teaching and learning.Another survey by Al-Fahadwas conducted at King Saud University to measure the attitudes and perceptions of undergraduate students toward using mobile technology in education. The results of the research showed the possibility of improving education by enhancing methods of mobile teaching/learning (Al-Fahad, 2009). Another study, by Farah and Samiul (2011), reviewed the technological challenges of mobile learning in Saudi Arabia. They applied a questionnaire to a group of 131 undergraduate students, finding that more than 75 per cent of them responded positively to m-learning's flexibility and communication capabilities. However, some students required training in order to benefit from this new learning environment.

Acceptance model of mobile learning

A large number of studies have explored factors that influence human attitudes toward using and accepting new technologies. Researchers have employed well-established models and theories to undertake increasingly in-depth investigations. This includes the theory of reasoned action (TRA) byAjzenand Madden (1986); the technology acceptance model (TAM), which was put forward by (Davis , 1989);Ajzen's theory of planned behavior (TPB), (Ajzen, 1991) and the unified theory of acceptance and use of technology (UTAUT), put forth by Venkatesh et al.(2003).Huetand Tcheng (2010) explained the acceptance of m-learning and integrated TAM using perceived enjoyment from the motivational model, and perceived mobility value, as external variables of perceived usefulness. The study found that perceived usefulness and perceived ease of use positively influence students' attitudes toward m-learning.

Wei-Han Tan et al. (2012)developed a conceptual model to examine factors that affect intentions to adopt m-learning in Malaysia. The findings indicated that perceived usefulness, perceived ease of use, and subjective norms can affect one's intention to use mobile learning; gender factors did not appear to show any effects on m-learning usage. Further, Wang et al.(2009) extended the UTAUT model by including perceived playfulness, which is the individual's tendency to interact with the computers, and self-management of learning. The results showed that performance expectancy, effort expectancy, social influence, perceived playfulness, and self-management of learning all had effects on behavioral intention to use mobile learning. Moreover, they also found that age differences moderate the effects of effort expectancy and social influence on using mobile learning, and

that gender differences moderate the effects of social influence and self-management of using m-learning. In addition, Jairak et al.(2009)focused on assessing the acceptance of m-learning in higher education. The results show that only effort expectations and social influences affect students' intention to use m-learning. They also found that performance expectations, effort expectation, and social influences affect the attitudes of students regarding mobile learning.

Kamaruzaman&Zainol(2012)focused on behavioral responses among secondary school students. The authors of the study developed a mobile learning application to teach English. They found that this technology can improve the encouragement and performance of students when they learn English through the use of mobile devices. They also found that the functionality of the m-learning application used, the layout design, the content, and personal motivation all influence behavior positively.Shams(2013) explored the factors that influence the behavior of learners towards the use of m-learning applications. The result of this study showed the important relationship between the utility of m-learning, ease in m-learning, and self-management of the learner, and behavior towards the actual use of m-learning applications.

The usability of mobile learning applications includes some features that differ from other computer systems. These include the mobile context, connectivity, screen size, and different display resolutions. These features can influence usability factors such as effectiveness, efficiency, satisfaction, learnability, memorability, errors, and the cognitive load (Harrison et al., 2013). Another factor that is affected by m-learning applications is learner performance. A study by Vogel et al.(2007) aimed to explore the impact on learning performance. The results of this study showed positive support for learner performance enhancement, with support for constructive alignment as a moderate variable for students who use m-learning technology.

Moreover, an experiment byHamdan& Ben-Chabane(2012)discussed how to improve students' personal skills and performance by using mobile learning applications. They performed the experiment with IT students at UAE University. They found that using mobile learning technology can improve student performance in the educational process.In addition, user satisfaction is influenced by many environmental and individual factors. A study by Hassanein et al. (2010) focused only on factors facilitating student satisfaction with mobile learning. The study presented a model of student satisfaction with mobile learning, showing that both external and internal facilitating factors associated with the mobile learner can influence students' satisfaction with this technology.

Say Quran Application

Say Quran mobile application is an android mobile application that is designed and developed for verbal Quranic verse recognition and identification by listening to part of the verse. This application will facilitate learning the holy Quran. Moreover, it will assist users in efficiently understanding the correct meaning of Quranic verses. In addition, the application will provide the users with an alternative way to study Quran, by simply saying the verse, which would give the user the position, translation and interpretation of the verse.

The application had been developed by using ASR API (Application Programming Interface) which is available in Android OS. The application was implemented using Android Jelly Bean 4.1.2. It needs an Internet connection in order to work properly since it needs to run Google's ASRengine. The application's layout is developed by using Google Layout UI. It also consists of Quran XML, Translation XML and Interpretation XML which is being parsed to SQL Lite Database.

Say Quran mobile application can be used to identify the Arabic speech through the device's microphone, and then the speech will go through the ASR engine to be analyzed to text then will give results back. Then, the application would start a search loop through the Holy Quran to look for the verses that contain that is similar to the spoken words. Those results would be brought back to the user. So, the verse, the name of Surah (chapter) and the verse's number will be shown to the user.

The user can select the appropriate language of interpretation select the context he wants and then would give him a representation of that verse's interpretation and translation to many languages. Since Arabic is a verbal language, developing an Arabic ASR application is considered a very big challenge since there is no enough material on this subject. The following figures can represent the steps of working on Say Quran App. Figure 1 shows the results in two languages with the basic information provided about the verse (In which chapter and the number of verse within the chapter). Figure 2 shows part of the list of different languages that can be selected to show the interpretations (Alqahtani and Fayyoumi, 2013)

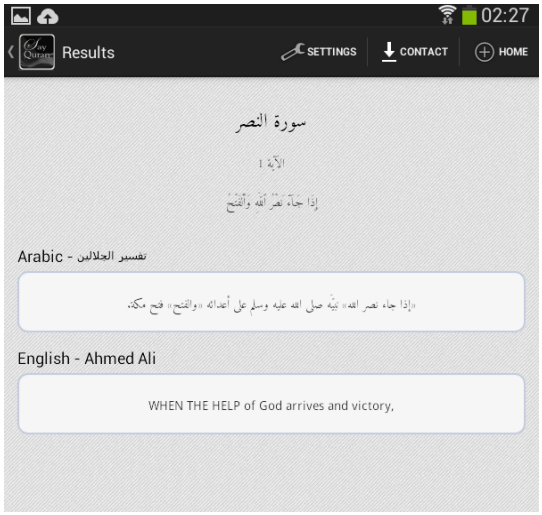

Figure 1: Quran Verse, Verse Number, Surah/Chapter Name and Interpretation

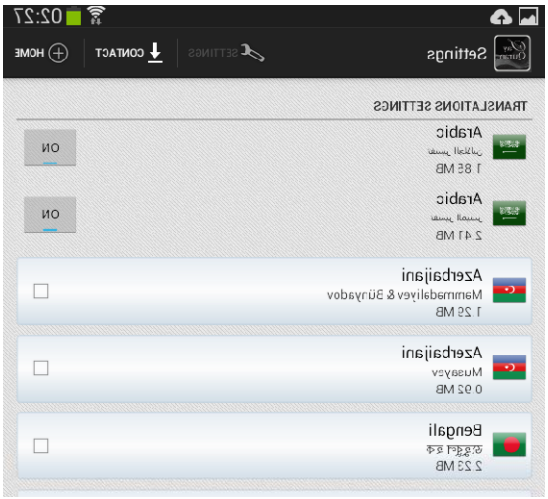

Figure 2 : Settings of Translation

RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

Based on the literature review and previous studies that have focused on the factors affecting mobile learning applications and impact on their users, the research model for this study is composed of three dependent variables: mobile learner performance, mobile learner satisfaction, and mobile learner behavior. In addition to these dependent variables, there are four independent variables; perceived usefulness,application's ease of use, content quality, and layout design of the mobile application.

Perceived usefulness:

Perceived usefulness can be defined as the perceptions of a person using a new technology that it will enhance satisfaction and performance.Many studies have shown that perceived usefulness has a strong effect on learner performance in the learning process.Perceived usefulness can have a great impact to increase productivity, enhance performance, improve effectiveness and achieve satisfaction. Also, according to Hassanein et al. (2010),high perceived usefulness will result in higher satisfaction.Thus, we hypothesize:

H1: Perceived usefulness enhances m-learners' performance.
H2: Perceived usefulness enhances m-learners' satisfaction.

Content quality:

Learningcontent plays a strong role in attracting and motivating students to learn. Derakhshan's (2009) study shows that content is an essential feature instudents' technological based learning experience. Furthermore,Kutluk and Gülmez (2014) find that students strongly agree that well-organized and easy-to-navigate content is an attractive feature for m-learners. Thus, learning content must provide materials that help learners to quickly access the needed information. This information can be in the form of equations, formulas,

graphics, definitions, and video. Thus, having good content inspires students to learn (Bekele, 2010; Mara, 2012).In addition, the content of mobile applications should incorporate pedagogical objectives and requirements. It should be easy to navigate, and provide accurate and up-to-date information. When m-learners are exposed to good quality content, they will be happy, satisfied and more eager to learn (Kim et al., 2005; Bekele, 2010; Mara, 2012). Hence, we hypothesize the following:

H3: Content quality enhances the level of m-learners' satisfaction.
H4: Content quality enhances m-learners' behavior.

Application's ease of use:
Ease of use is a belief about new technology which influences personal attitudes towards using that technology. According to studies of interface designfor mobile applications, there is a relationship between good interface design and ease of use for m-learning apps. Thus, when an application is difficult to use, the learners cannot use it and they may leave it. According to the study (Davis, F.D., 1989) ease of use is a construct to measure system/application quality, which is related to user-friendly application design. According to Abu-al-Aish et al.(2013) and Davis (1989),ease of use can positively affect m-learning behavior. Thus, we hypothesize:

H5: An application's ease of use enhances m-learners' behavior

Layout design
Layout design can incorporate typographic elements, which can connect meanings. These elements should be related to each other across the mobile screen. For m-learning applications, screen size is the standard, which can be divided into menu, navigation area, and the content area, which displays the learning content (Darcey and Conder, 2012).The attractiveness of the interface layout and the colors used will have a great impact on the learner's behavior(Kamaruzaman&Zainol, 2012).

Layout design and graphic design should have the same look. Elements such as columns, margins, and icons should be placed on the screen consistently. That way, when the user understands how to use one screen, he or she will be able to understand other screens and how they work. Colors can be used to complementinformation to accomplish the purpose of the m-learning application, but should be used in moderation (Kim et al., 2005). Thus, layout design positively influences m-learner behavior (Jairak et al.,2009).

H6: An application's layout design enhances m-learners' behavior.

M-Learners' Performance
According to a studyby Hashim et al. (2011),learner performance can be defined as the extent to which the learner can believe that using mobile technology in learning would be of benefit.

Mobile learning can help students to take control over their learning and optimize it inside and outside the classroom through the learning environment. Therefore, learner performance suggests that learners will find that mobile learning is beneficial and useful since they learn quickly and in different locations. In the mobile learning environment, new units, activities and skills are designed to support learners in a new process of learning. In addition, the technology of m-learning can change people's thoughts, actions, feelings and skills (Vogel et al.,2007).

In the individual environment, mobile learning can empower learners with improved study and personal skills. Moreover, in a collaborative environment (such as a group of learners), mobile learning can enhance communication, problem solving, critical thinking skills, and students' responses to challenges. Learner performance will be enhanced as long as there is some interaction between learners and the mobile applications (Hamdan& Ben-Chabane, 2012).

Learners' performance can be evaluated by observing their actions. For example, their level of learning will be of higher quality, they will gain more understanding of the subject, achieve the desired learning outcomes, enjoy using the mobile application for learning, improve their collaboration with classmates, increase the productivity of their learning time, display a positive attitude toward the subject, and so on (MacCallum, 2009). Many studies focus on studying the factors that influence mobile learning; however, the present study measured the impact on learners who used the Say Quran mobile application, evaluating their performance, satisfaction, and behavioral intention to use it.

A study by Vogel and colleagues (2007) aimed to explore the impact of mobile applications on learning performance. The results of the research showed positive support for an increase in learners' performance, with

support for constructive alignment as a moderator variable for students who use m-learning technologies. Moreover, an experiment by Hamdan and Ben-Chabane (2013) discussed how to improve students' personal skills and performance by using mobile learning applications. They performed their experiment at UAE University, using IT course students, and found that using mobile learning technology can enhance student performance in the educational process. The researchers also found that the performance of a mobile learner will have a positive effect on learners' behavioral intentions to use m-learning applications(MacCallum, 2009).

H7: M-learners' performance enhances m-learners' behavior.

M-Learners' Satisfaction

In the field of information systems (IS), user satisfaction refers to the degree to which users feel comfortable with the systems to achieve their goals. In addition, in the field of human-computer interaction, user satisfaction refers to the affection expressions gained from interacting with a system. Therefore, satisfaction is a subjective set of interactive experiences influenced by affective elements.

Satisfaction, in most studies, can indicate characteristics of quality. When the user is satisfied with a system, it means that he or she has control, the freedom to use the system, and can therefore get what is required and needed from the system. According to Hassanein and colleagues (2010), mobile learner satisfaction can be influenced by perceived usefulness, and a high level of perceived usefulness results in higher satisfaction. Perceived usefulness can be defined as the perception of a person who uses a new technology designed to enhance his or her satisfaction and performance. With this in mind, m-learner satisfaction is greatly influenced by the application's perceived usefulness and content quality (Mara, 2012).

H8: M-learners' satisfaction enhances m-learners' motivation.

M-Learners' Behaviors

The behaviors of mobile learning applications' users can be defined as a set of actions in conjunction with the m-learning environment. The use of mobile learning applications provides learners with new opportunities and changes their behaviors. The behavior of m-learners is positively affected by content, ease of use, and layout and design of mobile learning applications. (Nayebi et al., 2012). Furthermore, m-learners' performance has a positive effect on their behavior. Student behavior is affected by many factors; for example, content quality can influence m-learners' satisfaction and behavior variables (Chaiprasurt*et al*., 2011). Ease of use can affect m-learners' behavior positively (Kim. *et al.,* 2005). In addition, in m-learning applications, the screen size is a standard that can be divided into menus, a navigation area, and a content area to display the learning materials (Miao, 2012). The attractiveness of the interface layout and the colors also have a great impact on learner behaviors (Kamaruzaman&Zainol, 2012).

M-Learners' Motivation

There are many factors that contribute to successful practice in m-learning, and motivation is one of those factors. Motivation lies at the heart of successful learning, since motivated students are keen to learn. Motivation can be defined as a person's internal needs, desires, and wants and can determine his or her attitude (Bekele, 2010).

According to Chantorn*et al.*'s (2011) study, we can expect an increase in the satisfaction and motivation of students in online learning environments that are supported by mobile technologies. In the learning environment, and especially mobile learning, MacCallum (2009) has proven that motivation has a great impact on how learners use technology for mobile learning. He also found that learners are more likely to use mobile technology if they feel it can improve and enhance their performance. Hence, m-learners' motivation is influenced by their satisfaction; at the same time, it can affect the relationship between usefulness and m-learners' performance (Chaiprasurt et al., 2011).

Thus, content and perceived usefulness positively influence learner satisfaction with the application. Ease of use, content, and layout design also positively affect m-learners' behavior, as shown by the previous researcher (Miao, 2012).

H9: M-learners' motivation enhances the relationship between perceived usefulness and m-learners' performance.

The following diagram shows the proposed research model.

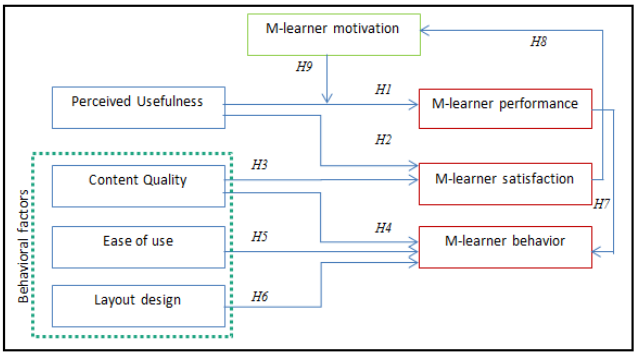

Figure 3: Research Model

RESEARCH METHODOLOGY

A) Data Collection and Measurement Scales

In order to test our model and understand the factors influencingstudents' performance, satisfaction and behavior in using the Say Quran application, an experiment was carried outusing theSay Quran application.170 students of the Computer Sciences and Information Systems College who also study the Holy Quran in cooperation with the Religion Origins College were asked to use the Say Quran application.Then, a structured questionnaire was created and distributed online for the students (both males and females) who study the Holy Quran. According to the equation used todetermine the sample size of the study (Sekaran and Bougie, 2009),the sample size of this study was about 118 participants out of a larger population of 170 students. The questionnaire contained 34 questions describing eight constructs: m-learner performance, m-learner satisfaction, m-learner motivation, m-learner behavior, perceived usefulness, content quality, ease of use, and layout/graphic design.

The questionnaire was checked and approved by a group of referees who were empowered to revise the questions as needed. Moreover, some study participants were involved in the process of vetting the questionnaire's wording during the pilot study. Not only were wordings revised, some language was revised to improve clarity, the relevance of the questionnaire items to the research concepts, and to what extent the items could clarify the study idea. Finally, the questionnaire was modified and adjusted based on referees' and the pilot study subjects' comments.

Table 1: Summary of measurement scales

Variable /Construct	Measurement Items
M-learner Performance	1. When I use the Say Quran application, my learning skills are enhanced. 2. I am sure that Say Quran increased my understanding of the Holy Quran. 3. Using the Say Quran application would enable me to perform learning tasks more quickly. 4. Using the Say Quran helped me to achieve my desired grade in the Holy Quran course.
M-learner Satisfaction	1. Generally, I am satisfied with the Say Quran mobile application. 2. I became fond of the services provided to me by using the application. 3. I will recommend this application to others.
M-learner Behavior	1. When I use the Say Quran application, I plan to use mobile learning applications as a part of my studies. 2. I will use the Say Quran application frequently in all lectures of the Holy Quran course. 3. I am enjoying using the Say Quran m-learning app. 4. I will not hesitate to start the Say Quran application anywhere; I will not only use it during lectures.
M-learner Motivation	1. I like to use the Say Quran application to learn as much as possible. 2. I want to use Say Quran and attend traditional classroom facilities. 3. I believe that I can improve my skills by using the Say Quran application. 4. I believe that using the Say Quran m-learning application has helped me to learn more things I'm interested in.
Perceived Usefulness	1. Using the Say Quran application would improve my learning performance. 2. The Say Quran application would enhance my academic effectiveness. 3. Using this application would increase my productivity (reduce the time

	required to accomplish tasks). 4. Using such an m-learning application could make both teaching and learning easier .
Content Quality	1. I agree that the content of the Say Quran application is visibly described to the user. 2. I am satisfied with the contents of the Say Quran application. 3. I agree that the division of contentswithin the application is straightforward. 4. The content in the application is readable. 5. I agree that thedivision of contentswithin Say Quran is easy to absorb. 6. Voice recognition when using the Say Quran application was accurate. 7. Voice recognition when using the Say Quran application responds quickly.
Ease of Use	1. I found navigating around the application screen to be easy. 2. Distinguishing the appropriate icon for the application for the needed information is easy. 3. The application is user friendly.
Layout and Graphic Design	1. The application is adapted to mobile devices'screen sizes. 2. The Say Quran application's layout design can support both landscape and portrait modes seamlessly. 3. The application is familiar to the user. 4. I have found that the text and colors are clear. 5. I feel happy with the design of the Say Quran application.

RESULTS OF THE STUDY

A) Reliability and validity

As for reliability and the internal consistency of measurement scales,the values of correlation coefficients of the statements of every construct are positive and statistically significant at P<0.01. Moreover, the Pearson correlation coefficients for all of the questionnaire's statements ranged from (0.971) to (0.801). Therefore, the questionnaire has a high internal consistency. The equation of Cronbach'salpha (α) is used in this research in order to examine the reliability of the questionnaire. The following table shows the questionnaire coefficients' stability.As the table below demonstrates,the general stability of the research tool is equal to .9783. This means that the questionnaire has a high rate of stability and can be applied to perform the experiment.

Variables	Cronbach's alpha	No. of items
M-learner Performance	.9389	4
M-learner Satisfaction	.9582	3
M-leaner Motivation	.8941	4
M-learner Behavior	.9119	4
Perceived Usefulness	.9300	4
Content Quality	.9550	7
Ease of Use	.9103	3
Layout and graphical design	.9532	5
General Stability	.9783	34

Table 2: An illustration of Cronbach's alpha of the study variables

The arithmetical means are shown below for the scores of responses for all the study variables statements. When this mean iscompared with the 5-point scale, from1 to 5 (High > 3, Neutral = 3 and Low < 3), it was found that results of the study are greater than the agreement point (+3), which means that all of the study variables are high because their arithmetic means are greater than 3 (Elliott and Wayne, 2006).

Construct	Mean	Standard Deviation
M-learner Performance	3.99	.760
M-learner Satisfaction	3.95	.788
M-leaner Motivation	3.93	.757
M-learner Behavior	3.92	.714
Perceived Usefulness	3.96	.749
Content Quality	3.84	.761
Ease of Use	3.97	.773
Layout and graphical design	3.97	.760

Table 3: Arithmetic mean and standard deviation for the scores

RESEARCH MODEL VALIDATION AND HYPOTHESES TESTING

In this study, a principal component analysis extraction with varimax rotation was performed on all items in an exploratory factor analysis. To test preconditions of the sample, Bartlett's test of sphericity and Kaiser-Meyer-Olkin measures were used for the factor analysis. The value of Kaiser-Meyer-Olkin was .873, exceeding the recommended value of .6 (Kaiser, 1974).

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.873
Bartlett's Test of Sphericity	Approx. Chi-Square	3884.089
	df	561
	Sig.	.000

Table 4: Test of preconditions for analysis

Regression tests were conducted for hypotheses testing,in order to understand the relationship between variables and to determine the strength of the relationships. The following table is a summary of the regression analysis of the research hypotheses.

					Change Statistics				
Hypothesis	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.791[a]	.626	.623	.70388	.626	177.709	1	106	.000
2	.587[a]	.345	.338	.75777	.345	55.716	1	106	.000
3	.606[a]	.367	.361	.55582	.367	61.391	1	106	.000
4	.659[a]	.434	.429	.49102	.434	81.411	1	106	.000
5	.579[a]	.298	.292	.38380	.298	45.035	1	106	.000
6	.565[a]	.319	.313	.37803	.319	49.682	1	106	.000
7	.577[a]	.271	.264	.41626	.271	39.389	1	106	.000
8	.687[a]	.472	.467	.50772	.472	94.607	1	106	.000
9	.728[a]	.530	.521	.45211	.530	59.207	2	105	.000

Table 5: Summary of regression analysis of hypotheses

DISCUSSION AND CONCLUSION

Technology in the educational process is not new, and mobile learning applications have become more pervasive. Therefore, it is necessary to understand the impact of technology used in learning options. Modern speech recognition technology has had a great effort on mobile learning applications. It helps a user to interact with the device as if he or she were talking to another person. Many studies have been conducted on the challenging characteristics of Arabic speech recognition. One of them is how to recognize verbal verses from the Quran.

A comprehensive study of every aspect about mobile learning is necessary, because mobile learning in Saudi Arabia is still in its early stages. It is important to meet the goals of various m-learning factors. This study has aimed to develop the Say Quran application and to perform experiments to verify its influence on users. The survey results confirmed nine hypotheses, and the proposed model has been confirmed. All hypotheses were accepted by the study, as did previous experimental studies (Kamaruzaman&Zainol, 2012; Mara, 2012;Miao, 2012; Chaiprasurt et al., 2011; MacCallum, 2009; Kim. *et al.,* 2005).Despite the challenges of applying the

application, most respondents in the study had high satisfaction and positive attitudes towards the m-learning application. However, the study could be repeated with a larger sample size in order to generalize the results.

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Modification of DeLon and Mclean Model in the Success of Information System for Good University Governance

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ABSTRACT
Information System (IS) is requirement for private colleges in improving their governance to reach Good University Governance (GUG). From 2006 to 2008 information technology (IT) assistance had been granted to 1,072 private colleges and continued by grant development program. Considering such a big IT grant, there is a need to study the IT grant efficiency and the success in its implementation in private colleges as well as appropriate leadership to reach GUG. This research used a sample of 61 private colleges in East Java under Kopertis Wilayah 7 (Coordinator of Private Higher Learning Institutions-Region 7), consisting of universities, institutes, polytechnics and academies as recipients of IT Grant during a period of 3 years. Each private college was represented by 4 persons as respondents consisting of those managers of IT in the areas of academic, finance, website and library, so that the number of expected respondents were 244. However, only 112 of the data sets were obtained and eligible to analyze. The collection of data was conducted by questionnaires and interviews. Data analysis was done using Path Analysis with Structural Equation Modeling (SEM) to analyze the 7 variables under study, i.e. transformational leadership, system quality, information quality, service quality, individual impact, user satisfaction and GUG. Eleven hypotheses were formulated and examined, and 5 hypotheses were not significant, while 15 hypotheses were significant. The non significant hypotheses were influence of: (1) transformational leadership on user satisfaction, (2) system quality on individual impact, (3) information quality on individual impact, (4) service quality on individual impact, (5) user satisfaction on GUG. Six significant hypotheses were influence of: (1) transformational leadership on individual impact, (2) system quality on user satisfaction, (3) information quality on user satisfaction, (4) service quality on user satisfaction, (5) user satisfaction on individual impact, and (6) individual impact on GUG. Private colleges need betterment efforts, especially in human resources to handle information technology (IT). However, there are many constraints faced to achieve GUG and need attention: (a). availability of human resources mastering technology, (b). supportive policy. Users of IS in private colleges should always improve their knowledge and skills.
Keywords: transformational, leadership, system, information, success, and GUG

INTRODUCTION

Support for information technology (IT) has been implemented by the Directorate General of Higher Education (Higher Education) since 2006 (Dikti,2006), to help colleges, the present is a major requirement for the college (PT) in improving governance in achieving the Good University Governance (GUG). Forms of organization in the IT management have its own character that is distinctive for which the form of required information system must have its own character (Kertahadi,1998). It required leadership style; power-oriented leadership style will be less effective than the leadership style-oriented expertise (expertise) and behavioural (Nimran,1997). Transformational leadership includes three components: idealized influence (charisma), intellectual stimulation, and individual attention (individualized consideration) (Bass and Avolio,1994). The new revision of the theory of transformational leadership, transformational behaviour adds another called inspirational motivation (Bass and Avolio,1999).

According to (Mac Kenzie et al,2001) there are some fundamental differences between transformational and transactional leadership on how to influence subordinates, the study was not enough to produce findings that support transformational leadership model (Tepper and Taylor, 2003). Conflicting evidence emerged with respect to the factor structure of the model, and found a very strong relationship inter-sub dimension (Avolio et al, 1999). (Rafferety,2004) is based on a model developed from the (Bass and Avolio,1994) found five sub-dimension transformational leadership which has discriminant validity between each other. So is the case in higher education leads based information system that the system can be successful.

Information systems success model has been developed by previous researchers (Bailey and Pearson, 1983), several success models of the information systems,(DeLon and McLeanm1992, DeLon and McLean,2002, DeLon and McLean,2003) model obtained a lot of attention from researchers subsequently (McGill et al,2003), (Livari,2005) also examined the empirical model of DeLone and McLean, the results prove that the success of

information systems is influenced by the system quality, information quality and service quality, user satisfaction and individual impact.

Discussing the quality of the system is to feel the ease of use is the most common measure of the system quality because a large amount of research related to TAM (Davis,1989). But the notion that ease of use associated with the development of the overall system quality. (Rivard et al,1997) Develop and test a device that consists of 40 items that measure the quality of the system with eight factors: reliability, portability, hospitality use, easy to understand, effectiveness, ease of maintenance, economical, and certainty. It has created its own index by using the dimensions of quality identified from the model of the original D & M or they review by themselves the System Quality through referrals (Petter,2008, Seddon,1997) saw a connection between the system quality and perceived usefulness. (Seddon, 1997) results concerning the relationship between these two variables, supported by the research results of (Rai et al,2002).

Information quality is often a key dimension of the instruments concerning the end-user satisfaction (Ives et al, 1983); (Doll and Torkzadeh, 1998). As a result, the information quality is often not distinguished as a unique construction, but measured as a component of user satisfactions. Therefore, the size of this dimension is an issue for the successful study of IS. Develop a generic scale of information quality and others have developed their own scale using literature that is relevant to the type of information system under study (Wixom and Watson,2001).

Service quality (Servqual) is as a tool for measuring the service quality (Pitt et al,1995). While Servqual is the most commonly used to measure the service quality of IS, has received some criticism. However, by using factor analysis confirmation Jiang et al,2002) found that Servqual is a satisfactory tool for measuring the quality of IS services. Another measure of service quality has included the expertise, Satisfaction, and capabilities of supporting staff (Yoon et al,1998). The most widely used by the user of instrument satisfaction is (Doll and Torkzadeh, 1998). instrument of End User Computing Support (EUCS) and (Ives et al, 1983) instrument of user information satisfaction (UIS). In a comparison between the Doll and Torkzadeh's EUCS and UIS, (Seddon and Yip,1992) found advantages EUCS instruments and UIS in the context of accounting IS. Individual impact is closely linked to performance, namely improving the performance of individual users of the system (Mason,1978) shows the sequence of impacts ranging from the received information, understanding information, application information is a little market specific issues and decisions to change behavior by changing the organization's performance (Chervani et al,1992), use the decision effectiveness measurement to measure the impact of information systems.

One of the derivative concepts, then, even involves the implementation of the corporation, which is Good Corporate Governance (Josua,2006), (Trakmen,2008), suggested a model of university governance, namely: University governance by academic staff; Corporate governance: Trustee governance; Stakeholder governance ; Amalgam models of governance. The measurement of GUG on the colleges is adopted from the good corporate governance (GCG) included four indicators (Ramaswamy et al,2008): a) Fairness, b) Transparency, c) Responsibility, d) Accountability.

THE STUDY

Type of Research

The type of research conducted is survey research, that is by taking a sample of the population using the questionnaire as a suitable data collection tool (Singarimbun and Effendi,1986). Research survey conducted for the purpose is behavioural research in the implementation of information systems of private colleges (Astuti,2006) which provides an explanation for the relationship between variables through research and testing previously formulated.

Location of Research

The research site is in private colleges (*PTS*), which have received grant funding of ICT in the province of East Java with some following consideration criteria: 1) The *PTS* should have received a grant from the Higher Education ICT, 2) The *PTS* should have been running the grant of ICT, especially in the areas of Academic, Finance, Library and Web as a medium of information, 3) The *PTS* should have been running the college information system in the form of online or offline (Tajuddin et al,2014.

Population and Sample

Sample is equal to population or referred to saturated sample, respondents are 244 people of management led-level of information systems on *PTS*, which are 4 MIS leaders of each *PTS;* Academic Management, Financial Management, Library Management and Website, so that 4 x 61 *PTS* = 244 samples. The *PTS* samples have

received grant funding from the ICT Directorate General of Higher Education from 2006 to 2008, East Java, where the number of private colleges received the funding of ICT is as much as 61 *PTS*. The detailed description of the ICT grants recipients of *Kopertis* Region VII East Java is as follows: Academy: 3 *PTS*; Polytechnic: 2 *PTS*; College: 28 *PTS*; Institute: 4 *PTS*, and University: 23 *PTS*.

Technique of Data Collecting

In this research, data collection is conducted by: questionnaire, interview; documentation; observation and depth interview.

Operational Definition of Research Variable

1. Transformational Leadership Variable

Based on the model developed by (Pounder,2001), promoted to five sub-dimension transformational leadership is composed of (Rafferety,2004): a) Vision; b) Iinspirational Communication; c) Supportive Leadership; d) Intellectual Stimulation; and e). Personal recognition. In this study, transformational leadership will be measured through five sub-dimensions on the adaptation of measurement developed by (Bass,1990) using a five-point Likert scale, namely: Vision is measured using 8 (eight) question items, inspirational communication is measured by using 7 (seven) question items, supportive leadership is measured by using 8 (eight) question items, intellectual stimulation is measured using 11 (eleven) question items, and personal recognition is measured using 7 (seven) question items that developed from (Rafferety,2004).

2. **System QualityVariable**

Quality system means the quality of hardware and software combination in information systems. The focus is on performance of the system which refers to how well the capabilities of hardware, software, policies, and procedures of information systems can provide information for the needs of users (DeLon and McLean,2004). Indicators used are 5 (five) indicators used by (Wixsom and Watson,2001), namely: a) Ease of Use, b) System Flexibility, c) System Reliability, c) Data Accuracy, d) Human Factor.

3. **Information Quality Variable**

Information Quality refers to the output of the information system, concerning the value, benefits, relevance, and urgency of the information produced (Pitt et al,1995). This variable describes the quality of information perceived by users as measured by 4 (four) indicators used (Wixsom and Watson,2001), namely: a) Accuracy of information, b) Completeness of information, c) Format Information, d) Currency.

4. **Service Quality Variable**

Service quality variable of the information system regarding the quality of the resulting system whether the user is willing or not and to what extent the system can assist users in generating jobs. This variable is measured using (DeLon and McLean,2004) indicators: a) Quick responsiveness), b) Insurance, c) Empathy, d) Service afterwards (Following up), e) Online affectivity.

5. **User Satisfaction Variable**

User satisfaction is a response and feedback which is raised by users after using the information system. User attitudes towards information systems are subjective criteria about how like the user to the system used. This variable is measured by four (Seddon and Kiew,1996); (McGill et al,2003) indicators consisting of: a) Software satisfaction. b) Efficiency, c) Effectiveness, d) Satisfaction.

6. Individual Impact Variable

Individual impact is the influence of information on user behaviour is closely linked to performance, which is improving the performance of individual users of the system. (Mason,1978) Describes the impact sequence starting from receiving information, understanding information, application of information to a particular problem and change the decision behaviour, with the result of organizational performance changes. Impact can also mean to have contribution to the user, a better understanding of decision making, increase productivity of decision making, change user activity or change user's perception on the importance or usefulness of the information systems. The individual impact variables (Goodhue,1998) are as follow: a) Effectiveness and Productivity, b) Important and Valuable.

7. **Good University Governance (GUG) Variable**

Good university governance itself is not a standard concept in its application, except in the case of basic managerial principles. These applications can vary, according to the conditions and ideologies that embraced by a nation or society. For example, good university governance in the United States are usually applied by giving full autonomy, both in terms of academic and managerial and financing, to higher education institutions as long

as it can be justified. Consequently, government influence is relatively weak and vice versa, the authority of the executive managers and board of a university to be strong.

The importance of autonomy in achieving academic excellence (i.e. in terms of teaching and research) for higher education, but not the same thing applies in terms of managerial and financing. This disagreement is usually associated with important functions for the community colleges and high cost of higher education. On current trends, the high cost of higher education is usually considered to be a burden the state and society, so that universities be better trying to find independent sources of financing. In the measurement of the college adopted the GUG of good corporate governance (GCG) includes four indicators (Ramswamy et al,2008): a) Fairness, b) Responsibility, c) Transparency, and d) Accountability

Analysis Method using Path Analysis (Gozali,2007) and Structural Equation Modelling *(SEM)* (Hair et al,1998).

FINDINGS

Description of Research Variable

The research is conducted by distributing questionnaires to respondents involved in the management of information and communication technology (ICT) at private colleges in the province East Java. The improper questionnaire to be analysed is returned questionnaires, but the respondent's answers are incomplete, inconsistent, not eligible as samples. The results showed that only 30 private colleges with 120 respondents, after data verification, only 112 respondents are eligible.

Clustering results of the 112 respondents based on the form of college are grouped into five sections those are 13 universities by 47 respondents, 1 institute by 4 respondents, 13 colleges by 49 respondents, Polytechnic by 8 respondents and 1 Academy by 4 respondents. Based on gender is dominated by 64 men and 48 women. Based on the age is classified into 4 intervals; = <25 years is 5 people, 24 people are 26-35 years, 36-45 years is 51 people and the fourth group is > 45 years is 32 people. Based on the study are grouped into five levels of education; 3 Diploma, 50 S1, 51 Masters, 8 Doctoral, and no other. Based on work Satisfaction or work duration; under 5 years is 13 people, 27 people are 5-10 years, 11-15 years work Satisfaction is 27 people, and over 15 years is 45 people.

Construct Validity and Reliability

Validity is the valid observed variables that actually represent the construct of unobserved variables. The construct validity test is necessary in a behavioural study to ensure that the operational variables measured the desired construct properly (Hair et al,1998).

The validity measured in this study is construct validity. The construct validity is measured through convergent validity and discriminant validity. Convergent validity is demonstrated confirmation of construct validity through measurement of a particular measurement method. Whereas discriminant validity is a measurement that indicates that a construct is different from the other construct (Hair et al,1998).

Convergent validity and discriminant validity can be measured through the use of factor analysis. Convergent and discriminant validity of the measurement by the author referred to the measurements presented by (Hair et al,1998), measuring convergent validity through the variance extracted, while discriminant validity is measured by comparing the average squared of correlation (variance correlation) among constructs with the variance extracted of each construct. Alpha value of extracted variance of each variable is greater close to or greater than 0.5. Variance extracted value indicates all variables analysed have adequate convergent validity.

Calculation of the discriminant validity of each variable is presented below. In Appendix 3 shows the mean variance correlation among variables, and the results compared to the obtained average variance extracted. All the analysed construct variance extracted is greater than its average variance of correlation. So it can be said that all the analysed construct has good discriminant validity.

Structural Model Test

1. Assumption Test

Analysis through structural equation modelling is performed using two-stage approach (Hair, et al., 1998), several advantages of the two-stage approach compared to one-stage approach, of which it is possible to test all the patterns of relationship coefficients contained in the model, allowing for understand whether any structural model will provide an acceptable fitness value, minimize interpretational confounding through the estimation of measurement models first.

2. DataNormalization Test

Normality of the data can be tested by observing the value of skewness and kurtosis which are usually presented in descriptive statistics. Statistical value used to test for normality is the z-value. When the z value is greater than the critical value, it can be assumed that the data distribution is not normal. This critical value can be determined based on a specified level of significance. At the 0.01 level, if the value of z greater than ± 2:58 then the assumption of data normality is rejected.

3. Outliers

Test the presence or absence of outliers, can be seen with the Mahalanobis distance (Md). Mahalanobis distance is a measure distances far-near from the centre of data "average" with each observation point. In this case the observation point is the respondent's number of questionnaire. Examination of the multivariate outliers performed using Mahalanobis criterion at the level of p <0.001. Mahalanobis distance is evaluated using the number of degrees of freedom parameter in the model used is = 114 which is obtained from statistical tables = 166.41. The rule of making decisions, if Md from the point of observation> 166.41 then said that it is the outlier observation point, whereas if Md from the point of observation <166.41 it is said that the observation point is not an outlier.

4. Analysis of Fit Model

Measurement model is measured from the loading factor (standardize coefficient) on each indicator to latent variable. Factor loading values indicate the weight of each indicator as a measure of each variable. Indicator with a large factor loading indicates that the indicator variable as the strongest (dominant) measure. The results of confirmatory factor analysis of indicators of the four variables in the first model can be seen in the following table.

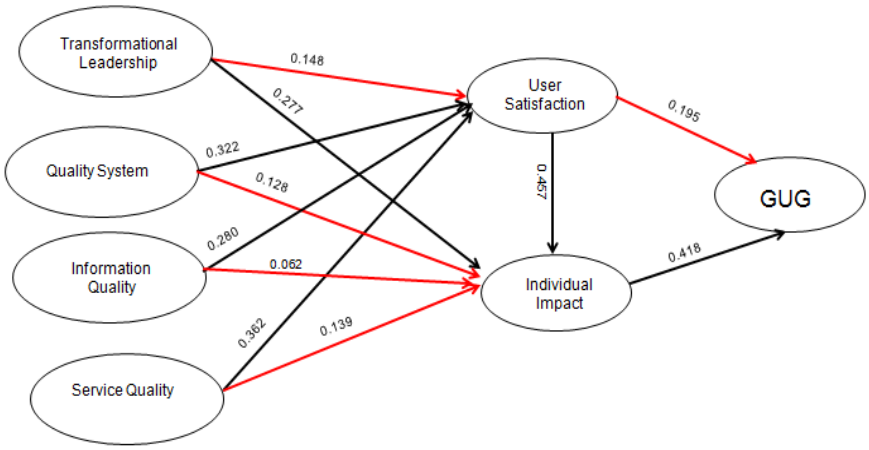

Figure 1. SEM Result Structural Model

Based on the Figure 1. the results of structural model testing is presented as follows:

1. There is no significant influence of Transformational Leadership on User Satisfaction. It is seen from the p-value> alpha of 0.05. This means that regardless of the high value of Transformational Leadership, will have no influence on the value of User Satisfaction.
2. There is a significant influence of Quality System to User Satisfaction. It is seen from the p-value <alpha of 0.05. Because the coefficient is positive indicating the direction of their relationship. This means that the higher the value of the System Quality, the higher the value of User Satisfaction.
3. There is a significant influence on Information Quality to User Satisfaction. It is seen from the p-value <alpha of 0.05. Because the coefficient is positive indicating the direction of their relationship. This means that the higher the quality of information, the higher the value of User Satisfaction.
4. There is a significant influence on the Service quality to User Satisfaction. It is seen from the p-value <alpha of 0.05. Because the coefficient is positive indicating the direction of their relationship. This means that the higher the value of service quality, the higher the value of User Satisfaction.
5. There is a significant influence Transformational Leadership to Individual Impact. It is seen from the p-value <alpha of 0.05. Because the coefficient is positive indicating the direction of their relationship. This means that the higher the value of transformational Kepemimpina, the higher the value of individual impact.
6. There is no significant influence of the impact of System Quality to Individual Impact. It is seen from the p-value> alpha of 0.05. This means that regardless of the value of the System Quality, will have no influence on the level of the individual influences.

7. There is no significant influence of Information Quality to Individual Impact. It is seen from the p-value> alpha of 0.05. This means that regardless of the quality of information, will have no influence on the level of the Individual Impact.
8. There is no significant influence of Service Quality to Individual Impact. It is seen from the p-value> alpha of 0.05. This means that regardless of the Service Quality, will have no influence on the Individual Impact.
9. There is a significant influence of Individual Impact to User Satisfaction. It is seen from the p-value <alpha of 0.05. Because the coefficient is positive indicating the direction of their relationship. This means that the higher value of user satisfaction, the higher value of the individual impact.
10. There was no significant influence of User Satisfaction to Good University Governance. It is seen from the p-value> alpha of 0.05. This means that regardless of the value of User Satisfaction, will have no influence of the Good University Governance.
11. There is a significant influence of Individual Impact to Good University Governance. It is seen from the p-value <alpha of 0.05. Because the coefficient is positive indicating the direction of their relationship. This means that the higher value of user satisfaction, the higher value of the individual impact.

In addition to testing the direct influence, in the SEM also known as indirect influence. Indirect influence is the result of multiplying two indirect influences. Revealed a significant indirect influence if the both direct influence of the shape it is significant. Here are presented the results of the indirect influence:

Table 1. SEM Result Structural Model: Indirect Influence

Indirect Influence	**Direct Influence Coefficient**		**Indirect Influence Coefficient**	**Remarks**
X1 →Y1 → Y2	X1 →Y1 = 0.148	Y1 → Y2 = 0.457	0.068	X1 →Y1 → Y2
X2 →Y1 → Y2	X2 →Y1 = 0.322	Y1 → Y2 = 0.457	0.147	X2 →Y1 → Y2
X3 →Y1 → Y2	X3 →Y1 = 0.280	Y1 → Y2 = 0.457	0.128	X3 →Y1 → Y2
X4 →Y1 → Y2	X4 →Y1 = 0.362	Y1 → Y2 = 0.457	0.165	X4 →Y1 → Y2
Y1 →Y2 → Y3	Y1 →Y2 = 0.457	Y2 → Y3 = 0.418	0.191	Y1 →Y2 → Y3

Source: Primary Data Processed
Note: * stated significant at 5% error rate

Based on the above tables and figures, the results of structural model testing are presented as follows:

1. Indirect influence of Transformational Leadership to Individual Impact through User Satisfaction, indirect influence coefficients obtained for 0.068. Because the direct influence (Transformational Leadership to User Satisfaction, and Individual Impact to User Satisfaction) one of which is not significant, it can be concluded there is no significant indirect influence of Transformational Leadership to Individual Impact through User Satisfaction. This means that regardless of the value of Transformational Leadership, will not influence at high and low value of individual influences, although changing the value of User Satisfaction.
2. Indirect influence of the Quality System to Individual Impact through User Satisfaction, indirect influence coefficients obtained for 0.147. Due to the direct influence (Quality System to the User Satisfaction, and the Individual Impact User Satisfaction) are both significant, it can be concluded there is a significant indirect influence of the Individual Impact System Quality through User Satisfaction because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher the value of the Quality System, the higher the value of individual impact, if the User Satisfaction is also increases.
3. Indirectly influence of Information Quality to Individual Impact through User Satisfaction, indirect influence coefficients obtained for 0.128. Due to the direct influence (Information Quality to User Satisfaction and User Satisfaction to Individual Impact) are both significant, it can be concluded that there are significant indirect influences between the qualities of information on the Individual Impact through User Satisfaction because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher of Information Quality, the higher value of Individual Impact, if the User Satisfaction is also increase.
4. Indirect influence of the Individual Impact to Service Quality through User Satisfaction, indirect influence coefficients obtained for 0165. Due to the direct influence (Service Quality to User Satisfaction and User Satisfaction to Individual Impact) are both significant, it can be concluded that there are significant indirect influences between the Individual Impact to Service Quality through User Satisfaction because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher value of Service Quality, the higher value of Individual Impact, if the User Satisfaction is also increase.
5. Indirect influence of User Satisfaction to Good University Governance through Individual Impact, the indirect influence coefficients obtained for 0.191. Because the direct influence (the Individual Impact to User Satisfaction, Individual Impact to Good University Governance) are both significant, it can be concluded that

there are significant indirect influences between the User Satisfaction to Good University Governance through Individual Impact because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher value of User Satisfaction, the higher value of Good University Governance, if the Individual Impacts is also increase.

Descriptive data analysis carried out by studying the frequency distribution of respondents' answers to introductory question items about the identity of respondents, while the inferential statistical data analysis is done through a review of respondents' answers on the research variables. Inferential analysis through structural equation modeling (SEM) techniques on the results of questionnaire data collection. The SEM results of data processing are as follow:

Tabel 2.SEM Result Structural Model: Direct Influence

Inter-Variable Relationship	Coefficient	P-value	Remarks
Leadership Transformational (X1) → User Satisfaction (Y1)	0.148	**0.150**	Non Significant
System Quality (X2)→ User Satisfaction (Y1)	0.322	0.005	Significant
Information Quality (X3) → User Satisfaction (Y1)	0.280	0.011	Significant
Service Quality (X4) → User Satisfaction (Y1)	0.362	0.002	Significant
Leadership Transformational (X1) → Dampak Individu (Y2)	0.277	0.006	Significant
System Quality (X2)→ Individual Impact (Y2)	0.128	**0.234**	Non Significant
Information Quality (X3) → Individual Impact (Y2)	0.062	**0.550**	Non Significant
Service Quality (X4) → Individual Impact (Y2)	0.139	**0.221**	Non Significant
User Satisfaction (Y1) → Individual Impact (Y2)	0.457	0.002	Significant
User Satisfaction (Y1) → *Good University Governance* (Y3)	0.195	**0.222**	Non Significant
Individual Impact (Y2) → *Good University Governance* (Y3)	0.418	0.011	Significant

Source: Primary Data Processed.

Influence of Transformational Leadership towards User Satisfaction

Based on the analysis, the coefficient of the relationship between Transformational Leadership and User Satisfaction is 0.148 with p-value is 0.150. Because the p-value> 0.05 indicates that the hypothesis that "the relationship between Transformational Leadership and User Satisfaction" is rejected. This means that regardless of the value of Transformational Leadership, will have no influence on the level of User Satisfaction value.

Influence of Quality towards User Satisfaction

Based on the analysis, the coefficient of relationship between the System Quality and User Satisfaction is 0.322 with p-value is 0.005. Because the p-value> 0.05 indicates that the hypothesis that "the relationship between System Quality with User Satisfaction" is received. Because the relationship is positive coefficient indicates a direct relationship. This means that the higher value of System Quality, the higher value of User Satisfaction.

Influence of Information Quality towards User Satisfaction

Based on the analysis, the coefficient of relationship between Information Quality and User Satisfaction is 0.280 with the p-value is 0.011. Because the p-value <0.05 indicates that the hypothesis that "the relationship between User Satisfaction and Information Quality" is received. Because the relationship is positive coefficient indicates a direct relationship. This means that the higher Information Quality, the higher value of User Satisfaction.

Influence of Service Quality towards User Satisfaction

Based on the analysis, the coefficient of relationship between Service Quality and User Satisfaction is 0.362 with a p-value of 0.002. Because the p-value <0.05 indicates that the hypothesis that "the relationship between Service Quality and User Satisfaction" is received. Because the relationship is positive coefficient indicates a direct relationship. This means that the higher the value of service quality, the higher the value of User Satisfaction.

Influence of Transformational Leadership towards Individual Impact

Based on the analysis, the coefficient of relationship between Transformational Leadership and Individual Impact is 0.277 with a p-value is 0.006. Because the p-value <0.05 indicates that the hypothesis that "the relationship between Transformational Leadership and Individual Impact" is acceptable. Because the relationship

is positive coefficient indicates the direction of the relationship. This means that the higher value of Transformational Leadership, the higher value of Individual Impact.

Influence of System Quality towards Individual Impact

Based on the analysis, the coefficient of relationship between System Quality and Individual Impact is 0.128 with p-value is 0.234. Because the p-value> 0.05 indicates that the hypothesis that "the relationship between System Quality with Individual Impact" is rejected. This means that regardless of the value of Quality System, will have no influence on the level of Individual Impact.

Based on the analysis of indirect influences between the Quality System to Individual Impact through User Satisfaction, obtained coefficients of the indirect influence of 0.322x0.457 = 0.147. Due to the direct influence (System Quality to the User Satisfaction, and the Individual Impact to User Satisfaction) are both significant, it can be concluded that there are significant indirect influences of the System Quality to Individual Impact through User Satisfaction. Because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher value of System Quality, the higher value of Individual Impact , if the value of the User Satisfaction is also increase. From the above shows that the influence of the System Quality (X2) to Individual Impact (Y2) through the intermediate variable, User Satisfaction (Y1). Thus User Satisfaction (Y1) is an intervening variable influences that bridged between System Quality (X2) and Individual Impact (Y2).

Direct Influence of Information Quality towards Individual Impact

Based on the analysis, the coefficient of relationship between Information Quality and Individual Impact is 0.062 with p-value is 0.550. Because the p-value> 0.05 indicates that the hypothesis that "the relationship between Information Quality and Individual Impact " is rejected. This means that regardless the value of Information Quality, the higher value of Individual Impact.

Based on the analysis of indirect influences between Quality of Information and Individual Impacts through User Satisfaction, obtained coefficients of the indirect influence is 0.280x0.457 = 0.128. Due to the direct influence (Information Quality to User Satisfaction and User Satisfaction to Individual Impact) are both significant, it can be concluded that there are significant indirect influences between the Information Quality and Individual Impact through User Satisfaction. Because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher Information Quality, the higher value of Individual Impact, if the value of the User Satisfaction is also increase. From the above shows that the influence of Information Quality (X3) to Individual Impact (Y2) through the intermediate variable, User Satisfaction (Y1). Thus User Satisfaction (Y1) is an intervening variable that bridged influences between Information Quality (X3) and Individual Impact (Y2).

Influence of Service Quality towards Individual Impact

The relationship hypothesis testing between Individual Impact and Service Quality is presented in Table 5.18. Based on the analysis, the coefficient of relationship between Service Quality and Individual Impact is 0.139 with p-value is 0.221. Because the p-value> 0.05 indicates that the hypothesis that "the relationship between Service Quality and Individual Impact" is rejected. This means that regardless of the Service Quality, will have no influence on the level of Individual Impact.

Based on the analysis of indirect influences between Individual Impact and Service Quality through User Satisfaction, obtained coefficients of the indirect influence of 0.362x0.457 = 0.165. Due to the direct influence (Service quality to User Satisfaction and User Satisfaction to Individual Impact) are both significant, it can be concluded that there are significant indirect influence of Individual Impact to Service Quality through User Satisfaction. Because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher value of Service Quality, the higher value of Individual Impact, if the value of User Satisfaction is also increase. From the above shows that the influence of Service Quality (X4) to Individual Impact (Y2) through the intermediate variable, User Satisfaction (Y1). Thus User Satisfaction (Y1) is an intervening variable that bridged influences between Service Quality (X4) and Individual Impact (Y2).

Influence of User Satisfaction towards Individual Impact

The hypothesis testing of the relationship of User Satisfaction and Individual Impact is presented in Table 5.18. Based on the analysis, the coefficient of relationship between User Satisfaction and Individual Impact is 0.457 with p-value is 0.002. Because the p-value <0.05 indicates that the hypothesis that "the relationship between User Satisfaction and Individual Impact" is acceptable. This means that the higher value of User Satisfaction, the higher value of Individual Impact.

Influence of User Satisfaction towards Good University Governance

The relationship hypothesis testing between User Satisfaction and Good University Governance is presented in Table 5.18. Based on the analysis, the coefficient of relationship between User Satisfaction and Good University Governance is 0.457 with p-value is 0.002. Because the p-value <0.05 indicates that the hypothesis that "the relationship between User Satisfaction and Good University Governance" is received. This means that the higher value of User Satisfaction, the higher value of Good University Governance.

Based on the analysis of indirect influences between User Satisfaction and Good University Governance through Individual Impact, the coefficient obtained by the indirect influence is 0.457x0.418 = 0.191. Because the direct influence (Individual Impact to User Satisfaction and Individual Impact to Good University Governance) are both significant, it can be concluded that there are significant indirect influences between the User Satisfaction and Good University Governance through Individual Impact because the coefficient of the indirect influence is positive indicating a direct relationship. This means that the higher value of User Satisfaction, the higher value of Good University Governance, if the Individual Impacts is also increase. Result shows that the influence of User Satisfaction (Y1) to Good University Governance (Y3) through the intermediate variable, Individual Impact (Y2). Thus the Individual Impact (Y2) is the of intervening variables that bridging influence between User Satisfaction (Y1) and Good University Governance (Y3).

Influence of Individual Impact towards *Good University Governance*

The relationship hypothesis testing between Individual Impact and Good University Governance is presented in Table 5.18. Based on the analysis, the coefficient of relationship between Individual Impact and Good University Governance is 0.418 with p-value is 0.011. Because the p-value <0.05 indicates that the hypothesis "the relationship between Individual Impact and Good University Governance" is received. Because the coefficient of relationship indicates the influence of both positive marked unidirectional. This means that the higher value of Individual Impact, the higher value of Good University Governance.

CONCLUSIONS

This research contributes to the successful model of information system by adding confirmatory factor analysis to the five (5) research variables of information system success based on the DeLone and McLean's theory that is the system quality, information quality, service quality, user satisfaction and individual impact. The addition of CFA will help to identify the validity and reliability of each indicator becomes instrument of the five variables in this research. The research also found of the two hypothesis proposed towards GUG in which one hypothesis is proved directly influences to GUG, that is the relationship between individual impact and GUG, while indirectly, is the relationship between user satisfaction through individual impact to GUG.

There are eleven hypothesis are constructed in this research that is relationship exists in the transformational leadership theory, the success model of information system. After the hypothesis testing proposed in this research, five of eleven hypotheses are not significant if directly related, whereas if it is indirectly related, only one hypothesis is not significant.

Compared with the results there are some differences primarily due to model differences in the used five variables namely system quality, information quality, service quality, and individual impact. From this DeLone and McLean's five variables, namely Hypothesis H2, H3, H4, and H9, while H6, H7, H8, adopted the model of Seddon. The results show that Hypothesis H2, H3, H4 and H9 provide the same hypothesis with research of DeLone and McLean. Meanwhile, H6, H7 and H8 opposed against Seddon and Kiew. The results of this research on transformational leadership is that the transformational leader who behaves in his leadership, will be more effective, more satisfied to subordinates, and better capability to create an extra effort to subordinates in carrying out the responsibilities. Implication of these results is for future research in the same topic.

Valid instrument is developed using samples data collected from the developed countries, confirmatory analysis and cross-cultural, validation using a large sample gathered elsewhere is required for further generalization of the instrument. While exploratory factor analysis can be a satisfactory technique during the early stages of research on the construction, subsequent use of confirmatory factor analysis (CFA) seems necessary at a later stage. The advantage of applying CFA as compared to the classical approach to determine convergent and discriminant validity is widely recognized.

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Perceptions of Teachers and Students towards Educational Application of SNS and its Educational Effects in Middle School Class

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ABSTRACT
SNS use by youth is a growing trend. However, there is a lack of studies on how the application of SNS can contribute to learning and public education for youth. As SNS was not originally developed for educational purposes, there is a possibility that it can be used for meaningful educational activity or that its application can lead to the opposite result. This study aims to investigate educational applications and effects of SNS in class through in-depth interviews with middle school teachers and students. Two teachers and 20 students using SNS in the classroom participated in this research. Data was collected through in-depth and written interviews. Course materials were also collected and all data were analyzed. The results of this study are as follows. SNS can be used for not only subject education but also for various kinds of learning activities. Positive effects were found such as expanding the face-to-face communication opportunities of teachers and students, increasing the frequencies of interactions, and widening the spectrum of educational opportunities and variety when properly applied. SNS was also applied for effective class management and student guidance work. However, as negative effects of SNS application including students' exposure to unhealthy information and cyber-bullying were reported, further efforts are needed to identify appropriate methods of using SNS for educational purpose.

INTRODUCTION
Recently, the emergence of the Internet and the development of wireless communications technology have enabled the presentation of education in various methods without limitations of time and place. Along with these changes, usage of diverse Social Networking Services (SNS) such as Facebook, Twitter, Line, and others have been invigorated. Especially, as Internet usage by portable mobile devices has increased due to the development of wireless communications technology, SNS has become a part of daily life for the younger generation.

Though there is an argument that excessive use of SNS interferes with learning in youth, considering the fast growth of SNS as a daily communication tool, it is better to encourage meaningful educational applications than to prevent its use. Public education, the fruit of communication and interaction among teacher, students, and learning contents, can be promoted by the proper application of media that helps communications such as SNS. While past education focused on face-to-face communication between teacher and students or knowledge acquisition through books, recent education has evolved by adapting various media including e-books and smart devices. Highly advanced networks and the spread of smart devices enable more comfortable and diverse applications of SNS as a new educational communication tool (Lim, Kang, & Shin, 2012; Weber, 2012).

There are many reviews on applying SNS as a tool for ensuring the internal stability of school education due to the fact that a majority of secondary school students use SNS for communication. There are also several teachers that currently apply SNS in many areas of school education in a limited manner (Seol & Son, 2012; Choi & Lee, 2012; Kimmons, & Veletsianos, 2014). For example, opinions about specific topics can be shared with individuals outside the classroom through SNS, and students can expand their knowledge acquisition process thorough communication with either a teacher or with peers after school. Therefore, it is necessary to determine how to apply SNS for education and explore the use of SNS in the educational environment to expand the area of learning.

Though the use of SNS by teenagers has been increasing, there is little research on the effects of SNS application on learning and school education. As SNS was not originally developed for educational purposes, it can be used meaningfully for educational purposes or can bring a completely opposite effect depending on the context and users. Therefore, this study aims to investigate the educational application and effects of SNS with middle school teachers and students by adapting the qualitative method. The following are the research questions for this study.

Q1. What are the perceptions of middle school teachers and students towards the educational application of SNS?

Q2. What are the perceptions of middle school teachers and students towards the educational effects of SNS?

LITERATURE REVIEW

SNS Use for Educational Purpose

SNS refers to a kind of social media tool used for communication that brings the offline concept of social relationships into the online space and allows individuals to share their ideas or interests and express their opinions. There are many types of SNS and they are used in various areas such as management, advertisement, or politics (Weber, 2012). Boyd and Ellison (2007) defined SNS as a web-based service that constructs an individual's profile, shares connections created through the individual's relationships, and supports the individual's interactions based on these connections. They (2007) emphasized the individual's autonomous participation in using SNS while declaring SNS as a service that promotes an individual's interactions.

Richter (2008) categorized the characteristics of SNS as follows: personal information management, professional investigation, context understanding, network management, and information exchange activities. SNS supports learning activities not limited to the physical space by expanding learning spaces, enabling learners to take control of the learning process by giving them the initiative, promoting self-reflective learning, and encouraging peer learning (Greenhow & Robelia, 2009). According to several studies, many students admitted that using SNS was good for discussing learning topics and sharing ideas. These activities were confirmed to be helpful for achieving the given learning objectives (Yue et al., 2009; Alloway, Horton, Alloway, & Dawson, 2013).

There are two main reasons for using SNS for educational purposes in school environments. First, SNS is used for improving class quality in the teaching and learning context. Education developed based on the social relationships from exchanged knowledge online can be evaluated through students' activities such as posting their opinions about projects, assignments or discussion topics to their SNS or sharing photos taken during field study with other classmates.

Second, there is a possibility of SNS application not only for curriculum education but also as a communication tool among members of the school community such as teachers, students, and parents. This exchange of opinions should be considered as part of the educational activity in a broad sense. As using SNS to facilitate student communications can enhance the mutual understanding of school members and establish a sense of trust, it is necessary to examine the impact of SNS on improving the quality of education by improving the school culture.

In this study, SNS for educational purposes can be defined as 1) a tool for reflecting or forming social relationships between teachers and students to promote public education in the virtual space, and 2) services that provide either web-based or mobile based information systems as a place for exchange and communication to generate, share, and connect public or private information related with teaching and student guidance.

Effect of SNS on Education

Many studies on the effects of the educational application of SNS were primarily conducted in higher education (Arslan & Sahin-Kizil, 2010; Ellison, Steinfield, & Lampe, 2007; Hung & Yuen, 2010; Wang et al., 2012). SNS is considered to be a tool for promoting interactions in learning and learning outcomes in higher education (Veletsianos, Kimmons, & French, 2013). It was also reported that SNS fosters an environment for students that encourages interactions with external learners and specialists (Amador & Amador, 2014; Kang, Lim, & Park, 2012). Kim, Kim, and Choi (2011) noted that collaborative learning using SNS promoted cooperative reflection and reflective thinking in college students and improved their self-efficacy. In addition, they showed that using SNS in college courses helped students build a social relationship with professors and peers, and also had a positive effect on achieving learning objectives and knowledge creation (Arteaga Sánchez, Cortijo, & Javed, 2014; Wodzicki, Schwämmlein, & Moskaliuk, 2012).

There was a similar result found in research targeting elementary school students. Kim and Han (2011) addressed the effects of discussion using Twitter in elementary school education. They insisted that it improved students' learning outcomes through information exchange and collaborative learning and also had a positive impact on students' satisfaction with learning (Kim & Han, 2011). According to Park and Park (2014), the application of SNS for creating UCC in English classes helped to develop speaking and writing skills, and also increased students' interests and participation ratio in English learning. Another research investigating the educational effects of online collaborative learning using SNS revealed that collaborative learning activities with SNS in elementary school improved students' social efficacy (Leem & Kim, 2013).

However, there is little research on the educational effects of using SNS in secondary education. Most research focused on its effect on students' relationships, with conflicting results. While several studies reported that SNS created a collaborative atmosphere and developed bonding relationships among classmates (Reich, 2010; Siegle, 2010), others reported adverse effects such as the invasion of privacy, harm from groundless rumors, SNS addiction, depression, and bullying (Vandoninck, d'Haenens, Cock, & Donoso, 2011; Landoll, La Greca, & Lai, 2013; Leung, & Lee, 2012).

SNS is widely used as a tool for expressing opinions. Providing smart devices to students facilitates the use of SNS in a new educational environment, and students can engage in various productive learning activities by applying the characteristics of SNS (Lee, Lee, & Kim, 2013). These characteristics are more suited for informal learning, however, they can also be used effectively when the learning is well structured for learners' needs in school education. Therefore, this study aims to investigate how school education applies SNS in educational settings and the perception regarding its effects.

METHOD

This study recruited teachers that actively used SNS for educational purposes in the classroom as well as middle school students with experience using SNS at school in order to investigate the educational application and effects of SNS in middle school from the perspectives of both teachers and students. In-depth interviews about SNS application in education and its effects were conducted. Data was then collected and the results were analyzed.

Participants

With the cooperation of the Ministry of Education, Science and Technology, two teachers who had used SNS in teaching were recruited for this study. These two teachers had served as SMART education-guiding teachers under the Ministry of Education, Science and Technology and used SNS intensively in their class and for other learning activities. Teacher K, a middle school Science teacher in Seoul with 12 years of experience, applied SNS during courses and extra learning activities. Teacher H, a moral class teacher with 6 years of experience, used SNS for classes.

As the target students also had to have experience with using SNS in class, students were selected from the classes of the two teachers based on the teachers' recommendations. 10 students were selected randomly from each school among those who agreed to participate in the interviews. The total number of students that participated in the interviews was 20, with five male and five female students in second and third grade.

Interview questionnaire

Semi-structured questionnaires were developed for in-depth interviews with teachers and students about SNS's educational application and effects. The validity of the questionnaire developed for teachers was tested by a committee consisting of one current teacher and four specialists with more than five years of experience in the fields of educational technology and educational psychology. The validated questionnaire was then used for the first round of in-depth interviews. Based on the results, the questionnaire was revised to enable teachers to better describe their experiences and opinions. The revised questionnaire was used for the second round of interviews. The validity of the questionnaire developed for students was tested by one professor of instructional technology and four postdoctoral researchers (one in instructional technology, one in educational psychology, one in psychology, and one in computer education). The questionnaire was tested for terminology, and two current teachers evaluated the level and appropriateness of the questions. The main contents of the in-depth interview items are described in table 1.

Table 1: Main Contents of In-depth Interviews

Category	Teacher	Student
SNS's Educational Application	. The most appropriate subject or activities that are suitable for using SNS in school . Examples of SNS application in classes or other learning activities and teaching strategies . Scope of SNS application	. SNS educational application? . Does SNS educational application help to improve your leaning in school? If so, why? . Does SNS educational application help you to study at home after school? If so, why?
Effects of SNS Educational Application	. Effects of SNS educational application in school . Students' reactions to SNS educational application, classroom atmosphere, individual changes . Inappropriate SNS educational application in school education and negative results	. Changes in the relationship between yourself and the teacher after SNS educational application . Changes in the relationship between yourself and classmates after SNS educational application . Negative aspects of SNS educational application? . Which aspect of SNS educational application interferes with your study? If so, what are the reasons?

Data Collection and Data Analysis

In this study, data was mainly collected using in-depth interviews and collecting documents. As previously described, two teachers that actively applied SNS in teaching and guiding students as well as 20 of their students with experience using SNS in the classroom were recruited for the interviews. Two in-depth interviews were conducted using the developed questionnaires shown in table 2.

Table 2: Procedures for the in-depth interviews with teachers and students

	Procedure for in-depth interviews with teachers	Procedure for in-depth interviews with students
1st Round	- Participants: Two teachers and five researchers (seven participants) - Duration: About two hours - Free discussion based on the semi-constructed questionnaire - Recording of discussion	- Participants: 20 students, two teachers and five researchers (twenty-seven participants) - Duration: About 30 minutes - Freely described their thoughts in writing based on the printed semi-constructed questionnaire - Recording of discussion
2nd Round	- Distribution of revised questionnaire based on the results of the 1st round in-depth interview - Asking the two teachers to share specific experiences and opinions regarding the questions in detail - Distribution and subsequent collection of emails	- Interview to confirm the answers from the 1st round of in-depth interviews - Additional records with the questionnaire previously completed by the students - Distribution and subsequent collection of the printouts

To interview the students, the printed questionnaires were first distributed and the students were instructed to write down their answers to the questions. This format was employed because the participants are middle school students and may have difficulty with descriptively expressing their opinions and responses to the questions. After this process, interviews were conducted with the students to confirm their responses. The interview contents were additionally recorded in the questionnaires completed previously by the students. The teachers also provided course resources and documents related to SNS application with additional explanation.

All the collected data were used for analysis. While analyzing the data, characteristics and effects of the educational application of SNS were identified. They were labeled, categorized, and summarized. Among the data distributed according to categories, the data on the educational effects of SNS were coded into either positive or negative effects and further analyzed. The three researchers later reexamined the analyzed results.

RESULTS

Usefulness of SNS as an Instructional Medium

Regarding SNS application in class as an instructional method, the teachers emphasized the interactions between teachers and students and between students and students as the primary element of teaching and learning. They noted that SNS application could work as a useful tool especially for investigating, discussing, organizing, and summarizing during collaborative learning activities or project participation through student-student interactions in the class.

> Teacher K: SNS can be effectively used when students' participation is important and gathering different opinions is needed. SNS can be applied to discussions, activities with several procedures and exchanging opinions or knowledge either in the preview stage or during class. It can also be used as a communication tool for after school activities or for providing feedback to each other.

> Teacher H: You can use SNS for collaborative activities. It is especially useful when carrying out small group projects, sharing opinions, or performing any kind of collaborative task as a group or individually. You can upload announcements or other information from the teacher, receive real time updates and provide feedback. It is also good for building relationships with friends or teachers at an early stage.

Figure 1: Example of SNS application in class

These two teachers stated that SNS was useful for learning activities before or during class, providing feedback after class, and forming relationships. In the classes taught by these teachers, the learning objectives and guidance with activities were provided first, followed by collaborative learning activities. Summarizing and presenting the learning activities in front of other groups was the next step. After the sharing stage, students received feedback from the teachers regarding their performances. These teachers applied various teaching strategies when using SNS in their classes. The strategies involved interactivity for solving and achieving common goals, simultaneity for sharing and applying information promptly, collaborative overall activities, communication skills with pros, cons, and various opinions provided, and a fusion of overall activities blending online, offline and individualized learning.

> Teacher H: Students started research through SNS as a group, shared what they discovered by posting on SNS, compared what others did to what they did, and shared their experiences with other groups with different opinions. Further, each group investigated all cases in detail, then organized, and shared the results on SNS with other groups. Finally, the groups presented what they learned based on their SNS postings. As all materials were posted on SNS, students could compare, combine, search, and even post questions or opposing opinions anytime.

Students also had positive attitudes towards using SNS as an instructional method in class. They thought SNS was good for discussions and exchanges with other students, sharing learning materials or information, and asking questions to the teacher. In addition, they were interested in participating in a new trial regarding collaborative learning and solving problems online with students from different schools, which was not possible in the traditional class

> Student 1: It is good for sharing ideas or resources with other students. Not only can things be shared easily and quickly, but I can also add my own thoughts on them through SNS

> Student 2: By using SNS, I could stop being judgmental and narrow-minded and got to accept and understand different ways of thinking in a short time.
>
> Student 3: Recently, we had a class at the same time as students from another middle school through Classting. In the class, we discussed the same topic. When a student from one school presented his opinions, students from the other school responded and gave him feedback. Before then, we didn't know each other at all. However, SNS helped us to get to know each other and become closer.

Possibility for SNS Application for Afterschool Activities

SNS was used for regular classes and also for extra educational activities. For example, it was used for 1) delivering announcements or guidelines for class activities such as homework diaries and school newsletters, 2) improving student guidance by providing counseling to students using SNS, 3) establishing a communicative atmosphere in the entire class through sharing photos and interesting information, forming relationships, and promoting friendships, and 4) collaborating and completing group projects when performing creative activities.

> Teacher K: The educational approach of SNS application to learning activities besides subject teaching provides opportunities for collaboration, sharing, and participation and leads to the reduction of dissonance by creating a communicative classroom culture. I have tried to use SNS for projects involving collaboration and enable students to help each other thorough SNS application.
>
> Teacher H: In the aspect of class management, I use it for social bonding activities and as a supplementary tool for the homework diary. I promote friendships by having events such as posting each group's photos on SNS and making students comment on each other's posts, posting missing announcements, or highlighting important news that needs to be reiterated so students don't miss them. Students also post questions that they are curious about and seek answers from the teacher or their friends.
>
> Student 4: I liked to use SNS as I was able to ask questions that I didn't have a chance to ask in class, got to know the materials that I had to prepare for the next class, and also talk to many friends at the same time. I also think it was useful for posting links containing learning resources and sharing them via SNS. It helped to get access to materials that I couldn't find by myself and gave me a chance to review the shared supplementary materials.

Positive Effects of SNS: Improvement of Learning Competence and Communication Skill

The teachers noted the improvement of learning competence as a positive effect of SNS application in the class. From examining students' reactions in class, they found improvements in interest, concentration, understanding, and practical ability. Even though they agreed that SNS application was effective for promoting students' learning motivation and increasing interest in learning, they also cautioned that these effects depended on how the curriculum and class design were reconstructed to apply SNS properly.

> Teacher H: I could see that students were more likely to speak their opinions and pay attention in class with more interest than in a traditional class when using SNS, however, it was hard to see an actual connection or improvement of the emphatic ability towards other people between the online and offline situations.

The students considered the improvement of learning competence as a positive effect of SNS application in class. They agreed that it helped them understand the learning contents and memorize them. As more supplementary resources are accumulated through SNS, students get to understand the learning contents deeply by studying them. Classes then become more interesting for the students and they are able to participate voluntarily and actively in learning activities. They can search for related information through SNS, find answers during the process, and all these processes help them to memorize what they learn.

> Student 5: In classes with SNS application, students discovered more diverse and specific answers by themselves through SNS search. Afterwards, teacher checked and confirmed what the students already found. In this procedure, students were able to participate actively in the learning activities, and I think that is why it was hard to find students who dozed off in the Moral class.

> Student 6: Regular classes were boring as I had to present and write by myself, and could only access information through textbooks. However, in the SNS-using class, I could look for things by myself and create a presentation based on them. It was very helpful for me to remember what I studied for a longer period than before.

Improvement in communication skills is another positive effect of classes with SNS application according to the teachers. It was effective as it helped the students participate actively in the class, and developed their communication skills, collaborative skills, and opinion integrating skills. Occasional participation by parents using SNS can also set up a collaborative environment where the school and home can interact and work together.

> Teacher H: Students' participation is more essential than teacher's teaching in this kind of class. It is good to have a chance to improve students' communication skills, collaborative skills, and opinion integrating skills by exchange of opinions within the group and collaborations with other groups.

> Teacher K: It was very helpful for me to plan upcoming activities and schedules based on the feedback I received from the students. Previously, I had to decide what to do based on my preferences. On the contrary, it was stimulating to construct and organise activites with all class members and students. Parents could observe, monitor activities, and provide feedback. For me, it was a way to come closer to achieving the school community's common goal.

Positive Effects of SNS: Establishment of Friendly Relationships

Teachers also commented that using SNS helped to establish an interactive and vivid classroom culture. They noted that by applying SNS (Classting) into their classes, they were able to create a more open and active classroom atmosphere with the students.

> Teacher K: As daily activities affect each class' culture and characteristics, the function of SNS goes beyond just simply recording what happens, but enables us to reach the level of creating a friendly climate where every member of the class takes care of each other and do things together.

> Teacher H: Due to the friendly class atmosphere, I found that students spoke their opinions more often during learning activities. I also found that they paid more attention to completing assignments while interacting with each other at any given time.

Students also agreed that SNS application in class was good for building or improving relationships with friends or a teacher. The positive effect of SNS on relationships with teachers was to help students have more friendly communications with the teacher, feel closer, freely carry on conversations and discussions with the teacher or get advice from him or her. In addition, SNS helped with building trust between the teacher and the students and increased communication by providing a counseling outlet that the students could consult regarding their career seeking or personal issues.

> Student 7: As the teacher gave us missions and rewarded the students who succeeded, we became friends with him eventually and had more conversations than before.

> Student 8: I became really close to the teacher and started to talk about serious things. There was a private chat room where I could talk to the teacher one on one; I could consult with him over my concerns for my dream or other problems. Also, he commented on the postings we uploaded, and I think it gave us a chance to become closer to him.

For personal relationships, SNS served as a space where students could have conversations with classmates with whom they were not close, and they could find clues about other classmates' characters on SNS. They also got along better and SNS improved their unity. In addition, SNS enabled them to become acquainted with each other by allowing the students to share announcements and learning materials, collaborate, and communicate with others.

> Student 9: I could understand the personalities and tendencies of my friends by reading their thoughts reflected on postings and it broadened my understanding.

> Student 10: Using SNS made me become more familiar with my friends and teacher, and further improved our unity as a class.

Negative Effects of SNS

The effects of SNS application are not just positive. Teachers and students commented on several negative effects of using SNS. These include students' excessive usage of mobile phones for long periods of time, revealing inappropriate facts and invasion of privacy based on rumors, posting irrelevant information, ethical issues with comments, and cyber-bullying.

> Teacher K: We found that some students posted irrelevant information, and there were ethical issues with malicious comments in response to these information. Also, there was an issue with parents' negative perception of SNS application.

> Teacher H: Groundless rumors spread so quickly and many students believed them as the truth. It seems students tend to have a more relaxed attitude in online space than in offline. This makes them post private photos or reveal facts that another person didn't want to share. Personal information will be easily reproduced as a result. Moreover, cyber-bullying among students can result from using SNS.

The students pointed out negative effects of using SNS in class. According to them, it distracted them from studying, harmed friendships, or even exposed them to unhealthy information. For example, if the teacher did not check the SNS space and provide feedback, there was a possibility of spreading bad rumors about classmates or cursing each other. Thus, the space needs to be monitored and guidelines provided. Moreover, as students tend to use SNS excessively, it is really important to help students set limits to decide how long they will use SNS daily, and follow their own rules.

> Student 11: As I become distracted with games or other stuff on the Internet after logging onto SNS, I spend more time on the Internet surfing rather than focusing on studying.

> Student 12: I couldn't concentrate on the class as I was thinking of what to post on SNS and even bad rumors about other classmates.

> Student 13: It interferes with studies if you use SNS for non-educational purposes. During the class, I open my cell phone and access SNS to check new posts and I am curious about what other friends talks about.

Teachers suggested ways to decrease the negative effects of SNS application. These include using SNS with a specific purpose, implementing information ethics education about the etiquettes of SNS usage, and teacher efforts to supervise the SNS space and professionalism.

> Teacher K: An orientation to understand the function of SNS and information ethics education about postings and Internet culture should be provided before applying SNS in the class. This means that we need to use a closed type of SNS optimized for the educational environment.

> Teacher H: An information ethics education session is mandatory and its importance should be emphasized to the students. This is something that should be used not only for preparation but also something we always address and discuss.

CONCLUSIONS

This study aims to investigate the perceptions of teachers and students towards educational applications and effects of SNS in middle school classes through in-depth interviews and provide suggestions about how to apply SNS to ensure the internal stability of public education. The summarized primary implications are as follows.

First, teachers applied SNS for searching, discussing, summarizing, and facilitating collaborative activities in subject matter education. They also guided students to use SNS for previewing and reviewing in addition to providing feedback and announcements through SNS. Students shared the teachers' attitudes towards using SNS. They stated that they used SNS for discussion, sharing information or resources, and asking questions. In consideration of these findings, as students can make use of SNS for exploring resources, learning activities and communication with others,

there is a possibility of using SNS to help students communicate with others by setting up a network of students with specialists, parents, seniors, and teachers, promoting richer research information and exchange, and further help to provide more various and in-depth education. As an example of SNS application for other activities, it was used as a communication tool between teachers and students mainly for announcements or class management, educational guidance by counseling, forming personal relationships or friendships, and creative activities. In addition, SNS could be used for posts to parents regarding their children's class materials or homework. Using these SNS functions, the tool can be applied to support teachers with attempting diverse activities for communicating with students and parents. This expansive communication will be helpful to prepare for and prevent school violence, as well as to guide extracurricular activities, and class management. It was found that teachers adapted the strategies of interactivity, simultaneity, and communication, used various methods to encourage external motivation and customized individual guidance to promote students' participation.

Second, teachers reported the positive effects of SNS application in class as improvement of students' learning competences, interactive classroom atmosphere, developing students' collaboration capabilities and improving communication skills. Students also considered the positive aspects of SNS application as promoting learning activities, after-school activities, improving memorization of learning contents, and establishing personal relationships.

However, as there is always the possibility of being exposed to the negative effects of SNS, implementation of prevention and ethics education programs on SNS usage etiquette, hours of use, and cyber-bullying, in addition to teachers' guidance and control over students' SNS usage are strongly recommended. Recently, cyber-bullying came to the fore as a serious social issue. Social media use by youth can result in bullying, and solutions that can cope with different types of youth friendships are required. Therefore, above all, it is necessary to educate both teachers and students to be aware of the dangers of the negative effects of SNS application in class and prevent these effects before applying SNS in class.

As shown in the results, there are many advantages of SNS application in education. However, there are also things to be considered before SNS application in class.

First, to initiate meaningful educational activities using SNS in class, there should be effective strategies and efforts to encourage students' participation under the instructional design context. SNS may provoke students' motivation as a new medium, however, for them to keep using it, teachers should employ sophisticated instructional strategies. Teachers need to maintain students' interests and participation by providing helpful resources for learning through posting photos or videos that record the progress of students' activities.

Second, selecting the proper SNS that fits the purpose is very important when planning to use SNS in school education. Based on the results of this study, SNS can be used as a tool not only for communication, but also for sharing diverse materials. However, there are differences in the functions of existing SNS tools. Some of them limit file sharing or uploading materials, which are considered the most important features of SNS for educational activities. Therefore, teachers should research the SNS functions they need to use in advance, select the right one, and also consider using a supplementary service simultaneously.

Third, to apply SNS in public education, there are many things that should be considered. As students can access external websites in the cyber space due to the Internet's openness and connectivity, it is necessary to prevent misuse of SNS application by educating students to recognize the possible ripple effects from their postings and admonish them not to post contents that damage others. Issues of exposure of teachers' privacy have to be considered as well. In addition, it is important to foster an atmosphere that can establish a formal relationship with students through SNS.

As there was a lack of empirical studies regarding the contributions of SNS application in school education, this study investigated potential methods for applying SNS for educational purposes based on the perceptions of teachers and students and provides suggestions on reinforcing public education through SNS application. However, there were difficulties when choosing the study subjects. There were few teachers and students with experience using SNS for educational purposes in class, as the application of SNS is not yet common in schools. Thus, it is hard to generalize the results of this study. Based on this research, future studies should be conducted to determine other methods of applying SNS to reinforce public education in the future.

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The Comparison of Accuracy Scores on the Paper and Pencil Testing vs. Computer-Based Testing

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ABSTRACT
This study aimed to compare the accuracy of the test scores as results of Test of English Proficiency (TOEP) based on paper and pencil test (PPT) versus computer-based test (CBT). Using the participants' responses to the PPT documented from 2008-2010 and data of CBT TOEP documented in 2013-2014 on the sets of 1A, 2A, and 3A for the Listening and Reading section, the researcher estimated the reliability estimation results using classical test theory and the value of information function and on the item response theory on PPT are then compared with CBT, which has the greater reliability and the value of information functions is said to be more accurate. The study shows that with the classical test theory approach, the reliability coefficients between the scores of the results of PPT and those of CBT are almost the same, and using the item response theory, it was found that although the value of the information function on PPT and CBT relatively similar in several subtests, there is a tendency for participants with the moderate ability that CBT is more accurate than PPT, and for the low and high ability of participants, PPT tends to be more accurate than CBT.
Keywords: accuracy, reliability, value of information function (VIF, paper and pencil test (PPT), computer based test (CBT)

INTRODUCTION

Nowadays, the development of science and technology is advancing. This has an impact on life, including on education. The presence of technology in education is used to assist and improve the quality of learning (Woolfolk, 2007). More specifically, this technology can be utilized in educational assessment, namely the implementation of the test. The utilization of technology in educational assessment is aimed at the effectiveness and efficiency of the implementation of the test (Chee and Wong, 2003; Towndrow & Vallence, 2004).

At first, the test for assessment which is popular is paper and pencil test. Along with the development of the Internet and intranet networks, the access to information inside and outside the school becomes easier. This tool can also be used for other purposes, for example, for the examination based on computer and the Internet, for example, known as Computer Based Testing (CBT). However, the utilization of computers for CBT has not been optimal yet in Indonesia in various tests.

In 2007-2010, the association of Teachers of English as a Foreign Language in Indonesia (TEFLIN) in collaboration with the Directorate General of Senior High school developed a test to measure English competency, later called as the Test of English Proficiency (TOEP). TOEP was developed based on constructs should be measured in a language test that is often referred to as communicative competence (Bachman, 1990; Bachman & Palmer, 1996). The development of the items of TOEP is based on the taxonomy in language proficiency from Munby (1983) which has identified micro-language proficiency skills which include listening, speaking, reading and writing. From 2006 to 2010, eight sets were developed for PPT to TOEP which have proved equivalent (Retnawati, 2014a). Subsequently in 2012, funded by the Department of Higher Education, the CBT system of TOEP was pioneered in using the sets used in PPT, which was then implemented from 2013 on Listening and Reading subtests.

On the preliminary study, there were some technical problems faced in the implementation of TOEP based CBT. The test participants were not familiar with the implementation of the CBT, and they often did the tests based on PPT. The difficulties in the implementation of CBT included the difficulty to log in, use a headset for listening, use the mouse to answer, and in some areas there was a problem about the availability of electricity and the access to Internet. These constraints led to the testees' doubt of the accuracy of the results of the test, moreover, there were several sets of TOEP being used in the administration of the test. Related to the above, the present study investigated the comparison the accuracy of TOEP scores of the PPT and CBT.

There are many advantages and disadvantages of using computer assessment compared with paper based task (Noyes & Garland, 2008). The advantages of online assements are (1) the richness of the interface, for example, the use of graphics allows a dynamic presentation of the test content, (2) the user population, computer-based

testing via the internet allows a more diverse sample to be located, (3) standardisation of test environment, that is, the test is presented in the same way and in the same format for a specified time, (4) online scoring, this results in faster feedback and (5) greater accuracy, that is, reduction in human error. In the other hand, the disadvantages of using computer in assessment are (1) lack of a controlled environment with responses being made at various times and settings and perhaps not even by the designated individual, double submissions may also be a problem, (2) computer hardware and software, these may be subject to freezing and crashing; in the test setting, time can be wasted when computers have to be restarted or changed, (3) the computer screen, for longer tests, it may be more tiring to work on the computer than on paper, (4) serial presentation, it is difficult to attain equivalence with computer and paper presentation, (5) confidentiality.

In its developmental process, TOEP considers the item difficulty by using both the classical test theory and the Rasch model of the modern test theory. Accordingly, the accuracy of CBT and PPT is determined by using two theoritical approaches, the classical test theory and item response theory.

The accuracy in the classical test theory is determined by the value of the standard error of measurement (SEM). SEM is estimated in the following formula

$$\sigma_E = \sigma_x \sqrt{1 - \rho_{xx'}} \qquad (1)$$

where σ_x is standard deviation of total score and $\rho_{xx'}$ is the reliability coefficient (Allen & Yen, 1979; Crocker & Algina, 1986). The formula shows that the higher the reliability coefficient, the smaller the SEM, and vice versa. The reliability coefficient can be estimated, by the formula such as Cronbach's alpha (Ebel and Frisbie, 1991; Reynolds, Livingstone, Willson, 2010).

In the modern approach, a well-known formula in the measurement involving the level of difficulty commonly is called the Rasch model (Hambleton, Swaminathan, and Rogers, 1991). The model of the relationship between chance to answer correctly (P), ability scale (θ) and item difficulty to-i (b_i), e natural number, and n items in the test is expressed in the following equation:

$$P_i(\theta) = \frac{e^{(\theta - b_i)}}{1 + e^{(\theta - b_i)}} \quad \text{, where i : 1,2,3, …,n} \qquad (2)$$

The b_i parameter is a point on a scale of abilities in order to the probability a testee respond properly is 50%. Suppose a test item has a parameter b_i = 0.4. This means that the minimum ability required to have 50% probability to answer correctly is 0.4 on a ability scale. The greater the value of the parameter bi, the greater the ability needed to answer correctly with a 50% probability. In other words, the greater the value of the parameters b_i, the more difficult the item is.

In the item response theory, there is the value of information function. The information function item is a method to describe the strength of an item on the test, the selection of items, and the comparison of several sets of test. The item information function expresses the strength or contribution of test items in uncovering latent trait measured by those tests. If I is an information function, $P_i(\theta)$ is the probability to answer correctly for participants θ with the ability to answer correctly point I, $Q_i(\theta)$ opportunities θ participants with the ability to answer one item I, mathematically, the item information function satisfies the following equation.

$$I_i(\theta) = \frac{\left[P_i'(\theta)\right]^2}{P_i(\theta)Q_i(\theta)} \qquad (3)$$

The test information function is a function of the number of items contructing the test information (Hambleton and Swaminathan, 1985: 94). Associated with this statement, the function of test information will be high if the items of the test have information function which is also high. The test information function can mathematically be expressed as follows.

$$I_i(\theta) = \sum_{i=1}^{n} I_i(\theta) \qquad (4)$$

The difficulty index of item parameter and ability parameter of participants are estimated. Because these are the result of estimation, the nature of true parameters is probability and it is not free from by measurement error. In the item response theory, the standard error of measurement (SEM) is closely related to the function information. SEM has an inverse quadratic relationship with information function, the greater the value of information

function, the smaller SEM or otherwise (Hambleton, Swaminathan, and Rogers, 1991, 94; Retnawati, 2014b). If the value of the function information is represented by $I_i(\theta)$ and the estimated value of SEM is revealed by SEM (θ), then the relationship between the two, according to Hambleton, Swaminathan, and Rogers (1991: 94) is expressed by

$$\text{SEM}\ (\hat{\theta}) = \frac{1}{\sqrt{I(\theta)}} \qquad (5)$$

De Gruijter & Van der Camp (2005: 118) statet that the value of the function information item and also the value of the test information function, depend on the latent ability. The value of item information is invariant, so that the ratio of the value of the two items' information functions is also invariant. The ratio of the information value of the two items is stated as follows:

$$\frac{I_{i_1}(\theta^*)}{I_{i_2}(\theta^*)} = \frac{I_{i_1}(\theta)}{I_{i_2}(\theta)} \qquad (6)$$

for all the transformations of θ * of θ. The invariant properties of the ratio of the value information function is used to determine the relative efficiency of the test. The relative efficiency of the two tests is defined as the ratio of the variance mistakes or, equivalently, the ratio of the value of the information function (McDonald, 1999: 279). This value can be compared when two tests measure the same attributes. The same thing is done by Lord (1980: 83) and also Stocking (1999), but it has a different symbol. Conventionally, the relative efficiency of test A and test B is written as:

$$\text{ER(f,A,B)} = \frac{I_A(\theta)}{I_B(\theta)} \qquad (7)$$

so if the ratio is less than one, then test A is said to be less efficient providing less information, or equivalently have a larger error in measurement compared with test B. The comparison of information value of both tests is used to compare the score of the PPT and CBT on TOEP.

The comparison of the administration of PPT and CBT has been investigated by many researchers. Al-Amri (2007) explored the comparison of paper and computer-based testing in reading context and the impact of test takers' characteristics. The results are there are no significant differences between paper and computer-based testing in reading context. Jamil, Tariq, & Shami (2012) reported teachers' perceptions of computer-based (CB) vs. paper-based (PB) examinations. The results showed that overall sampled teachers' attitudes were positive towards CB examination systems but in some situations they preferred PB. Comparatively for female participants had highly ranked, highly qualified, less experienced, teachers who have computer training certificate or degree, and teachers who have CB examination experiences were more positive towards CB examinations.

The comparison of the administration of PPT-based and CBT has been studied by many experts. Al-Amri (2007) tapped the comparison of paper and computer-based testing in reading context and the impact of test takers' characteristics. The results are there are no significant differences between paper and computer-based testing in reading context. Jamil, Tariq, and Shami (2012) reported teachers' perceptions of computer-based (CB) v. paper-based (PB) examinations. The results showed that overall the sampled teachers' attitudes were positive towards CB examination systems but in some situations they preferred the New Testament as well. Comparatively female, highly ranked, highly qualified, less experienced, teachers who have computer training certificate or degree, and teachers who have CB examination experiences were more positive towards CB examinations.

Maguire, K.A., Smith, D.A., Brailler, S.A. (2010) examined the difference in test scores for students who engaged in proctored course assessments electronically via computer interface compared to students who took proctored assessments through a paper and pencil format in the classroom. The results indicated that students who completed all assessments electronically scored significantly higher than those students completing all assessments via pencil and paper. No interaction was present between test format and test number, suggesting that none of test format had a more severe learning curve. The findings of this study, taken into conjunction with those of previous studies, suggest that proctored CBT provides an accurate assessment of a student's abilities.

Coniam (2006) describes an English language listening test intended as computer-based testing material for secondary school students in Hong Kong, Test takers generally performed better on the computer-based test than on the paper-based test. Interviews with test takers after taking both tests indicated an even split in terms of

preference, with boys opting for the computer-based test and girls the paper-based test. Choi (2003) verified the comparability of paper-based language test (PBLT) and computer-based language test (CBLT) on the basis of content analyses, correlational analyses, ANOVA, and construct-related validation studies. The content analyses revealed that the sample tests representing 316 *Comparability of two types of language test* PBLT and CBLT were highly comparable in terms of content and linguistic features. The dimensionality check also revealed that the results did not violate the strong assumption of unidimensionality required by IRT, thus ensuring the appropriate application of IRT. The overall results of construct-related validation studies indicate comparability of the subjects' scores across CBLT and PBLT modes. The grammar test showed the strongest comparability, and the reading comprehension test the weakest comparability. The pattern of correlations among subtests, disattenuated correlations, and confirmatory factor analyses support to a certain extent that CBLT and PBLT subtests measure the same constructs.

The results of the existing studies indicate that the test scores of PPT and CBT are comparable and the differences are not significant, neither is the construct validity. From the mean score of the acquisition of PPT and CBT, there is research that concludes that the average scores f CBT results are higher, and also there is positive perception of the administration of CBT. These results are seem contradictory, and need to be strengthened by the results of other studies on the comparison of CBT and PPT.

METHOD

This study was conducted using the quantitative approach, by comparing the reliability and value of the test information function of CBT TOEP and PPT TOEP. The data are in the form of responses of TOEP test takers from all provinces in Indonesia, documented in 2008-2010 for PPT and documented in 2013-2014 for CBT, a sample of 600 test takers for each set of TOEP was established randomly. Three sets of TOEP, set 1A, 2A, and 3A for Listening and Reading section were analyzed.

The accuracy of PPT and CBT TOEP is known by comparing the reliability using the classical test theory approach and comparing the value of information function of both tests directly and through its relative efficiency. The reliabilities are estimated by calculating the reliability using Cronbach's alpha coefficient. On the item reponse theory, the item difficulty is estimated first before the value of the function information is. The estimation of item difficulties on Rasch model are done using the QUEST program (Adams & Khoo,1993). The value of test information function in every sets is estimated based on the difficulty index of the items on PPT and CBT.

The results of the estimation of the reliability and the value of the information function on PPT and CBT are then compared directly and by using the graphs. The administration of the test that has a greater value of information function is more accurate. The comparison of the value of the information function between PPT and CBT is also served as the relative efficiency of CBT to PPT, which is illustrated with graphs to be interpreted. If the relative efficiency is greater than 1, then CBT is more accurate than PPT. But on the contrary, if the relative efficiency is less than 1, then the PPT is more accurate than CBT.

RESULT

Using the participant's responses to TOEP set 1A, 2A, 3A both in listening and reading subtests, based on PPT or CBT, the reliabilities' estimation is done. More results are presented in Table 1. The results show that the reliability of TOEP scores tend to be stable at a high category, all of which are not less than 0.90. On set 1A, the reliability score on CBT is lower than the PPT and set 3A, both Listening and Reading-based PPT is slightly lower than in the CBT.

Table 1. Reliabilities of Score on Listening dan Reading Subtests Based on PPT dan CBT

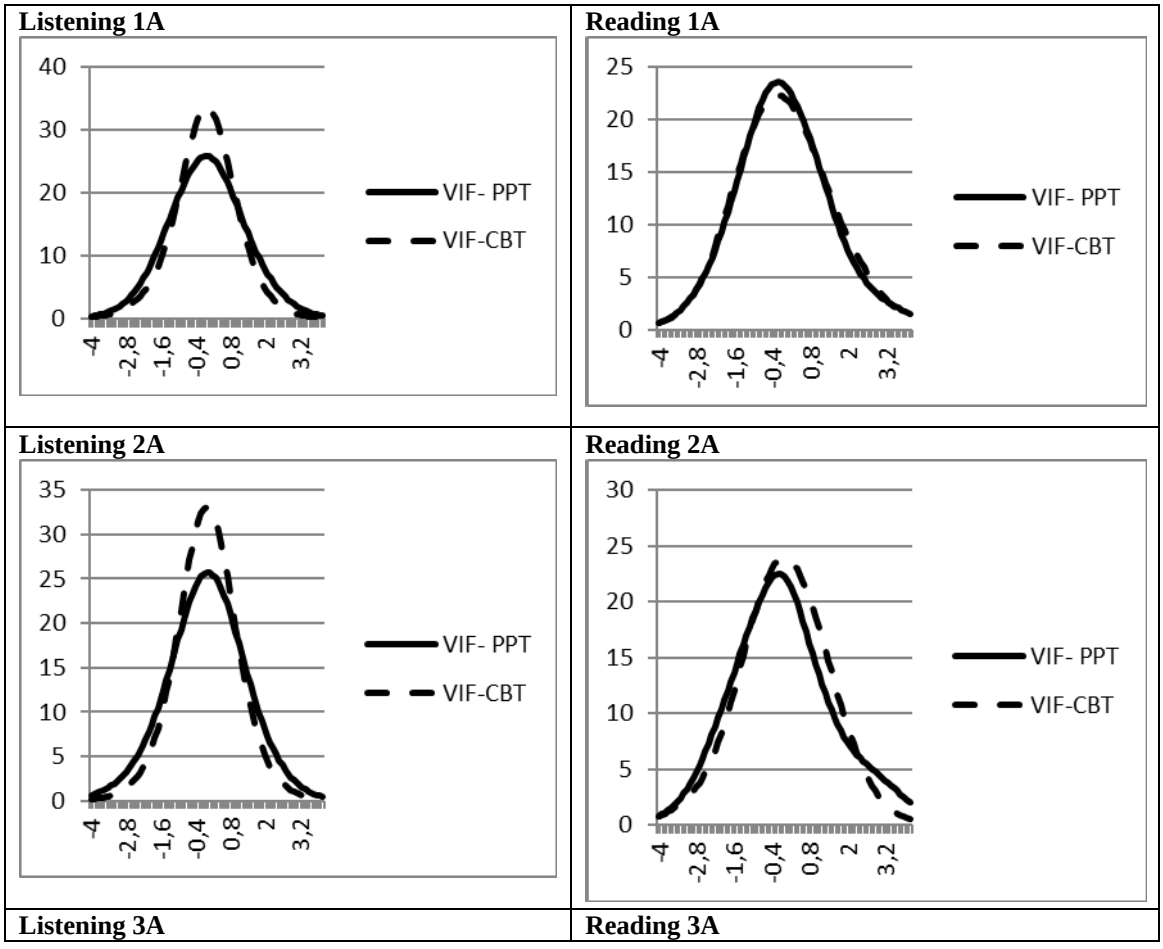
Set	Subset	PPT	CBT
1A	Listening	0.99	0.90
	Reading	0.99	0.99
2A	Listening	0.99	0.99
	Reading	0.99	0.99
3A	Listening	0.98	0.99
	Reading	0.98	0.99

Based on the test takers' response to the set tests, the difficulty index is estimated by using the Rasch model. Using the parameters of these items, the value of information function (VIF) are estimated, with the abilities ranging from -4 to +4, both on the Listening and Reading subtests, based PPT and CBT. The estimation results for each subtest are presented in Figure 1.

On Listening sets 1A and 2A, and Reading set 3A, there is a tendency which is almost the same. On the scale of the ability approach to the average (on a scale of 0), the value of information function on the CBT is higher than that on PPT. But on a low and high ability scale, the value of information function on PPT is higher than on CBT. This shows that in the ability scale approaching 0, CBT is more accurate than PPT, and on the low or high ability scale, PPT is more accurate than CBT.

On Reading 1A and 2A, and Listening 3A, the results show different things. On this set, the value of information function on the PPT and CBT is almost the same. This shows that in the three sets, namely Reading 1A, Reading 2A, and Listening 3A, there is the same accuracy scores obtained by TOEP takers between PPT and CBT.

These results are supported by the comparison between value of the information function obtained on PPT and that on CBT. On the Listening subtest 3A, the relative efficiency is relatively stable to the value close to 1, so it can be said the accuracy of the scores on Listening set 3A on PPT and CBT is almost the same. On the Listening sets 1A and 2A, on the ability around 0, the relative efficiency values of more than 1 indicates that CBT is more accurate than PPT. But on the contrary, on a scale approaching abilities approaching -4 and +4, the value of relative efficiency is less than 1. This indicates that the PPT is more accurate than the CBT. More results are presented in Figure 2.



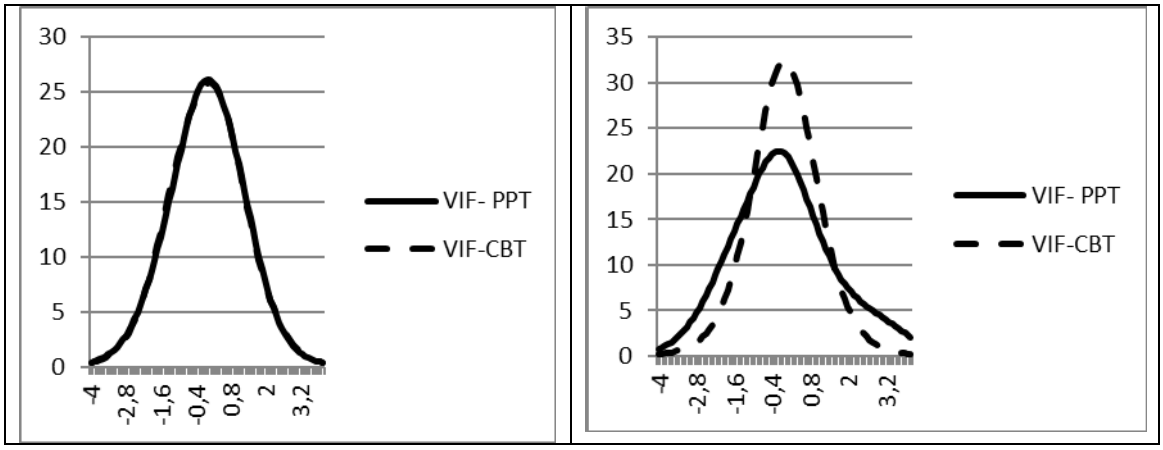


Figure 1. Value of Information Function (VIF) on Subtest Listening and Reading of TOEP based on PPT and CBT

Similar result occurs to Reading subtest. On Reading set 1A, the relative efficiency is around 1, except for high abilities. This shows that the accuracy of PPT and CBT is almost the same, except for the high abilities, in which reading ability is measured more accurately using PPT compared with CBT. On set 2A and 3A, there is a tendency that on the medium ability, the relative efficiency is more than 1, which shows that CBT is more accurate than the PPT. As for the low and high abilities, there is a tendency that PPT is more accurate than CBT. More results are presented in Figure 3.

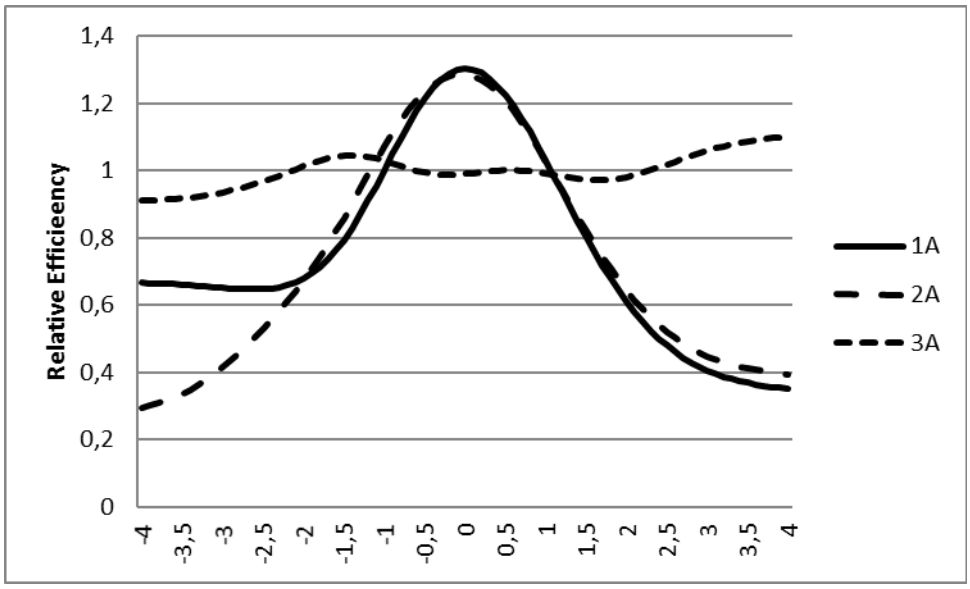


Figure 2. Relative Efficiency on Listening Subtest between CBT to PPT

The results of the analysis based on the classical test theory shows that the reliability scores on TOEP based on PPT and CBT are almost the same. This shows that, the accuracy of the score on PPT and CBT can be compared and the value is close to 1. With the high reliability, fewer measurement errors and higher accuracy of a test set will be obtained.

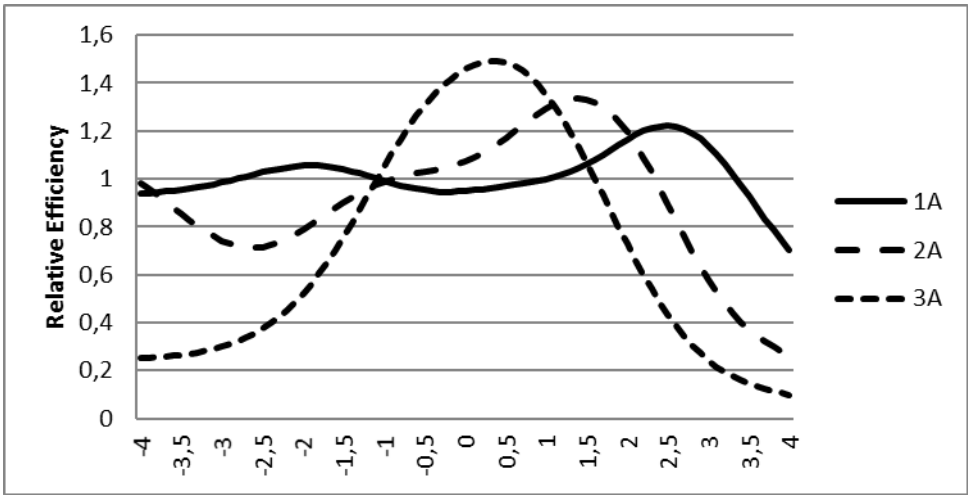


Figure 3. Relative Efficiency on Reading Subtest between CBT to PPT

In the estimation of the reliability and value of information function, the concern is the acquisition of scores, which does not overly affect the accuracy of measurement of the listening and reading abilities of the test takers of TOEP on PPTand CBT. This is in line with the finding of the research by Al-Amri (2007), which states there is no significant difference in scores of PPT and CBT and by Choi (2003), which proved that there is no difference between the construct validity of PPT and CBT. But the results of this study are different from the results of the study by Maguire, KA, Smith, DA, Brailler, SA (2010) which shows that students who completed all assessments electronically scored significantly higher than those students completing all assessments via pencil and paper.

The research finding from observing the comparative value of the information function, shows that though the value of function information on CBT and PPT is relatively similar in several subtests, there is a tendency that for test takers with moderate ability, CBT is more accurate than PPT, but for test takers in the low and high ability, PPT tends more accurate than CBT.

On the implementation of CBT, there are many obstacles that could hinder the test takers to do the tests. These constraints include test takers' unfamiliarity with the implementation of the CBT, the difficulty to log in, the difficulty using a headset for listening, using the mouse to answer, essentially related to the ability of the test takers using the information technology. Besides the obstacles, in some areas the availability of electricity and the slow internet network is a constraint in the implementation of CBT. The constraints in the administration of CBT in this study are in line with the opinion Noyes & Garland (2008).

CONCLUSIONS

The study shows that with the classical test theory approach, the reliability coefficients between the resulting scores of PPT and CBT almost the same, and using the item response theory, the researcher was found that although the value of the information function of PPT and CBT is relatively similar in several subtests, there is a tendency for testees with the moderate ability that, CBT is more accurate than PPT, and for those with the low and high ability, PPT tends to be more accurate than CBT.

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The Effects of the Constructivist Learning Approach on Student's Academic Achievement: A Meta-Analysis Study

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ABSTRACT
In this research, a meta-analysis study was conducted in order to determine the effects of constructivist learning approach on students' academic achievement. Master's thesis, doctoral dissertation and articles in national and international databases, which are realized between the years of 2003–2014, appropriate to the problem and which can be included in a work of meta-analysis with important statistical data, have been studied by scanning in Turkish and English. At the end of the literature review, a total of 53 studies about effects of constructivist learning approach on student's academic achievement have been included in the meta-analysis study. Meta-analysis study determined that the constructivist learning approach, compared to traditional teaching methods, has positive effects on the student's academic achievement. After using a random effects model with a 0.910 and 1.402 interval of the confidence, the overall effect of constructivist learning approach in relation to academic achievement of students is found 1.156 (95% CI, SE=0.125). 50 of the 53 studies included in the study have positive results, though only 3 of them show negative effect. As a result of moderator analyzes, we see that the highest effect values are observed in the master's thesis, in the teaching of science and at the college level.
Keywords: Constructivist learning approach, traditional learning, academic achievement, meta-analysis, effect size

INTRODUCTION
At the age of information, the rapid changes occurring in technology make obsolete the newly produced informations and change them in a very short time. Every society, institutions and individuals are usually obliged to keep up with these changes. This is the reason that faces to all these changing institutions and changing situations, the self-renewal and development have become now a necessity. In this case, instead of learning by heart informations, individuals have the responsibility of producing new informations and products based on this ancient knowledge. This obligation for individuals led by the age of information has also affected education systems and institutions. Now, a system where learner receive all information as ready from the teacher is considered inadequate, but instead, it is necessary to pass a system where, the learners are active in their educational environment, configurate the old information in mind with new information, and use this information in order to produce new information. Because of this necessity, many countries change their traditional education system and adopt the constructivist learning approach and they organized their institutions of education accordingly. Due to the situations discussed above, in the researches and discussions about the education, the constructivism is, now, more and more, used in a remarkable way (Cunningham and Duffy, 1996). The constructivism is finding its place in the studies in different fields. The constructivism, which is a training theory and which is based on knowledge of the age of Socrates, is not only a concept of education. The constructivism, which is, at the same time, an epistemological theory and a concept, is knowledge and learning approach (Haney and McArthur, 2002). In terms of education, the constructivism is seen as an educational framework that appears very often in the studies of educational literature (Kinnucan-Welsch and Jenlink, 1998). According to this theory, learning is a process of establishing a link between the new information and the information that exists in individuals, during this process. The individual information is not piled on; individual establishes the basis of information by adding his own comment. By this aspect, teachers have an important role in the constructivist approach in which the core of learning system is the learner. With this approach, teachers do not directly transfer the information to the students; but they guide and help learners to reach the information and to construct it (Bryant, Kastrup, Udo, Hislop, Shefner and Mallow, 2013). As an intermediary between the students and education programs, teachers help them to learn and to develop their self (Holt-Reynolds, 2000). Teachers organize the learning process according to students' interests and needs, to incite to ask questions, to produce the new ideas, to make estimations and observations, to work in collaboration and to test their ideas (Kim, 2005). In relation with these aspects, constructivism requires the regulation of the academic environment which must be different from the traditional classroom environment.

A teaching and learning environment dominated by the constructivist approach is different from a teaching and learning environment dominated by the traditional approach. In an academic environment dominated by the traditional approach, information is given directly to students and there are no activities in which students can be active learners. In the constructivist learning environment, debates, and activities for the interests and needs of learners, a certain uncertainty and collaboration to provide creative thinking are organized for the learners (Taylor, Fraser and Fisher, 1997). In such an environment, students are motivated and directed to solving the problem with collaborative work. While doing these works, students' experiences are taken into account (Rice and Wilson, 1999). In the constructivist learning environment, the technology is used at the highest level. In the technology-assisted classrooms, project-based training, methods and techniques based on the collaborative work are used in order to make learners active (Means and Olson, 1995). In terms of these aspects, the constructivist approach proposes radical changes in teaching and learning environment unlike the traditional educational approach. In an environment, in a relaxed manner without being under any pressure, using students' past experiences and ideas acquired by a variety of sources, working on real-life problems by doing researches and interrogations, continuing teaching outside of the classroom, and where students are responsible for their own learning, it is seen that these learning approaches have a positive influence on students' academic achievement (Tenenbaum, Naidu, Jegede and Austin, 2001, Maypole and Davies, 2001). All of these in mind, in an educational environment dominated by constructivist learning, learning will be realized in a high level of efficiency and durability (Taşpınar, 2012).

In the constructivist approach that allowed a different perspective on education, we see also different measurement and evaluation activities. In this approach, learners are very active in the teaching and learning activities. Exams which do not allow thinking and commenting, which measures the knowledge and skills in the bottom rung of the cognitive level with multiple choice and short answer quizzes will be inadequate and insufficient. That is why, in the constructivist approach, in place of product-oriented learning, focusing on the process of learning by exhibition, project work, portfolio, scoring key diagnostic tree, checklists, performance evaluation, self-assessment, alternative assessment tools such as peer reviews should be used. Here, which is evaluated is not the product of learning but the learning process and that students continue learning throughout the assessment and evaluation studies. Considering all of this information, it can be concluded that the constructivist learning approach which use a different view in learning activities, have an important contribution on the academic achievement of students and on the durability of the informations learned.

Problem

Today, we see an increasing number of scientific studies. Different results made on a specific issue, are obtained from studies realized independently from each other. Even though studies enable comprehensive generalizations themselves, they can not provide a comprehensive description because of limitations such as sample size, time, transportation, number of practitioners. Because of the nature of the sciences of the education, in the research, the events and the facts are examined in their environment. The researcher try to explain and to comment on the events and on the facts intervened in their own environment (Yıldırım and Şimşek, 2011). In the researches for the social sciences, we see that the researches are not continued until obtaining a concrete solution (Karasar, 2005). To interpret knowledge in the social sciences and open the way to various researches, comprehensive and reliable top quality works are necessary (Akgöz, Ercan and Kan, 2004).

In order to make a more general description, important works obtained after scanning of literature works are benefited from many other studies (Cooper, 2010). This idea is the basis of the literature and the purposes of meta-analysis. Major studies through gathering synthesized individual work allow to the policymakers and researchers to see the *big picture* providing scientific generalizations and to give the opportunity for making an overall assessment. It is scientifically proved to what extent it is important to have applicable results in the social and behavioral sciences and it is necessary to have brief, feasible works and which will have the quality to be the bases of the new works (Özcan, 2008).

Training programs in Turkey is renovated in 2005 by putting the constructivist approach in the center of system. However, the importance of this approach has increased in the teaching-learning process and it has been revealed in several studies. There are a number of studies conducted around the subject of "Constructivist Learning Approach" which attracted the attention of educators in Turkey (Aktaş, 2013; Arseven, 2010; Çelebi, 2006; Kızılabdullah, 2008; Küçükyılmaz, 2003; Turgut, 2005; Türkoğuz, 2008; Üzel, 2007; Yazgan, 2007). In these studies, the effects of the constructivist approach on academic achievement, attitude, scientific process skills, persistence, motivation and the critical thinking are examined. Researches made from different angles about the constructive learning approach are needed to be combined, synthesized and evaluated.

In spite of the existence of many studies to determine the effects of constructivist learning approaches on the academic achievement, any meta-analysis survey has been found on this subject. In this context, the question of "what are the effects of the constructivist learning approach on learners' academic achievements?" is important to answer.

Purpose

The purpose of the research is to determine the effects of constructivist learning approach compared to traditional teaching methods on students' academic achievement by using the method of meta-analysis. For this, the meta-analysis of relevant studies in the literature has been studied. In addition, various working characteristics which may alter the effectiveness of constructive learning approach are determined. These are the types of publication, courses, level of education, sample size, practice time and methods of constructivist learning approach. Under this general purpose, the characteristics of the studies included in the meta-analysis, the differences between the effect sizes of constructivist learning approaches have been precized.

METHOD

In this section; several passages such as the used research model, data collection, the criteria, the coding of the data, the analysis and interpretation of data will be treated.

Research Model

In order to determine the effectiveness of PBL approach in this research, the meta-analysis method is used. Meta-analysis is a statistical technique for combining the findings from independent studies. Meta-analysis is a statistical procedure application used for the synthesis and interpretation of individual studies. A meta-analysis uses a statistical approach to combine the results from multiple studies in an effort to increase power (over individual studies), to improve estimates of the size of the effect and/or to resolve uncertainty when reports disagree (Cohen, Manion and Morrison, 2007; Ergene, 1999; Glass, 1976; Hunter and Schmidt, 1990). Briefly, meta-analysis is the analysis of other analysis.

Collection of Data

Works included in this research are composed of published or not published master and doctoral dissertations about "Constructivist Learning Approach" in Turkey between the years of 2003-2014 that have the same problematic and the necessary statistical data analysis and of articles published in scientific journals.

Scanning of graduate theses held in Turkey was realized both in Turkish and in English on the website of the Thesis Center of National Council of Higher Education between 01/12/2015 and 15/02/2015. In this context, thesis including the key words "constructivism", "constructivism approach" in English and the key words "yapılandırmacı öğrenme", "yapılandırmacılık" in Turkish are listed. At the end of listing results, 46 theses respecting the criteria of our research were chosen. After the analysis, thesis having the appropriate problematic and the criteria are included in this study. Investigations were carried out in the form of examination of the full text. For restricted articles and the thesis that we did not find in the Thesis Center, we asked to be in contact with authors or the library of Universities. In this way, we reached a total of 3 theses. 2 theses could not be reached in any manner. During the examination, 28 theses on the effect of the constructivist learning approach for students' academic achievement and conforming to our topic have been found. These theses have also been included in the meta-analysis study.

In order to achieve articles published in Turkey, literature scanning is done, between January 2015 and February 2015, from ULAKBİM and ASOS databases which are generally index scientific journals in Turkey. As master's and doctoral thesis are also published in Turkey as articles, because of this situation articles and theses are mutually screened and compared.18 articles were included in the meta-analysis at the end of screening of studies about the effect of the constructivist learning approach on learners' academic achievements.

2 of master's thesis published about the academic achievement have 3 different methods, 2 of them have 2 different methods and one of articles has 2 different methods. Therefore, these studies were reviewed separately one by one and thus they have been included in the meta-analysis. In this way, 53 works were collected in the meta-analysis.

Inclusion Criteria

The criteria used for studies that were included in the study are:

1) The study should be held in Turkey between 2003-2014.

2) The study has to be a master's or doctoral thesis written in Turkish or English, or an article published in scientific journals.

3) It must include experimental studies.
4) The constructivist learning approach must be used on experimental group and the traditional teaching approach must be used on the control group.
5) It should include the mean and standard deviation of academic achievement of students in control group and experimental group.
6) It should give the sample size of the studied groups.

Coding of data
In order to determine if the studies are conforming to the criteria of inclusion for meta-analysis and in order to make a comparison between different studies in meta-analysis, a comparison Coding Form is regulated by the researchers. Information in the form of coding are selected to determine the general characteristics of the study. Some features available in the form of coding are as follows: the title, the author of the work, the type of study, year of study publication, the person by whom the scale was prepared, duration of application, the city in which the work was realized, the educational level of the group of students to whom the work was applied, the statistical data of the work, the effect size of the study.

With the aim of guaranteeing the reliability of the study, it is important that the coding is made separately at least by two researchers. One of them having made the coding in this study have completed his PhD in educational sciences and the other one is continuing his doctoral studies. The analysis of the first and second researcher is determined by comparing the number of overlapping and non-overlapping coding. After using the formula of reliability (Miles and Huberman, 2002), it is found that the reliability of coding is 97%. The values obtained from 70% and above are considered sufficient for the reliability criteria (Yıldırım and Şimşek, 2011). Therefore, the coding can be said to be reliable. Non-overlapping coding is checked again by two researchers and is corrected by them, after a common decision.

Analysis and Interpretation of Data
In this study, in order to analyze the data, the meta-analysis of the study effect is used. In the meta-analysis of the study effect, standardized effect size indicated by Cohen d is used. This statistical method provides a comparison of the effect size revealed by turning a common measurement system of the data of independent operations used in multiple studies. (Borenstein, Hedges, Higgins and Rothstein, 2009; Ellis, 2010; Üstün and Eryılmaz, 2014). Besides, it is advisable to make the analysis of the power indicating the possibility that the effect size was correctly obtained.

As the scales used for the researches included in the study were not the same and as we can have studies with values contrary to research, in order to test the differences between the groups to whom constructivist learning approach is applied and to whom it is not applied, in acceptable standards, standardized arithmetic averages adapted to the statistics of meta-analysis are used (Cohen, 1988; Huffcutt, 2002; Hunter and Schmidt, 1990; Lipsey and Wilson, 2001; Rosenthal, 1991; Schulze, 2004; Wolf, 1986). Various researches are in the contents of the works integrated into this research. Effect sizes obtained in studies using different tests on different samples were calculated separately. Weight is calculated as the relative weight of the work.

While interpreting the importance of effect sizes obtained by results of meta-analysis, some classifications are used. Effect size classified as follows according to Cohen, Manion and Morrison (2007):
• $0 \leq$ Effect size value ≤ 0.20 poor,
• $0.21 \leq$ Effect size value ≤ 0.50 modest,
• $0.51 \leq$ Effect size value ≤ 1.00 moderate,
• $1.01 \leq$ Effect size values, strong has an important effect.

In this meta-analysis research, the effects of constructivist learning approach are compared to the effects of traditional learning methods. In the study, constructivist approach and traditional learning methods are considered as independent variable and the students' academic achievement is considered as dependent variable. In the moderator analysis, the test of analogue ANOVA is used.
Comprehensive Meta-Analysis (CMA), MetaWin and Excel are used in order to analyze the data. For the overall effect size, sub-group analysis, publication bias, forest plot and funnel plot are used; for normal distribution graph, Meta Win is used; and for power analysis, Excel is used.

FINDINGS
In this section, the findings of the meta-analysis are studied. The result of analysis obtained by merging of problems of the research with meta-analysis and their interpretations are studied.

Findings of Overall Effect Size

The findings of our meta-analysis about the effects of constructivist learning approach on students' academic achievement and about the effects of traditional teaching methods on students' attitudes are presented below.

In order to calculate the effect size, first of all, we should determine the meta-analysis model which will be used. Firstly, the fixed effects model (SEM) and a random effects model (REM) is required for testing the homogeneity of the study. The findings concerning the homogeneity of studies and findings about overall effect size are represented in table 1 below.

Table 1: Findings about homogeneity and about overall effect size

Model	Value of average effect-size	Degrees of freedom	Homogeneity value	Chi-Square table value	Standard error	%95 confidence interval for the effect-size	
						Lower limit	Upper limit
SEM	0.927	52	531.540	69.832	0.038	0.852	1.002
REM	1.156	52	62.440	69.832	0.125	0.910	1.402

From table □□, at the significance level of 95% and with fifty-two degrees of freedom, the critical value was found to be 69.832. When homogeneity value of work has been included in the survey calculated based on the fixed effects model Q = 531.540, while the random effects model was found to be Q = 62.440. The value of homogeneity found by the random effects model seems not to exceed the critical value. That is why, it is said that the value of effect size of studies is prepared according to the random effects model by taking into account their homogeneous feature.

As a result of the analysis made by the random effects model, the average effect size value was found to be 1.156 with a standard error of 0.125. At the 95% confidence interval, the lower limit of the effect size is found to be 0.910, the upper limit is calculated to be 1.402. When looking at the statistical significance, Z is found to be 9.222 and p is calculated as 0.000. That is why the obtained results can be said to be statistically significant. As a result of the power analysis, the value is found as 0.972. This is a high value and we can say that this work is about to determine an actual effect in a right way.

The fact that the effect size value is found to be a positive value (+1.156) shows that the process effect is in favor of the experimental group. Therefore, the constructivist approach has more positive effects on the students' academic achievement than traditional teaching methods. This influence level is considered in a strong level according to the classification of Cohen and his friends (2007).
Findings regarding the effect size of the study are shown in Figure 1.

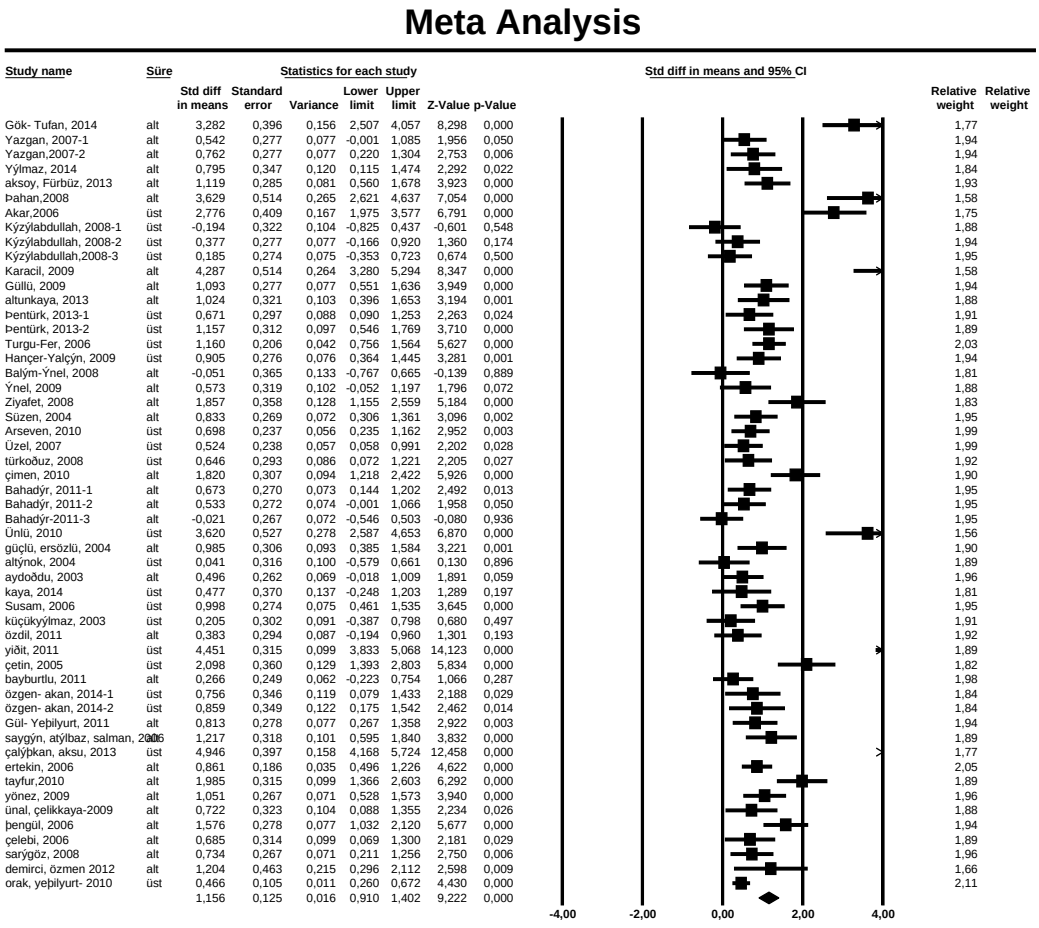

Figure 1. Effect Size values of Studies

The squares in the graph show the effect size of their study. The lines on both sides of the squares indicate the upper and lower limits of the effect size at the 95% confidence interval. The area of squares shows the weight in the overall effect size of studies where they belong. Diamond located in the rhombus shape below precises the overall effect size of the study.

While the examination of these studies' effect sizes, the smallest effect size value is calculated as -0.194 and the highest effect size value is determined as 4.946. Referring to the studies' effect sizes, we see that 50 of the 53 studies showed a positive effect size and 3 of them have negative effects. Whereas 50 studies with a positive effect are in favor of the experimental group of constructive approach, 3 studies with negative effects has an effect in favor of the control group to whom the teaching methods are applicated.

Normal distribution graph of studies' effect size included in the research are shown in Figure 2.

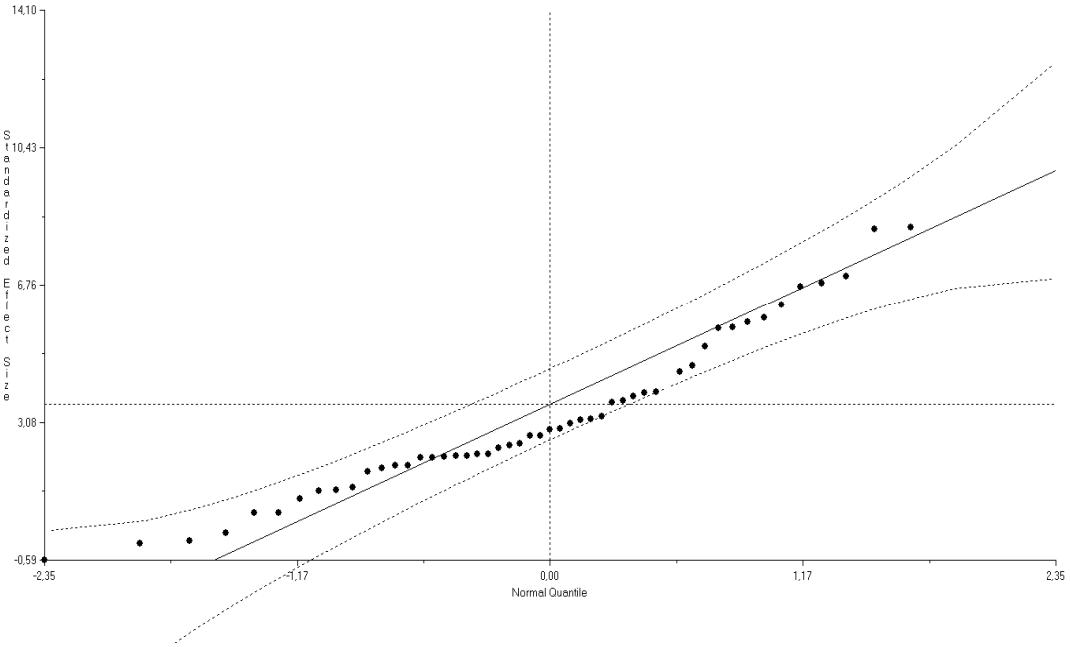

Figure 2. Graph of the normal distribution about effect sizes

When looking at normal distribution graph of studies' effect sizes, it is seen that the effect sizes are actually near to normal distribution and it is seen that they do not exceed the specified limits. Therefore, it is determined that studies included in the research show the normal distribution.

The overall effect size value about constructivist learning approach on students' academic achievement is calculated as being 1.156, which can be considered as a strongly high level. In order to reduce the effect size value from 1.156 to 0.01, the required number of 4860 is found, the effect size value of this number is zero. We can say by looking at the several numbers of studies that the results obtained from the analysis are reliable and that their publication bias is low. Besides, with the aid of the Funnel Plot graph (Funnel Chart), we can interpret if there is a publication bias or not.

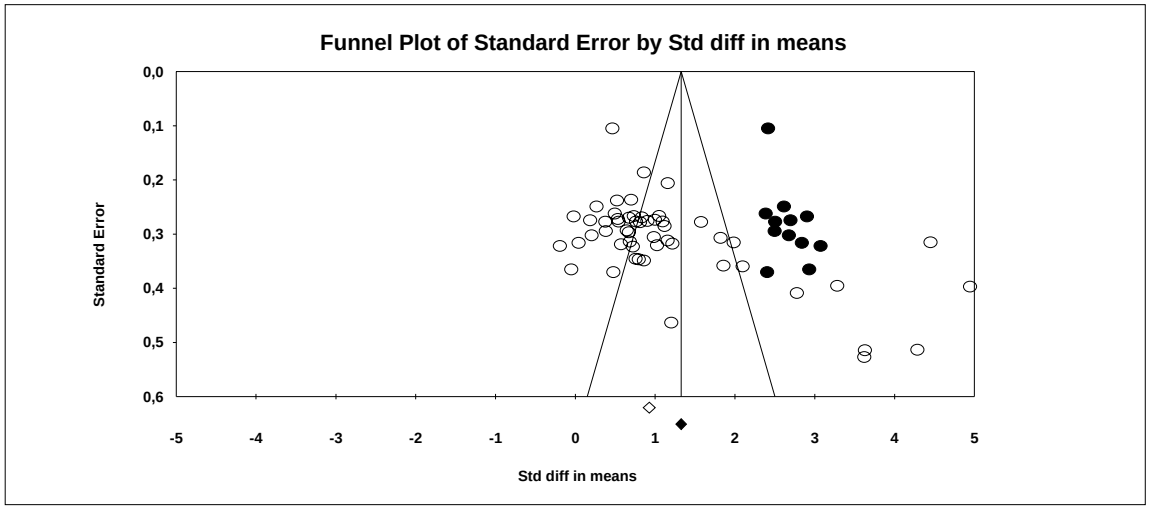

Figure 3. Funnel Plot Chart about effect sizes

In case of there is a publication bias on the Funnel chart, the effect sizes take place in an asymmetric way. In case of the lack of publication bias, they will take place in a symmetrical distribution. Referring to Figure 3, it can not be said that the effect sizes are distributed in a symmetrical structure. In the graph of Duval and Tweedie created by the trimm and fill method, if 12 studies are placed at the right side of the graph, it will be a fully

symmetric structure work. Nevertheless, it can be said that, for a study that combined with the aid of the meta-analysis of 53 publications, it is a low publication bias.

Findings about the problems

In terms of academic achievement; findings about the effect sizes according to the moderators are presented in Table 2.

Table 2: Effect of size differences by moderators

Variables	Homogeneity Value between groups (Q_B)	p	n	ES	ES (%95 CI)		Standard Error (SE)
					Min.	Max.	
Publication type	7.437	0.024					
Master's thesis			25	1.341	0.985	1.697	0.182
Ph.D.			9	0.420	-0.165	1.004	0.298
Article			19	1.272	0.861	1.682	0.209
Courses	40.167	0,000					
Computer			2	2.621	1.431	3.812	0.607
Biology			7	1.014	0.410	1.617	0.308
Geography			1	1.985	0.383	3.586	0.817
Religion			3	0.127	-0.787	1.041	0.466
Science Learning			2	2.890	1.761	4.018	0.576
Physics			11	0.559	0.084	1.034	0.242
English			2	2.743	1.621	3.865	0.573
Chemistry			6	1.002	0.348	1.657	0.334
Math			10	0.858	0.357	1.360	0.256
Music			2	1.861	0.689	3.032	0.598
Social sciences			4	1.385	0.563	2.207	0.419
Turkish			3	1.872	0.919	2.825	0.486
Educational level	9.838	0.020					
Primary			14	0.936	0.473	1.398	0.236
Secondary			26	0.996	0.656	1.337	0.174
High School			8	1.363	0.746	1.984	0.315
University			5	2.254	1.478	3.029	0.396
Sample Size	1.007	0.316					
1≤N≤29			30	1.043	0.709	1.377	0.170
30≤N			23	1.299	0.926	1.672	0.190
Practice time	0.173	0.678					
1≤s≤19			31	1.113	0.786	1.440	0.167
20≤s			22	1.220	0.832	1.608	0.198
Method	11.416	0.576					
4Mat			2	0.807	-0.562	2.177	0.699
5E			12	1.303	0.748	1.858	0.283
7E			1	-0.051	-2.000	1.898	0.994
Computer-based learning			2	1.438	0.092	2.784	0.687
Scientific Letters			2	0.255	-1.080	1.591	0.681
Invention			1	2.776	0.794	4.758	1.011
Drama			2	2.544	1.147	3.942	0.713
Realistic math education			1	0.524	-1.348	2.396	0.955
Visual			1	0.646	-1.256	2.548	0.970
Solidarity			15	1.086	0.592	1.580	0.252
Concept map			1	1.024	-0.894	2.943	0.979
Problem-based learning			3	1.415	0.284	2.547	0.577

Constructivism	8	1.112	0.443	1.780	0.341
Structured Homework	2	0.913	-0.436	2.263	0.689

There could find a statistically significant difference between groups which formed for publication types, courses and educational levels. There could not find a statistically significant difference between other groups.

CONCLUSIONS

A total of 53 studies about effects of constructivist learning approach on students' academic achievement are brought together. The total number of samples is 3271 (number of samples of control group and the experimental group). According to the random effects model, the overall effect of studies are between 0,910 and 1,402 interval of the confidence and according to the effect size classification of Cohen and his friends, they have a strong level of effect. According to the results of research made in order to analyze the effects of constructivist learning approach on students' academic achievements compared to the traditional learning method, we observe positive effects. This effect is seen on a strong level. While 50 of 53 studies are in a positive way, 3 of them give negative results. 3 studies with negative effects do not explain why exactly they have results in favor of traditional learning methods. In order to reduce to 0.01 the effect size value of 53 studies merged with meta-analysis method, we need to have at least 4860 studies which have zero as effect size value. By looking at the important number of studies, we can say that analysis results are reliable and that they have a low publication bias.

According to the results of analysis by type of publication, significant differences are detected. The highest effect size values are found in the thesis (ES=1.419) and in articles (ES=1.272). The effect size value seems to be in a small level for PhD thesis (ES=0.420).
When the results of the analysis are carried out according to the course, significant differences are obtained. The highest effect size values are found in the courses of science education of (ES=2.890), English (ES=2.743) and computer (ES=2.621) seems to be on course. However, the few number of studies about courses poses a problem with the probability of generalization of the results. Besides, courses like geography, biology, chemistry, music, social studies and Turkish seem to have important effect size values. The lowest effect size values are found in course of religion (ES=0.127), and it is determined that it is a weak level.

When we look at the results of analysis made according to students' educational level, significant differences have been identified. All bottom variables have high effect size values. However, because of the huge difference between the effect size value of the University which has the highest effect size (ES=2.254) and the effect size value of primary first level which has the lowest value (0.936), significant differences can be seen.

When we look at the results of analysis made according to the size of the sampling work group, any significant difference has been identified. The effect size value of both bottom variables are on strong levels. By contrast, the highest effect size values are found for people who are 30 years old and above (ES=1.299), the lowest effect size value is found for people who are between 1 and 29 years old (ES=1.043).

Concerning the results of analysis made according to the application time, significant difference has not been identified. The effect size value of both bottom variables is seen to be on strong levels. By contrast, the highest effect size values are found for application time with 20 and above (ES=1.220), the lowest effect size value is found for application time between 1 and 19 (ES=1.113).

For the results of analysis made according to the method used, significant difference has not been identified. The highest effect size values are found for invention (ES=2.776) and for drama (ES=2.544). However, the few number of studies about methods poses a problem with the possibility of generalization of the results. The lowest effect size values are found for the methods of 7E (ES=-0.051) and for scientific letter (ES=0.255). It has been determined that the other methods have high effect size values.

Based on the results obtained in this study, the following suggestions can be made for practitioners, the program developers and researchers:

1. As a result of a meta-analysis study conducted to determine the effects of constructivist learning approach on students' academic achievement; it was concluded that the constructivist learning approach makes more significant contribution to learners' academic achievement than traditional learning methods. Therefore, teachers can use the constructivist learning approach to improve student academic achievement.

2. It has been found that the use of constructivist learning approach in different lessons and subjects has a high effect size for students' academic achievements, except the lesson of religious instructions. That is why, the constructivist learning approach can be used in almost all areas.
3. When analyzing the effect size of constructivist learning approach on students' academic achievement according to learners' educational level, it is determined that the highest effect size values are found for college and high scool level. According to this result; in order to improve students' academic achievement, constructivist learning approach can be especially used for these educational levels.
4. When analyzing the effect size of constructivist learning approach on students' academic achievement according to the sample size, the effectiveness of constructivist learning approach is proved for every class. According to this result; in order to to increase students' academic achievement, constructivist learning approach can be used effectively in classrooms with different class sizes.
5. After studying the effect size of constructivist learning approach on students' academic achievement according to implementation period, any significant difference has been found. Therefore, constructivist learning approach can be applied in different implementation periods.
6. In order to increase the academic achievement of the students, methods based on constructivist learning approach, except scientific letter methods and 7E methods can be used.
7. Because of its effectiveness and its positive effects on students' academic achievement, constructivist learning approach can be more involved in education programs. In the curriculum other than religious instruction be given more space. More importance can be given to the constructivist learning approach in every lesson except religious instructions.
8. Constructivist learning approach can be more used in university's and high school's programs.
9. Studies that have different effect size levels can be examined one by one and we can try to determine by which factors these studies may be affected.
10. The effect sizes of the Master's thesis and articles have been found to be higher compared to the doctoral thesis. The reasons of this may be researched and explored.
11. According to the meta-analysis' results, by examining the studies which have a negative effect size value, we can try to search which factors are in the origin of this negative effect size.
12. Further studies about constructive learning approach can be realized by using a smaller number of variables.

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The Role and Use of E-Materials in Vocational Education and Training: The Case of Slovenia

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ABSTRACT
In the paper some issues and problems regarding the implementation of ICT in initial vocational education and training in Slovenia are discussed. After the brief analysis of the main theoretical characteristics of ICT and e-materials, the key findings from the recent EU survey on the ICT in schools are presented and some conclusions on the basis of the results of the ICILS study are drawn.

In the second part of the article, some of the most relevant findings from the empirical research conducted on the representative sample of Slovenian secondary VET teachers and students are summarized and interpreted.

We have asked teachers and students how often do they use offline and online available e-materials in teaching and learning and how do they evaluate their usefulness. While being quite critical towards the usefulness of available e-materials, the vast majority of teachers and students also claim that they use e-materials quite rarely. The reasons for such results should be further explored, compared with relevant statistical data in the national as well as international context, and appropriate systemic measures should be introduced.
Keywords: e-materials, learning in IVET, ICT, digital competence, vocational education and training

INTRODUCTION

In this paper, we are discussing issues and problems related to the roles of information-communication technology (ICT) in initial vocational education and training (iVET) in Slovenia. In the first part of the article we are briefly describing the theoretical characteristics of ICT and e-materials in educational contexts, its main features and recent developments, particularly in the context of iVET. In order to show the current state of affairs regarding ICT equipment and its usage in Slovenian iVET, we are also summarizing key findings from the recent EU survey on ICT in schools, issued by European Commission in 2013 (Survey of Schools..., 2013). Furthermore, we are drawing some conclusions on the basis of the results of the International Computer and Information Literacy Study (ICILS, 2014).

In the second part of the article we are presenting some of the most significant empirical findings related to the use of e-materials in Slovenian iVET. The study was conducted in 2011 on the representative sample of teachers and students attending three iVET programs.

ICT IN EDUCATION: KEY CONCEPTS AND ISSUES

At least in the Western civilization, digital computer-based technology and its various forms and functions have already become an inseparable part of everyday life. ICT cannot be ignored or avoided anymore – or even if it could be, at least in principle, the price an active individual would have to pay in contemporary society for being excluded from technological developments seems to be rather high and is thus not considered as a plausible option. Education institutions and processes that take place within them are a significant and constituent part of society, so it seems logical that they are inevitably affected by the contemporary computer-based technological developments as well. Discussions on that topic are numerous and can be followed by several decades already (cf. e.g. Groff, 1983; Apple, 1988). As early as in 1983, Groff stated that vocational education in the past saw its relation to the economy "primarily in terms of providing a trained work force", but in his opinion this focus "will not be sufficient. New expanded relationships will be required between occupational education and the economy in the computer-literate, high- technology, information society." (Groff, 1983, p. 93)

Discussing about the impacts of the new technology on education, in 1988 Apple posed a question of whether the "new technology is part of the solution or part of the problem in education". He emphasized that "there is something of a mad scramble to employ the computer in every content area. In fact, it is nearly impossible to find a subject that is not being 'computerized'" (Apple, 2003, p. 455). Nearly three decades later it is obviously even more so[1]. Many reasons for that can be identified: as Hawkridge (1990 in Tondeur, van Braak & Valcke, 2007, p. 963) points out, at least four rationales are driving the policies related to the implementation of ICT in education, namely the *economic, social, educational* and *catalytic* rationale (ibid.). In other words, students are required to develop their ICT skills – or we should probably name them "digital competencies" – because they are (1) necessary for the entrance to the contemporary labour-market (economic rationale), they are (2) inevitable for the students to become "responsible and well-informed citizens" (ibid., i.e. social rationale), because we believe that (3) ICT can significantly support and improve teaching and learning processes (educational rationale) and (4) contribute to the acceleration of educational innovations (catalytic rationale).

As a process, *e-learning* is closely connected with the implementation of ICT in education. According to the 2005 report *The use of ICT for learning and teaching in initial Vocational Education and Training* (2005), fostering e-learning in educational contexts is justified by several assumptions:

- It is expected to support synchronous or asynchronous communication between all the relevant stakeholders (i.e. students, teachers, tutors, mentors, master craftsmen etc.).
- It can enable simulation-based learning and thus significantly contribute to the intertwining of theoretical and practical dimensions of educational contents, particularly while using contemporary competence-based didactic approaches.
- It enables effective access to online media in all its forms (text, audio, video) from the classroom as well as from student's or teacher's home, and thus allowing the vast quantities of knowledge to be reached and processed relatively fast.
- By using automated Learning Management Content Systems managing large amounts of information and knowledge is more efficient (The use of ICT..., 2005, pp. 9-10).

It could therefore be argued that ICT can productively contribute to the popular (and actually quite traditional) idea of *lifelong learning* (see e.g. Vidmar, 2014), not only of youngsters and active adults, but of older population as well (Kump & Jelenc Krašovec, 2014). On the other hand, the study about the current and possible uses of ICT in iVET, carried out by Ramboll Management on behalf of the European Commission (The use of ICT..., 2005), identified a number of weaknesses related to the implementation of ICT in VET settings. Among issues to be tackled are (1) a lack of IT skills and training among teachers, (2) a low degree of e-readiness and a skeptical attitude towards e-learning among students, and (3) inadequate infrastructure, technical support and equipment among the institutions (ibid., p. ix). Some authors are critically stressing the most prevailing assumptions about the didactic functionalities of ICT and e-learning as well: it is worth noting, for example, Clark and Feldon's text on the "myths" constructed about the benefits of multimedia learning. Although we may believe that multimedia learning can by itself improve the motivation, knowledge and overall performance of students, authors (Clark & Feldon, 2005) convincingly argue that there is no firm empirical evidence supporting such presumptions. As they put it: "The questionable beliefs include the expectations that multimedia instruction: 1) yields more learning than live instruction or older media; 2) is more motivating than other instructional delivery options; 3) provides animated pedagogical agents that aid learning; 4) accommodates different learning styles and so maximizes learning for more students; and 5) facilitates student managed constructivist and discovery approaches that are beneficial to learning." (Ibid., p. 98)

Additionally, Kuskaya Mumcu and Kocak Usluel (2010, p. 99) argue that on the basis of some recent studies teachers do not "benefit from ICT in activities they developed in the classroom environment already and teachers' ICT usage often remains on a personal level" (ibid., p. 99). In other words, although teachers use ICT regularly for their personal purposes, they are not as successful in transferring these habits to their professional life. It should be mentioned, however, that such difficulties may be strongly related with the lack of the appropriate infrastructure: as noted by Alsabwy et al. (2013), not enough attention has been paid to investigate the role of IT infrastructure services as a foundation to create the success of e-learning systems. However, it needs to be considered that certain data regarding ICT infrastructure in schools at the EU level exists. In the following section we are briefly presenting some of the most relevant figures related to the access and ICT usage in vocational schools in Slovenia.

[1] In this text, we are consciously putting aside the otherwise highly relevant question of what may be or are the problematic dimensions of ICT implementation in education, although it should not be ignored that issues related, for example, with the reproduction of social inequalities through education are closely connected to the development and establishment of ICT in education – as well as in other social contexts.

HOW WELL ARE VOCATIONAL SCHOOLS IN SLOVENIA EQUIPPED WITH ICT AND HOW DIGITALLY LITERATE ARE SLOVENIAN STUDENTS?

With the population of 2 million inhabitants, Slovenia is one of the smallest EU countries. Nevertheless, vocational education system is traditionally well developed, although facing challenges otherwise typical for all the European VET area. Since we have – in this same journal – already described the main systemic and curricular characteristics of VET in Slovenia (see Mažgon & Štefanc, 2012), we will primarily focus here on its ICT related characteristics. The 2013 *ICT in Education* survey conducted by the European Commission (see Survey of Schools ... 2013) showed that situation in Slovenia regarding ICT equipment is mainly satisfactory, but some figures point to certain inadequacies that should be more carefully addressed. In 11th grade, for example, there are on average 2 students per computer in vocational schools (which is more convenient comparing to the average of 3 students per PC in EU), but at the same time as much as 25% of Slovenian VET students (compared to the average of 15% at the EU level) report that they actually "never or almost never" use a computer in lessons (ibid., p. 65). Furthermore, when it comes to the number of students per internet-connected laptop computer, the ratio in Slovenia is 11 students per laptop (while the average EU ratio is as low as 8:1). To put it differently, data shows that there may be relatively high number of PC computers (either internet connected or not) available in schools, but students do not seem to use it very often during the lessons, while at the same time they do not use their own laptop computers very frequently either.

Furthermore, it needs to be noted that according to the same report (ibid., p. 28), 7% of 11th grade VET students in Slovenia attend schools without broadband internet connection. This is the second highest share among all EU countries. However, this is not to say that Slovenian VET schools are not well equipped with ICT – in this regard Slovenia's VET schools are quite comparable to the average ICT equipment of other VET schools across EU. But being "well equipped" and "equipped enough" to enable unrestricted use of ICT in teaching and learning processes is not the same.

Therefore, it should be emphasized that more effort and resources would need to be invested for the purpose of (i) further equipping schools with broadband Internet connections; (ii) providing students and teachers with appropriate devices (such as tablets, laptops and similar devices); (iii) providing appropriate teacher education to foster their practical knowledge in this area. Such measures would also significantly contribute to better computer and information literacy results. If we take a brief look at the International Computer and Information Literacy Study (ICILS 2014), we can find out that the average Slovenian student's score in CIL assessment was 511, being the second worst score among 9 participating EU countries. More than one third of participating students (36%) did not achieve 2nd difficulty level, 8% of them did not even achieve the level 1, while the highest difficulty level was only achieved by 0,4% of Slovenian students. If we would like to foster the active usage of ICT in individual learning and during the classes, it seems obvious that more should be done to reduce the share of students whose computer literacy is rather weak.

In the following section, some of the empirical survey results regarding the usage and the usefulness of the e-materials in Slovenian VET programmes are presented. Since the survey was conducted in 2011, i.e. in the same period when the above discussed data was gathered (see ICILS, 2014; Survey of Schools ..., 2013), our findings can be productively linked to the empirical figures we have already summarized.

METHODOLOGY

We have used the descriptive and causal non-experimental method for the research. The data was gathered by a questionnaire consisted of opinion and evaluation scales. SPSS statistical package software was used to analyze the obtained data. We have calculated the degree of reliability (Cronbach $\alpha \geq 0{,}60$) and validity (in all the cases more than 33% of variance has been explained by the first factor).

Figures are shown in frequency and structural tables. Certain variables, although they are ordinal, were treated as interval, and arithmetic means were calculated for them. In addition, the Wilcoxon Signed Rank Test for testing the null hypothesis has been used to assess whether population mean ranks differ.

Sample

The questionnaire was completed by 370 *teachers* (29.6% males and 70.4% females) and 552 pupils (50.4% males and 49.6% females). 37.5% of the participating teachers worked in the *mechanical technician* programme, 32.3% of them in the *health care* programme and 30.2% taught in the *economic technician* programme. More than half of participating teachers taught general subjects (such as Math, Mother tongue, ESL, Social Sciences etc.), while 41.5% of them taught professional modules. There were some of individuals who taught both general and professional courses, but their share can be considered as negligible (5.5%). Participating teachers had an average of 15.12 years of working experience, majority of them six years or more, so the sample can be

considered as consisted of the experienced teachers who are competent enough to give a reliable, professional assessment of educational materials.

The *sample of pupils* included the pupils from the aforementioned educational programmes as well. 40.8% of them were enrolled in the *health care* programme, 32.2% in the *mechanical technician* programme and 27.0% in the *economic technician* programme. At the time when survey was conducted, one third of the student participants (33.0%) attended the third year of the programme, while 29.3% attended the fourth year, 23.2% the second year, and 14.5% of students attended the first year of the respective educational programme. In other words, the majority of participating students (62.3 %) attended either the third or fourth year of their respective educational programmes, allowing us to presume that they had enough experience to assess the level of usage and usefulness of e-materials.

TEACHERS' PERCEPTION OF USAGE AND USEFULNESS OF AVAILABLE E-MATERIALS

We have asked teachers to estimate how often they use offline and online available e-materials to prepare and conduct their lessons. Respondents were asked to choose among the four variable values (1-never, 2-rarely, 3-frequently and 4-very frequently). The main descriptive statistics results are presented in Table 1.

Table 1: The usage frequency of online and offline available e-materials (teachers)

	N	M	SD	Min	Max
How often do you use offline available e-materials for preparing and conducting your lessons	360	2,44	0,909	1	4
How often do you use online available e-materials for preparing and conducting your lessons	354	2,30	0,898	1	4

We have applied Wilcoxon signed-rank test to verify whether the population mean ranks differ. On the basis of the test result we were able to confirm that teachers tend to use offline available e-materials slightly, but still significantly more often than online available e-materials (Z = -2,541, p = 0.011). Such tendency seems to be a bit surprising – in the contemporary "network society" (cf. Castells, 2010) we would expect the majority of teachers to rely on online accessible materials significantly more often. Their judgment about the *usefulness* of e-materials follows the same pattern: when asked how useful they find online and offline available e-materials, teachers in the sample assess the usefulness of the latter slightly better than the former, but we could not prove that means differ significantly (see Table 2).

Table 2: The usefulness of online and offline available e-materials

	N	M	SD	Min	Max
How useful are offline available e-materials	292	2,69	0,715	1	4
How useful are online available e-materials	311	2,67	0,675	1	4

These figures may be signaling that VET teachers – although they might recognize the functionality and quality of online e-materials – still do not trust the quality and reliability of broadband connections in their classrooms enough to include such materials more often in their lessons (and subsequently they are not as much included in the lesson preparation process either). Table 3 shows the frequency distribution of teachers' opinions regarding the usefulness of e-materials in more detail.

Table 3: Teacher's opinions on the usefulness of available offline and online e-materials

	Usefulness of offline available e-materials		Usefulness of online available e-materials	
	f	f%	f	f%
Cannot evaluate	61	17,3	44	12,4
None of e-materials	9	2,5	4	1,1
Only few e-materials	107	30,3	128	36,1
Majority of e-materials	142	40,2	147	41,4
All e-materials	34	9,6	32	9,0
Total	353	100,0	355	100,0

It should be noted that a significant share of teachers answered that they "cannot evaluate" the usefulness of e-materials: nearly 20% percent of them said so for the offline available e-materials, while slightly more than 10% do not feel competent to evaluate online e-materials. These figures can be also understood to indicate the share

of teachers who do not use e-materials or at least do not use them often enough to be able to express their relevant judgment about their functional features. The reasons behind this figures should be further explored, but at least two possible hypotheses could be tested: either e-materials are available, but for some reason teachers do not choose to use them actively in the preparation and conduction of their lessons; or this shares indicate the percentage of teachers teaching courses (subjects, professional modules) for which e-materials are simply not developed and available. Apart from that, data shows quite polarized picture of teachers' opinions: namely, roughly half of the respondents replied that all or at least the majority of e-materials are useful, while approximately one third of them recognized as useful only few or even none of the e-materials. These latter shares are even higher for the online available e-materials (nearly 40%), revealing that teachers might be more critical towards e-materials, developed for online access and usage.

WHAT ARE STUDENTS' OPINIONS?

We posed the same questions as presented above to the VET students as well. We have asked them to evaluate how often they use offline and online available e-materials in general subjects (such as mother tongue, ESL, etc.) and in professional modules. In Tables 4 and 5 the main descriptive statistics results are summarized both for general subjects as well as for professional modules. Students were asked to choose among the four variable values[2]. For both areas, i.e. regarding the usage of e-materials in general subjects and in professional modules, Wilcoxon signed-rank test confirmed statistically significant differences between the average usage of online and offline available e-materials (for general subjects $Z = -5{,}326$, $p = 0.000$; for professional modules $Z = -3{,}450$, $p = 0.001$).

Table 4: Using online and offline available e-materials in general subjects (students)

	N	M	SD	Min	Max
We use offline available e-materials during the general subjects lessons	546	1,89	0,816	1	4
We use online available e-materials during the general subjects lessons	543	1,71	0,737	1	4

Table 5: Using online and offline available e-materials in professional modules (students)

	N	M	SD	Min	Max
We use offline available e-materials during the professional modules lessons	546	1,91	0,918	1	4
We use online available e-materials during the professional modules lessons	547	1,80	0,845	1	4

The mean scores of teachers' and students' opinions regarding the usage of e-materials indicate that students might be far more critical when it comes to the judgment about how often e-materials are actually being used in the classrooms. None of the mean scores reaches the average value of 2,00. The lowest mean value (and also the lowest standard deviation) can be noted regarding the usage of *online e-materials in general subjects*, suggesting that – at least in students' opinion – the majority of teachers of general subjects do not include e-materials in their classroom activities.

Table 6: Using offline and online available e-materials during the general subjects lessons

	Using offline available e-materials during the general subjects lessons		Using online available e-materials during the general subjects lessons	
	f	f%	f	f%
Not using at all	199	36,4	236	43,5
Using in very few general subjects	227	41,6	242	44,6
Using in the majority of general subjects	103	18,9	52	9,6
Using in all of the general subjects	17	3,1	13	2,4
Total	546	100,0	543	100,0

In the Table 6 the frequency distribution shows that nearly 80% of students claim that they are only occasionally or even not using offline available e-materials during the general subjects lessons. The share of students claiming the same for online e-materials is even higher, only slightly below 90%. These figures are even more interesting if we compare them with the considerably lower share of Slovenian vocational students included in *ICT in Education* survey (25%) claiming that they "never or almost never" use a computer in lessons (Survey of Schools..., 2013, p. 65). This points to the conclusion that computers may be included in the lessons far more often than e-materials, or to put it differently, teachers may use ICT to support their instruction (for example, by

[2] The variable values were: 1-do not use in any general subject; 2-use in very few general subjects; 3-use in the majority of general subjects; 4-use in all of the general subjects

using PowerPoint presentations or other forms of overhead projections) rather than using it as an equivalent to the printed materials (textbooks, workbooks, worksheets etc.). Quite similar responses can be observed when students were asked about their usage of online and offline available e-materials during the professional modules (Table 7).

Table 7: Using offline and online available e-materials during the professional modules lessons

	Using offline available e-materials during the professional modules lessons		Using online available e-materials during the professional modules lessons	
	f	f%	f	f%
Not using at all	224	41,0	233	42,6
Using in very few professional modules	176	32,2	214	39,1
Using in the majority of professional modules	115	21,1	74	13,5
Using in all of the professional modules	31	5,7	26	4,8
Total	546	100,0	547	100,0

The vast majority of students claim they use offline available materials in either very few or none of the professional modules (73,2%). This share is again higher when asked about the usage of online available e-materials (81,7%). It has to be noticed, however, that the shares of students who claim that they use e-materials in the majority or even all of the professional modules are higher than the same shares when asked about the general subjects. The difference amounts to +4,8 percentage points for offline and +6,3 percentage points for online available e-materials. It would be worth exploring up to what extent this could be the consequence of the fact that traditional printed materials are far less widespread and available for professional modules: since printed textbooks and workbooks simply do not exist for considerable number of professional modules, this fact might stimulate teachers to include more e-materials in their lessons.

One of the important questions in this context is also the question about how often students use offline and online available e-materials while studying at home. Their responses are presented in the Tables 8 and 9.

Table 8: Using offline and online available e-materials while studying at home

	N	M	SD	Min	Max
I use offline available e-materials while studying at home	549	1,58	0,797	1	4
I use online available e-materials while studying at home	548	1,99	0,991	1	4

Similarly as already noted above, the mean scores in the Table 8 reveal that students use online available e-materials more often than offline available e-materials while studying at home[3]. It was confirmed by the Wilcoxon signed-rank test that population mean ranks statistically significantly differ (Z = -10,164, p = 0.000). In the Table 9, frequency distribution of students' answers is shown.

Table 9: Using offline and online available e-materials while studying at home – frequency distribution

	I use offline available e-materials while studying at home		I use online available e-materials while studying at home	
	f	f%	f	f%
Never	321	58,5	217	39,6
Rarely	157	28,6	170	31,0
Often	53	9,7	108	19,7
Very often	18	3,3	53	9,7
Total	549	100,0	548	100,0

As for the offline available e-materials, it is quite obvious from the above frequency distribution that they play an utterly negligible role in home studying of VET students. Namely, slightly less than 60% of the students claimed that they never use such materials while studying at home, while nearly 30% claim to use them only rarely. If compared with the shares related to the usage of online available e-materials, the latter are obviously used more often, but still the share of students claiming that they never or rarely use online available e-materials seems surprisingly high, at least if we consider the fact that the majority of students are relatively well equipped

[3] They were assessing their usage of online and offline available e-materials on the following scale: 1-never, 2-rarely, 3-often, 4-very frequently.

with broadband connections at home and thus the results cannot be assigned to the technological obstacles. But on the other hand, such figures do not come as completely unexpected: since the shares of teachers using online and offline available e-materials are also low, it is somehow logical that students more or less "follow" their example. Or to put it differently: at least two conditions should be satisfied if we want to stimulate students to use e-materials in their own studying at home, namely (i) such materials should be didactically functional (meaning that they allow students to acquire educational objectives set for the particular courses), and (ii) teachers should actively use and promote the usage of such materials during their lessons.
Regarding students' opinions about the usefulness of e-materials, the figures presented in the Table 10 reveal quite interesting picture.

Table 10: Usefulness of offline and online available e-materials – students' opinions

	N	M	SD	Min	Max
How useful are offline available e-materials	392	2,28	0.905	1	4
How useful are online available e-materials	422	2,49	0.962	1	4

It is not that much surprising that students evaluate the usefulness of online e-materials higher than offline ones – this tendency is pretty much in the line with their opinions regarding the usage of such materials. We were also able to prove that population mean ranks significantly differ: Wilcoxon signed-rank test showed that students assign statistically higher values to the usefulness of online available e-materials (Z = -4,383, p = 0.000).

Table 11: Usefulness of offline and online available e-materials – frequency distribution

	Usefulness of offline available e-materials		Usefulness of online available e-materials	
	f	f%	f	f%
Cannot evaluate	153	28,1	119	22,0
None of e-materials	82	15,0	73	13,5
Only few e-materials	159	29,2	137	25,3
Majority of e-materials	112	20,6	143	26,4
All e-materials	39	7,2	69	12,8
Total	545	100,0	541	100,0

What comes as a surprise, at least to some extent, is the fact that far more students actually expressed their opinions about the usefulness of e-materials which – according to the data in Tables 8 and 9 – they do not or very rarely use. Namely, only 28% of students claimed that they could not evaluate the usefulness of e-materials, meaning that considerable amount of the respondents either did not accurately assess the frequency of their actual usage of e-materials or they simply assessed the usefulness of e-materials they are not very familiar with. If we put this inconsistency aside and briefly compare the shares in the table 11, it is again evident that considerably more students assess the usefulness of online e-materials higher than offline e-materials: if slightly less than 28% of them claim that the majority or all of the offline available e-materials are useful, the share of students claiming the same for online e-materials amounts up to nearly 40%. Again, these figures seem to be in line with the tendencies towards the ever more frequent usage of online available information in general.

CONCLUSION

Based on the data presented in the empirical part of our study we could not confirm the expectations that e-materials represent the relevant knowledge source widely used among teachers and consequently students for the development of their learning strategies (Radovan, 2011). At least indirectly we can assume that relatively rare usage of e-materials by teachers during their lessons may contribute significantly to the fact that students do not use them very frequently either. Namely, the presented figures show that teachers – according to students' estimates – never or very rarely use e-materials in professional modules (80% of students claim so), while the share of students reporting the same for general subjects is even higher (80-90%).

Therefore, it remains as a question to be investigated in the future research what kind of didactic strategies teachers actually use in the classrooms, why do they hesitate to include e-materials more in their lessons and how much they encourage students to participate in the usage of such materials in the school and at home. It should be further explored what kind of incentives at the national and institutional levels could contribute to the more frequent and didactically functional use of e-materials as well. In this paper, we could not analyze the problems related to the connection between ICT use and wider socioeconomic conditions. Recently published data shows that the considerable share of VET students come from socially disadvantaged environments (cf. e. g. OECD, 2015). From this perspective, the questions related to the conditions for functional ICT use in home

environment become relevant, which also points to the importance of the productive collaboration between school, parents and students (Kalin & Šteh, 2010).

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University Social Responsibility (USR): Identifying an Ethical Foundation within Higher Education Institutions

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ABSTRACT
Social responsibility is a responsibility not a requirement, of an organization for the impact of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, health and the welfare of society; which takes into account the expectations of stakeholders, is in compliance with applicable law and consistent with international norms of behavior, and is integrated throughout the organization and practiced in its relationship. By promoting sustainable development practices in the management at higher education institutions, universities can demonstrate their commitment to social responsibility practices. It should be embedded as part of the university's philosophy as a way of being, operating, and practicing. Social responsibility should be embedded into the core values and functions of universities' practices at every level. This paper explores the concept of university social responsibility (USR) and presents the SCOPE framework for identifying ethical issues in our modern day complex global world.

INTRODUCTION
Education has been perceived as a basic and powerful tool that links economic, societal, and environmental concerns together under a sustainable development strategy and serves to move nations, communities, and households towards a more sustainable future. The point of education is to create a feeling of global responsibility. People are the center of education for whatever platform, environment, or society humanity is trying to establish. Education can be seen as a driver, a vehicle, a trigger, a core value, or a key factor in human development. For example, UNSECO believes that education is a key to social, economic, and environment development, and is also a key in the creation of learning societies and achieving a sustainable future (UNESCO, 2007). Higher education institutions (HEIs) have been perceived as a root that connects local setting to a larger international field of knowledge.

University social responsibility (USR), is a philosophy or principle for social movement, which can be perceived as a philosophy of a university to use an ethical approach to develop and engage with the local and global community in order to sustain the social, ecological, environmental, technical, and economic development. USR acts as a key player for social changes, as USR implies having a policy of ethical quality, governing the performance of the university community. This is done via the responsible management of the educational cognitive, labor, and environmental impact from the university, in an interactive dialogue with society and its communities, in order to promote sustainable human development through education (transforming knowledge), provision of service, research, teaching, and scholarship. All of these underline an ethical collaboration not only with the university community but also with business community in terms of stakeholder involvement (Esfijani & Chang, 2012a, 2012b; Esfijani, Hussain, & Chang, 2012; Reiser, 2007; Vallaeys, 2013).

USR DEFINITION AND SCOPE
The term of university social responsibility (USR) can be defined as:

A policy of ethical quality in the activities of the university community (students, lectures, administrative staff), through responsible management of the educational, cognitive, labour and environmental impacts of the university, in a participative dialogue with society to promote sustainable human development in four steps: (1) commitment, (2) self-diagnosis, (3) compliance, and (4) accountability. (Vallaeys, 2013, p. 1)

USR can also be described as "university engagement and that university partnership with its communities is achieved through education (transferring knowledge), provision of services, research, teaching, and scholarship"

(Esfijani et al., 2012, p. 3). USR can be perceived as a philosophy of a university as an ethical approach to develop and engage with the local and global community in order to sustain the social, ecological, environmental, technical, and economic development.

Social responsibility is a responsibility not a requirement, of an organization for the impact of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, health and the welfare of society; which takes into account the expectations of stakeholders, is in compliance with applicable law and consistent with international norms of behavior, and is integrated throughout the organization and practiced in its relationship. This includes products, services, and processes (DRAFT ISO 26000 WD4.2.; Duckworth & Rosemond, 2010, p. 2). ISO 26000 (n.d., p. 1) addresses seven core subjects of social responsibility (SR) promoting sustainability in:

(1) Organizational governance;
(2) Human rights;
(3) Labor practices;
(4) The environment;
(5) Fair operating practices;
(6) Consumer issues; and
(7) Community involvement and development,

and seven key principles in: (1) accountability; (2) transparency; (3) ethical behavior; (4) respect for stakeholder interests; (5) respect for the rule of law; (6) respect for international norms of behavior; and (7) respect for human rights.

Accordingly, the concept of ethics and SR need to be introduced everywhere in the teaching and learning process as the *Think Globally, Act Locally* approach. By promoting sustainable development practices in the management at higher education institutions, universities can demonstrate their commitment to social responsibility practices. It should be embedded as part of the university's philosophy as a way of being, operating, and practicing. SR should be embedded into the core value and functions of universities' practices at every level.

Vallaeys (2013, p. 1) has indicated the importance of SR and has identified the key features of SR that a university should be aware, as follows:

1. Social responsibility is a responsibility of institutions' action and behavior for the impact they have influenced and caused to society.
2. Social responsibility requires a management practice that seeks to make society sustainable by eliminating unsustainable negative impacts and promoting sustainable forms of development.
3. Social responsibility is not beyond or outside the law; it works in coordination with legal obligations.
4. Social responsibility requires coordination between the stakeholders who are about to act on the negative impacts diagnosed.

USR, underlines an ethical collaboration not only with the university community, but also with ecology as a significant component of stakeholder involvement (Esfijani & Chang, 2012a, 2012b; Esfijani et al., 2012). The university needs to adopt a social responsibility strategy just like other business organizations as social responsibility usually refers to the concept of corporate social responsibility (CSR), in order to meet the expectations of the stakeholders (students, employers of graduates, funding agencies, and society) as well as internal stakeholders such as (administrators, faculty, and staff) in higher education institutions.

USR covers social, environmental, and economic issues that should not be separated from a university's strategic planning and operation, which is an important aspect of how universities interact with their internal and external stakeholders, and the society. The concept of USR was also a focal point at the 2nd Asia-Europe Education Workshop Austria with an emphasis on the theme of Knowledge Societies: Universities and their Social Responsibilities. During the discussion of the workshop, there was a clear consensus that a social dimension should integrate both policy and strategic planning in higher education institutions. In addition, the dimension of networking, accountability, and ethics should also be integrated as guiding principles for the role of universities in society.

There is a history of interest in USR and its relevance to the concept of MOOCs in Thailand (Nasongklha, 2013; Nasongklha, etc., 2014). This ongoing interest relates to aligning USR in Thailand directly with social change via MOOCs. This approach is intended to bring a level of social awareness to Higher Education Institutions within the country. Chulalongkorn University, recognized as the top research institute in the country, is paving a direction of sustainable development. The knowledge base of information has been accumulated for almost a

hundred years and more than a thousand items of content are being offered for publication in the form of open educational resources (OER) (Nasongkla & Chen, 2013).

USR STUDIES

The concept of USR has been researched in previous studies from different perspectives. Ahmad (2012) conducted a study on students' awareness and behavior in terms of contributing to social responsibility practices in the context of Malaysian universities. The results showed that most respondents were aware of the need to preserve the environment but lacked exposure to actual activities. This study adapted the concept of CSR and was intended to make significant contributions to the development of CSR practices at the university level. Another study by Dima, Vasilache, Ghinea, and Agoston (2013) proposed a model of social responsibility with a focus on six main dimensions including: (1) alumni-oriented projects; (2) inter-university cooperation; (3) university – high schools / other institutions cooperation; (4) community-oriented university – business environment cooperation; (5) community – oriented international cooperation; and (6) socio-cultural and ecological projects examined at Romanian universities. The results showed that alumni-oriented projects, international cooperation, and socio-cultural and ecological projects had a major significant influence on the academic social responsibility practices. Moreover, Karimi (2013) conducted a study to examine the correlation between university public relations and external factors including: (1) financial resources, (2) environment, (3) management challenges, (4) perceptual and attitude challenges, (5) technological change, and (6) individual experiences as an independent variables and social responsibility as the dependent variable in order to identify the role of Islamic Azad University (IAU) and its responsibility. The results of this study showed that there was a strong significance shown by IAU public relations in its social responsibility practices.

Furthermore, Nejati, Shafaei, Salamzadeh, and Daraei (2011) stated that the top ten world leading universities have all taken social responsibility seriously in line with common CSR practices on their websites including the following areas: (1) organizational governance (accountability, transparency, providing facts and figures); (2) human rights (diversity); (3) labor practices (employment benefit and compensation, leaning and development, providing healthy work and life balance); (4) the environment (preserving the environment and offering specific academic program); (5) fair operating practices (responsible involvement with the public and promoting social responsibility); (6) student issues (providing sufficient information for current and prospective students); and (7) community involvement and development (providing grants for community projects, and providing funding and support to generate and preserve affordable housing). The findings of this study provided sufficient information on the common core areas of CSR practices from the top 10 universities.

Another research study conducted by Tetrevova and Sabolova (2010) found that the following levels of university social responsibility practices should be considered as the key components of the USR practices: (1) Economic Level, (2) Ethical Level, (3) Sub-social Level, (4) Philanthropic Level, and (5) Environmental Level. The results of this study concluded that: (1) ICTs are not being used effectively to enable the interaction necessary to inform stakeholders in terms of the elements of accountability, (2) environmental information is not easy to find on university websites nor in the annual SR reports, (3) there is little awareness of the importance of SR among participants and stakeholders, and (4) university SR initiatives focus more on the legitimacy and public image rather than on the needs, expectations, and demands of the society in which they operate. The key question remains as to whether analysis of the online disclosure of SR information by universities offers useful units of analysis for the study of predictors of activism overall, and the diffusion of adoption of certain tactics or discourses, that could help to improve managerial commitment of USR.

USR FRAMEWORK

The practice of university social responsibility has also caught the attention of the Asian regions. The Association of Southeast Asian Nations (ASEAN) University Network (AUN, 2012) proposed an AUN University Social Responsibility and Sustainability conceptual framework with the following major components: (1) teaching and learning, research and academic services, (2) university's governance and administration, (3) community involvement, and (4) campus life in order to promote USR practice and address the social, economic, and environmental challenges facing in ASEAN Community. Moreover, USR was founded in 2008 in Thailand to address from a level of true sincerity and friendship in order to fulfill the following, (1) bridging communities, (2) goodwill commitment, and (3) sharing beyond border (Pookyaporn, 2011). Pookyaporn explained the common problems in the Thai context for USR practice includes: the environment, sufficient living conditions, mutual respect, integrity, gratitude, and true companionship. In alignment with the current bottom line for sustainable development, current research (Chen, 2015) has extended the framework to more dimensions based on the synthesis components of existing literature review. Chen's study has synthesized the components of USR as illustrated on Table 1. The USR components include social, sub-social, cognitive, organizational,

philanthropic, economic, ethic, environmental, and educational (SCOPE). Figure 1 is included to demonstrate the impact of SCOPE in each of the identified areas.

CONCLUSIONS AND RECOMMENDATIONS

The SCOPE framework (Chen, 2015) was developed as a result of a review of existing literature and research studies in the area of USR. Chen's research study found that although respondents indicated addressing the issues of university social responsibility, most of the actual practice and strategy plans are focused on achieving academic service. Thus, further investigation on the components of USR, practices, and how exactly to create such a USR impact should be examined in the future.

USR needs to be a component of each institution's strategic planning process. Strategic planning is a complex and time-intensive process. It is a process that should allow access for stakeholders from all level of the higher education system. The potential of strategic planning will not be realized until there is a strong and realistic strategic plan for the future. Such a plan must focus quite strongly on the details of how reform can and will be implemented, along with realizing the USR impact for not only the university, but also for the community and global society.

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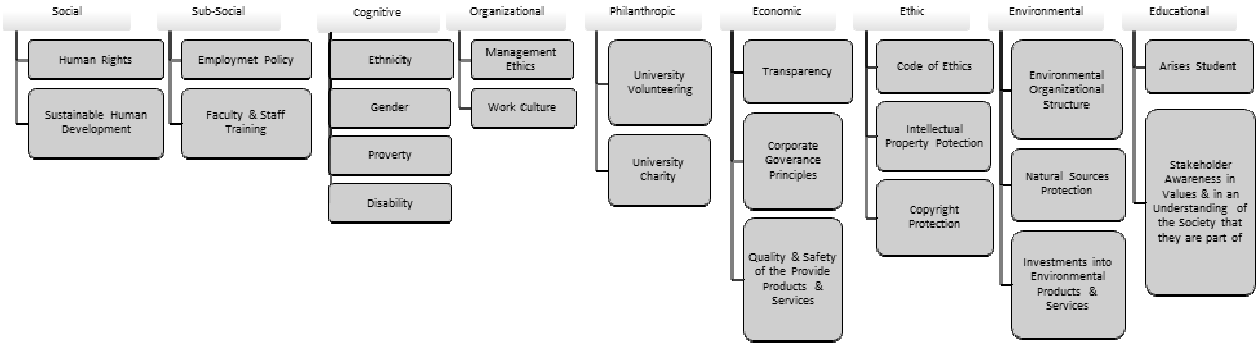
Table 1 Synthesis of USR Components

Components	Area	Supporting Literature
Social		Vallaeys (2013); Esfijani et al. (2012); Dima et al. (2013); Pookyaporn (2011)
	Human right	ISO 26000 ; Nejati et al. (2011) ; Tetrevova and Sabolova (2010)
	Sustainable human development	AUN (2012)
Sub-Social		Tetrevova and Sabolova (2010)
	Employment policy	Nejati et al. (2011) ; Tetrevova and Sabolova (2010)
	Faculty & Staff training	Tetrevova and Sabolova (2010)
	Work-life balance	Nejati et al. (2011) ;Tetrevova and Sabolova (2010)
	Equality opportunities in the workplace	Vallaeys (2013) ;Tetrevova and Sabolova (2010)
Cognitive		Tetrevova and Sabolova (2010)
	Ethnicity	Tetrevova and Sabolova (2010)
	Gender	Tetrevova and Sabolova (2010)
	Poverty	Tetrevova and Sabolova (2010) ;Pookyaporn (2011)
	Disability	Tetrevova and Sabolova (2010)
Organizational		Vallaeys (2013) ;Dima et al. (2013) ;Karimi (2013)
	Management ethics	Karimi (2013)
	Work culture	Karimi (2013)
	Aforementioned aspects	Karimi (2013)
Philanthropic		Tetrevova and Sabolova (2010)
	University Volunteering	Esfijani et al. (2012) ;Nejati et al. (2011) ;Tetrevova and Sabolova (2010)
	University charity	Tetrevova and Sabolova (2010)
Components	**Area**	**Supporting Literature**

Economic		Esfijani et al. (2012) ; Karimi (2013) ; Nejati et al. (2011)
	Transparency	ISO 26000 ; Tetrevova and Sabolova (2010)
	Corporate governance principles	ISO 26000 ; Tetrevova and Sabolova (2010) ;AUN (2012)
	Quality and safety of the provide products & services	Tetrevova and Sabolova (2010)
Ethic		ISO 26000
	Code of ethics	ISO 26000 ; Tetrevova and Sabolova (2010)
	Intellectual property protection	Tetrevova and Sabolova (2010)
	Copyright protection	Tetrevova and Sabolova (2010)
Environmental		Vallaeys (2013) ;Esfijani et al. (2012) ;J. Ahmad (2012);Karimi (2013) ;Nejati et al. (2011) ;Tetrevova and Sabolova (2010); Pookyaporn (2011)
	Environmental organizational structure (cycling, energy saving, etc)	Tetrevova and Sabolova (2010)
	Natural sources protection	Tetrevova and Sabolova (2010)
	Investments into environmental technologies	Tetrevova and Sabolova (2010)
	Environmental products & services	Tetrevova and Sabolova (2010)
Educational		Vallaeys (2013);Esfijani et al. (2012);Dima et al. (2013);AUN (2012)
	Arises student	Tetrevova and Sabolova (2010)
	Stakeholder awareness in values & in an understanding of the society that they are part of	Tetrevova and Sabolova (2010);AUN (2012)

Figure 1 USR SCOPE (Social, Sub-Social, Cognitive, Organizational, Philanthropic, Economic, Ethic, Environmental, Educational) Impacts



Using ICT-Supported Narratives in Teaching Science and their Effects on Middle School Students

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ABSTRACT
Effective and sustainable science education is enriched by the use of visuals, auditory, and tactile experiences. In order to provide effective learning, instruction need to include multimodal approaches. Integrating ICT supported narrations into learning environments may provide effective and sustainable learning methods. Investigate in this research is the effect on students' achievements, self-efficacy perceptions and attitudes towards science from ICT supported fables and "Force and Motion" topics used in a 6th grade science course.

A quasi-experimental (Pre-tests and post-tests with control group) research design was adopted to conduct the study. Participants were 44 (23 of experimental and 21 of control) 6th grade middle school students. Multiple choice "force and motion achievement test", "science self-efficacy perception scale" and "attitudes towards science scale" were applied. Parametric (Independent samples t-Tests and paired samples t-Test) and non-parametric (Man-Whitney U test and the Wilcoxon signed-rank test) were used via SPSS statistical analysis software (v.16.0). As results, it has been emerged that the application had positive effect on students' achievement, self-efficacy perceptions and attitudes towards science.

INTRODUCTION
Narration-based science education is a method to facilitate students' learning capabilities to provide the permanency of knowledge learned, and to relate the science content within their daily life. The main aim of narration-based science education is to create scientific literate persons who are able to use their knowledge in making decisions and who are aware of the interaction among science-technology-society (STS) and who know how this interaction affects other people (Millar, & Osborne, 1998). Scientific literacy means that a person can ask, find, or determine answers to questions derived from curiosity about everyday experiences. It means that a person has the ability to describe, explain, and predict natural phenomena (NRC, 1996).

Affective domain of learning skills are important factors in student achievement (Alsop and Watts, 2000; Duit and Treagust, 1998; Lee and Brophy, 1996; Meredith, Fortner and Mullins, 1997; Thompson and Mintzes, 2002; Weaver, 1998). The affective learning domain includes feelings, values, appreciations, enthusiasms, motivations, self-efficacy and attitudes. Examining these factors is essential to reveal the knowledge and skill status of the students. Motivation, as one of these factors, has been accepted as a major source for student success (Freedman, 1997; Lee and Brophy, 1996). Albrecht, Haapanen and Hall (2009) found that when the motivation of the students increased, their academic achievement also increased. Contrarily, poor motivation introduces low achievement (Cavallo, Rozman, Blinkenstaff and Walker, 2003; Glynn, Taasoobshirazi and Brickman, 2007).

CONCEPTUAL FRAMEWORK
Narratives in Science
A scientific text is used to provide the narrative. According to related literature, it has been indicated that four important styles of texts are used to explain science; expository text (Wellington & Osborne, 2001) which provides a causal mechanism for how a rainbow is produced or how inherited characteristics are transmitted from one generation to the next, argumentative text (Penney et al, 2003) are texts that fundamentally take a dialectical approach seeking to make the case that a given claim is true reasoning forward from the premise to the conclusion, narrative text, and a mixture of narrative and expository text (Avraamidou and Osborne, 2009). Avraamidou and Osborne portrayed the narrative texts as below;

"… is used to form 'narratives of science' and 'narratives of nature'. In the narratives of science, scientists develop a claim, which is supported by a series of data. In contrast, popularizing articles present 'narratives of nature' in which plants or animals are the subjects and their activities are presented in a story-form, and not in a

claim-data form" (Avraamidou and Osborne, 2009).

There is a significant advantage to using narratives in that students may be a part of the narration as actors and may assist to tell the story. For this point of view, narratives may increase the attention of students especially those who have low motivations (Barry et al, 2005). Millar and Osborne (1998) emphasized the value of the narratives to communicate ideas and to make ideas more coherent, memorable and meaningful. In their research report, Millar and Osborne argued that the importance of "explanatory stories". According to Millar and Osborne (1998), when the knowledge content of the curriculum presents explanatory story sets, these narratives provide better understanding of interrelated idea sets and moreover they may provide a sort of understanding which would be wished for in young people. Furthermore, such narratives may assure that the central ideas of the curriculum are not complicated by the weight of detail (Millar and Osborne, 1998).

Milne (1998) emphasized the importance of scientific stories for science education in schools. Some peoples thinks that science is a set of facts which able to be presented by an unadorned dialect (Milne, 1998). Actually, stories are very important in school science. In an examination of science textbooks, Milne (1998) has identified four different types of science stories which called (a) heroic, (b) discovery, (c) declarative, and (d) politically correct. Each of these types of story promotes a particular set of philosophical assumptions about science. These assumptions are presented implicitly within the framework of the story as truths of science.

Narratives are crucially important tools, which serve to make the knowledge meaningful and consist of relevant and consistent knowledge. Telling a story may contribute to science education as one of the oldest tools for communication. Adapting and using such activities to/in courses can make for a more engaging and enjoyable way to learn and to understand science-related information and facts. By using narratives, furthermore, learners can interpret the events faced in their daily lives and these activities may contribute the excitement of finding a solution for students (Demircioğlu at al., 2006; Türkmen & Ünver, 2012). Polhinghorne stated that the world is perceived as a narrative by people and for this reason, he emphasized that the studies done for the same world should also be dealt with in narrative form, because, thinking narratively is more effective and permanent (Clandinin & Conneley, 2000).

Students' practical skills and self-confidences can improve by ICT based narration activities. These activities may be used to make engaging science lessons. Use of technology in teaching-learning processes became an important function and information and communication technologies provide effective learning outcomes (Demirel, Yağcı and Seferoğlu, 2005). Therefore; we should integrate these technologies into teaching-learning activities to take advantage of computer and internet technologies or ICT (Akın & Baştuğ, 2005).

Technology Integration into Education

With the advancement on computer technologies, their integration has been discussed among educators for about thirty years. Since it has been seen as an essential appliance to keep up with developments and of innovation efforts, several governments invested in ICTs and embedded into their curriculums ICT related courses. In this way, they intend to provide ICT integration into teaching and learning processes in schools. Effective technology integration in the schools and learning environments requires changes in the fundamental process of teaching and learning, on the other hand it also needs changes in aspects such as teacher professional development and education standards (Su, 2009). The consensus among media researchers is that animation may or may not promote learning, depending on how it used. Griffin (2003) mentioned that the students must be technology literate in order to excel in future jobs and to be productive citizens. However, "technology integration" is not about merely technology, first of all, it is about knowledge content and efficacious teaching applications. Above all, technology integration should concentrate on curriculum content and student learning. According to Cartwright and Hammond (2003), the mean of "technology integration" has been explained as below;

"Technology integration is the use of technology to achieve learning goals and to empower students learning throughout the instructional program" (Cartwright and Hammond, 2003).

Nachmias, Mioduser ve Forkosh-Baruch (2010) indicated that ICT implementation of Israeli science and mathematics teachers in their classes was low altogether. In this study, about 22% of the mathematics teachers, and about 53% of the science teachers reported using ICT in their class. They also, pointed out the difference between the mathematics and science teachers' usage ratio. They summarized the obstacles hindering their usage of ICT in teaching and learning as school factors (school culture, resources), teacher factors (skills, self-confidence, time) and student factors (ICT skills, accessibility to ICT outside schools).

Petras (2010), conducted a descriptive study aimed to identify the eighth grade science and mathematics

teachers' ICT usage in teaching and how the ICT affects their teaching. According to research findings, though science teachers were more likely then mathematics teachers to use tools that would contribute to the development of 21st century skills, both were using traditional hands-on materials rather than digital tools and resources.

Donnelly, McGarr and O'Reilly (2011), stated that considering some potential barriers was necessary to integrate ICT based resource into schools. In this study, a working framework has been developed to describe the level of ICT integration (a Virtual Chemistry Laboratory, "VCL") into teaching practice and the factors underpinning this integration. In after study interviews, teachers stated that ICT (Virtual Chemistry Laboratory) usage provided better organization, time saving, resource sharing between students and between teacher and student, better explanation and modernity in classrooms. Also, teachers talk about some barriers such as willingness and teacher beliefs about assessment.

Rehmat and Bailey (2014), investigated pre-service teachers' conceptual change related to technology integration into science lesson in a science teaching methods course. They identified improvements in students' technology definitions, increased technology incorporation into science lesson plans, and favorable attitudes toward technology integration in science teaching after instruction. This research project demonstrates that positive changes in beliefs and behaviors relating to technology integration in science instruction among preservice teachers are possible through explicit instruction.

Although investments made in Turkey to increase the computer numbers and connections to the internet, teachers could not integrated ICTs into learning environments (Demiraslan & Usluel, 2006; Tezci, 2009), as in other many countries (Kiridis, Drossos ve Tsakiridou, 2006; Lim, 2007). These results are important because they indicate that existence of technology in schools does not mean that they will be used effectively in educational environments. Their effective usage depends on the teachers and how they use technology.

While the educational environments are reorganized, enriching the learning environments with the aid of educational technologies is important to increase motivation of the students by considering class environment and learning tools. In this study, we intended to incorporate the stories (e.g. fable) that students are previously familiar with and to pay attention in the learning and teaching process by using ICT resources. Some researchers asserted that the use of narratives in science education is a powerful teaching method (Fensham, 2001; Banister & Ryan, 2001). With the support of ICTs, the use of short stories and scientific topics should be of interest to students.

Can Students Learn from Narratives (Pictures and Words)?

In designing multimedia presentations, instructional designers base their decisions on a theory of how students learn (Mayer and Moreno, 2002). According to "Information Delivery Theory of Multimedia Learning", the computer is a system for delivering information to learners and learning involves adding information to one's memory (Mayer, 2009). The instructional designer's role is to present information (e.g., as words or pictures, or both) and the learner's role is to receive the information. As some students prefer visual presentations, other students may prefer verbal presentations. Therefore, multimedia presentations would be effective in delivering information effectively to both kinds of students and they could select their delivery way.

The other view is that meaningful learning occurs when students mentally construct coherent knowledge representations (Mayer, 2009). The "Cognitive Theory of Multimedia Learning" (CTML) is based on three assumptions suggested by cognitive research. These assumptions are: (a) dual-channel assumption – humans have separate channels for processing visual/pictorial representations and auditory/verbal representations (Baddeley, 1998; Paivio, 1986); (b) limited capacity assumption – the idea that only a few pieces of information can be actively processed at any one time in each channel (Baddeley, 1998; Sweller, 1999); (c) active processing – the idea that meaningful learning occurs when the learner engages in cognitive processes such as selecting relevant material, organizing it into a coherent representation, and integrating it with existing knowledge (Mayer, 2009; Wittrock, 1974). People learn more deeply from words and pictures than from words alone. According to this theory, the cognitive process of integrating is most likely to occur when the learner has corresponding pictorial and verbal representations in working memory at the same time (Mayer and Moreno, 2002).

Rapid advances in information technology are reshaping the learning styles of many students (Dede, 2005). This change is impacting teachers and classrooms in every subject (deCastell & Jenson, 2004). In order to provide more effective and permanent learning in science courses, which integrate ICT, use short stories, provide inter-student communication, and present active learning environments, there is an important effect of student abilities such as listening, understanding and creativity. Two learning approaches that stimulate these abilities are

narratives and ICTs. The combination of these two is intended to substantially increase the effectiveness of learning and teaching.

Arnold and Millar (1996), contend that the story-based approach leads to improved learning. Stories introduce characters or protagonists with different capabilities that can lead to different events, in a way which is typical of a narrative. Science stories can provide much knowledge about the nature of science. By the using of science stories, students may gain an appreciation of the interactive nature of science and see experiments as trying out explanations, rather than mere positivistic empiricism (Solomon, Duveen, Scott & McCarthy, 1992). Through stories, science emerges as a human endeavor, and students are offered insight of the importance of creativity within science processes (Ødegaard, 2003).

In this study, short stories were supported by ICT resources and used as teaching materials. Effect of ICT supported narratives on student achievement, self-efficacy perception and attitudes towards science were examined after using them.

METHODOLOGY

In this study, a quasi-experimental (pre-test and post-test with control group) research design was adopted. Control and experimental group students were part of intact classes. Despite we did not endeavor to equalize the groups by random assignment, groups were selected to have same characteristics such as gender range, socio-economical level, science achievement, attitudes towards science, self-efficacy.

ICTs supported short narratives was considered an independent variable and the scores of "achievement test" and "self-efficacy perception scale" and "attitude scale" were considered as dependent variables in this research. For this aim, when the experimental group was instructed with ICT supported short narratives, regular (curriculum oriented by aid of course and activity books) instruction was carried out in the control group. The research design and applications have been summarized in table 1.

Table 1. Research Design

Group	Pre-Test	Application	Post-Test
Control (n=21)	AT* ATSS** SEPS-SC***	Curriculum Oriented Teaching, Course Book and Activity Book	AT ATSS SEPS-SC
Experimental (n=23)	AT ATSS SEPS-SC	Course and Activity Book + Treatment with Curriculum Subjects including ICT Supported Short Narratives	AT ATSS SEPS-SC

*AT: Achievement Test,
**ATSS: Attitudes towards Science Scale,
***SEPS-SC: Science Course Self-Efficacy Perception Scale

In this research, ICTs supported short narratives was considered as an independent variable and the scores of achievement test and self-efficacy scale and attitude scale were considered as dependent variables.

Participants

Participants in this research project were students selected from a middle school in Denizli province. The measurement tools were applied for a few groups from the school and these data gathered from students were considered to determine the homogeneous two groups. To select the groups, their average scores from the measurement instruments and gender range were taken into account. As a result, 44 middle school 6th grade students contains a control group of 21 and an experimental group of 23 included in the study. Control and experimental group students were part of intact classes.

Preparation of Narratives

In the first place, the national science curriculum developed by the Ministry of National Education (MONE) has been investigated and the narrations were composed by considering the acquisitions of the 6th grade "Force and Motion" unit. These acquisitions were explained under four titles, which are; (1) Constant-Speed Linear Motion, (2) The Direction of Force and Measurement, (3) The Forces Acting Objects and (4) Weight and Gravity.

Narratives that were put down in writing were subjected to a panel review including 4 language experts (2 of them were academics and 2 of them were Turkish teachers). Furthermore, narratives were reviewed by two instructors from the science education department and three science teachers for the aim of whether they covered

the goals of curriculum or not. After this, computer experts transformed the narratives into animated cartoons. The names of these short stories are; "Atik & Petek" and "Ant Force" and "Jinni Ali and Fleshy Ayşe" and the content of narratives are detailed in appendix A.

Data Collection Tools

In this research, three data collection tools were used: the first one was a 17-question achievement test to measure the achievement of the students; the second one was the Attitude towards Science Scale (Benli, 2010), which measures the attitudes of the students towards Science using a five-point Likert scale with 30 items; and the third one was the Self-Efficacy Perception Scale (Tatar et al, 2009) consists of 27 items.

The achievement test has been developed by the researchers. Draft form of the achievement test consisting 32 multiple-choice questions was prepared by selecting from test books, SBS (Placement Exam) and DPY (State Boarding Exam) in order to cover all the acquisitions of the subject. The draft form was inspected by two language experts and two science teachers. After this inspection, 12 items were decided to exclude from the draft form of the test. According to result of the pilot application (n=76), "item difficulty indexes" and "item discrimination index" were investigated and three questions were excluded from the achievement test by the results of the item analysis. Kuder-Richardson (KR-20) formula was used to calculate the reliability of the achievement test, and it is found reliable at a level of 0.79. As a result of the analysis, the 17-questions achievement test, related to the subjects of force and motion, was developed. The test was applied before and after the instructions to the 6th grade students

The attitude scale was developed by Benli (2010) and the Cronbach Alfa coefficient was calculated by the researcher as $\alpha = 0.94$. The scale consists of 30 judgment items including 17 positive and 13 negative statements. Item examples of the scale are "Science education is needed for everybody", "Science topics are interesting for me", "I like to deal with science in my free time". Students were asked to sign their opinion about these statements by selecting from the options ranged between "totally agree" and "totally disagree".

The Self-Efficacy Scale for Science and Technology developed by Tatar et al (2009), consists of five point Likert type 27 items. The Cronbach Alpha coefficient for the scale was 0.93. Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. According to Bandura's theory, people with high self-efficacy—that is, those who believe they can perform well—are more likely to view difficult tasks as something to be mastered rather than something to be avoided (Bandura, 1977). Item examples of the scale are "I have difficulty when solving questions of science", "I cannot do my science homework alone", "I have abilities to be successful in science". Students were asked to sign their opinion about these statements by selecting from the options ranged between "totally agree" and "totally disagree".

Research Questions

The aim of the research is to investigate the effect of ICT supported scientific narrations on student science achievement, attitudes towards science and their self-efficacy perceptions. For this purpose, following research questions was examined in this research.

1. Does the instruction with ICT supported narrations improve the student's science achievement?
2. Does the instructions with ICT supported narrations effect the student's attitudes towards science?
3. Does the instruction with ICT supported narrations effect the student's self-efficacy perceptions of science?

The Implementation

Lectures are carried out with the national science education curriculum in Turkey. The science curriculum internalizes and demands to apply the constructivist approaches in teaching learning process (MONE, 2004, 2013). Therefore, the instructions were carried out by 5E (Engagement, Exploration, Explanation, Extension, and Evaluation) learning cycle model (Balcı, Çakıroğlu and Tekkaya, 2006). The learning cycle is an instructional model based on the constructivist approach, which promotes conceptual change (Stepans, Dyche and Beiswenger, 1988). There are four topic titles in the unit of "Force and Motion" of the 6th grade Science and Technology course. These titles are; "Lets Calculate the Velocity", "Lets Measure the Force", "Balanced ad Unbalanced Forces" and "Weight is a Force" and 26 acquisitions have been defined in national science curriculum related to these topics. We prepared three ICT supported short stories, related to the subject acquisitions, for the experimental group students (See appendices).

Figure 1. Frames from the instructions of experimental group students

In this study, we investigated the effectiveness of an instructional tool in teaching subjects of "Force and Motion". The courses were planned and conducted by 5E learning cycle model in each group. In the courses of experimental group students, instructions conducted with the help of ICT-supported short stories in the phases (especially engagement, exploration and evaluation) of learning cycle. The achievement test was taken as a pre-test by both (experimental and control) groups before the instruction. After finding out that the achievement level of both groups is close to each other, teaching activities are carried out for both groups. In experimental and control groups, the teaching period is continued for six weeks at four hours per week.

Data Analysis

The quantitative data were analyzed by using the SPSS 16.0 software. A lot of statistical tests (e.g. t-test) require that the data are normally distributed and therefore we should always check if this assumption is violated. One common test for checking the normality of data is Shapiro-Wilk test (Peat & Barton, 2005), which works well even for a small sample size. Normality of the control and experimental group data were assessed and according to results; achievement test data was normally distributed in pre- (W=.959; p=.116) and post-test (W=.978; p=.543). Other data (Gathered by the attitudes scale and self-efficacy scale) was not normally distributed. For this reason, nonparametric statistical technics were decided for evaluation of the data of attitudes and self-efficacy. To compare the achievement test mean scores, the Independent-Sample t-Test and Paired-Sample t-Test were used. Man-Whitney U test and the Wilcoxon signed-rank test was considered to analyze the difference in pre-test and post-test raw scores of attitudes and self-efficacy of the groups.

FINDINGS

According to results of Independent Sampled t Test summarized in table 2, there is no significant difference between achievement scores of the control and the experimental group in pre-application test [t(43)=0,78 p>.05]. According to these results, it can be said that the students of both control and experimental groups are equivalent in terms of science achievement levels prior to the application.

Table 2. The Comparison of Achievement Levels of Experimental and Control Group Students on Pre- and Post-Test Scores

Test	Group	N	X	SD	df	t	p	Cohen's d
Pre-Test	Control	21	7.48	3.69	43	0.78	0.435	
	Experiment	23	6.70	2.85				
Post-Test	Control	21	8.33	3.19	43	1.29	0.04	-0.64
	Experiment	23	10.26	2.80				

Level of Confidence α=0.05

According to the results summarized in the table 2, there is a statistically significant difference between the post-treatment test scores of the control and experimental group students [t(43)=1,29 p<.05]. According to these results, it can be claimed that the course carried out with the help of information technology-assisted short stories is more successful than the regular course. According to some researches made by Tavukçu (2008), Coşkun (2010) and Büyükkara (2011), adding computers to the learning environments has positive effects on achievement. Proceeding from this point of view, we can interpret that the integration of education tools, which have audio and visual features, has a positive effect on student science learning.

According to the Paired-Sampled t Test results given in the Table 3, there is a significant difference observed between the pre-test and post-test scores of the students in terms of achievement (t=7,80;p<.05). The reason for this significant difference can be interpreted that the knowledge level of the experimental group students is increased with the application of story-assisted courses. According to these results, it can be said that the method

used in the experimental group was increased the success of the students. In another study, Kahraman and Karataş (2012) was aimed to determine the effect of the narrations containing "history of science" subjects on students' science understanding. As a result of this study, it is probable that the use of these stories in the courses help students to understand the subject matter and demonstrate that understanding on a test. Our results are consistent with the results of the studies conducted by Kahraman and Karataş (2012).

Table 3. The Comparison of Pre-Test and Post-Test Scores of the Control and Experimental Group Students in terms of Achievement

Group	Tests	N	X	SD	t	p	Cohen's d
Experimental	Pre-Test	23	6.70	2.85	7.80	0.000	-1.26
	Post-test	23	10.26	2.80			
Control	Pre-Test	21	7.48	3.69	0.984	0.337	
	Post-Test	21	8.33	3.19			

Level of Confidence α=0.05

According to Table 3, there is no significant achievement difference statistically between the pre-test and post-test scores of the control group students, who had regular Ministry of Education curriculum without stories. However, there is an increase in the post-test when the average scores are observed (t=0,984;p>.05). The reason why there is no significant difference between the scores might be due to the typical increase of the course achievement. According to the study of Kahraman (2007) named "The effects of computer-assisted lectures on the attitude and achievement of the 7th grade students in the Physics subject of Science Course" an increase but no significant difference was observed in the control group in terms of achievement. However, even though there was no significant difference between pre- and post-test achievement scores of the control group, there was an increase in the post-test scores. Our study is consistent with the Kahraman's study. Based on these results, it can be interpreted that in addition to the textbooks and workbooks of the course, performing other activities can improve student achievement.

A Mann-Whitney U Test was used to compare the ratings of attitudes towards science for the 21 students in the control group and the 23 students in the experimental group. The mean rank of the ratings for the control group was 19.19, versus 25.52 for experimental group (see Table 4). Using a Mann-Whitney U test, the two distributions of ratings were not found to differ significantly, z = -1.635, p > .05, abs(r) = .25. For abs(r), a .1, .3, and .5 represents a small, medium, and large effect size, respectively (Kennedy, Russom and Kevorkian, 2012).

Table 4. The Comparison of Pre-Test and Post-Test Mean Ranks of Attitude

	Mean Rank			
Test	Control Group (n=21)	Experimental Group (n=23)	z	p
Pre-Test	19.19	25.52	-1.635	.102
Post-Test	14.36	29.93	-4.020*	.000

Level of Confidence α=0.05

According to post-test results, significant group differences were found in the students' attitudes towards science. The mean ranks of the ratings for the experimental group students were significantly higher than the control group students (see Table 4). The distributions of attitude scores between experimental and control group were found to differ significantly, z = -2.140, p = .032, abs(r) = .32. According to these results, it can be claimed that adding ICT-supported stories to the lectures will increase the self-efficacy perception of the students.

Table 5. The Comparison of Pre-Test and Post-Test Raw Scores of Self-Efficacy (Wilcoxon signed-rank test[a])

Group	Pre- and Post-test	n	Mean Ranks	Sum of Ranks	z	p
Control	Negative Ranks	12	11.67	140.00	-1.307[b]	.191
	Positive Ranks	8	8.75	70.00		
	Ties	1				
Experimental	Negative Ranks	19	11.66	221.50	-3.686[b]	.000
	Positive Ranks	2	4.75	9.50		
	Ties	2				

Level of Confidence α=0.05 a: Wilcoxon signed-rank test. b: Based on positive ranks.

A Wilcoxon signed-rank test was performed on pre- and post-test raw scores on each of the groups. The test showed that there was a significant difference between pre- and post-test scores of experimental group (Table 5). According to the results in Table 7, students demonstrated a significant improvement in experimental group (Z=-3.686, p=.000, abs(r)=0.56). But in experimental group, there was no significant differences between pre- and

post-test self-efficacy raw scores (Z=-1.307, p=.191, abs(r)=0.20). These results suggest that the instruction in experimental (with the assist of ICT supported stories) group had a positive impact on self-efficacy perceptions of students.

CONCLUSION AND DISCUSSION

According to the results of the study, a positive and significant difference occurs in favor of the experimental group students in terms of achievement and self-efficacy perceptions, when performing the science courses assisted by the ICT based short stories. Besides the attitude levels of students increased significantly in both (control and experimental) group (see table 5), there was a significant differences between pre- and post-test mean ranks of experimental group students. It is revealed that combining familiar stories with ICTs, which they like to use in their daily life, and using this combination in learning and teaching process as tools or materials have significant and positive effects on the students' achievement and self-efficacy.

According to the results of the study; we observed that the achievement, self-efficacy perception and attitude levels of both experimental and control group students are almost equivalent prior to the application. However, the application process has a positive effect in favor of the experimental group. Some differences occurred after the application in terms of achievement, self-efficacy perceptions and attitude towards science. When the post-test scores are considered, there is a meaningful difference between the pre-test scores of the experimental group students in terms of achievement, self-efficacy perceptions and attitude towards science. However, although there is an increase in the test scores of the control group students when the pre-test scores and post-test scores are compared, this increase is not statistically significant. In addition, it is observed that the attitudes and self-efficacy perceptions of the control groups towards science have not been changed.

ICT support in educational environments is helpful and effective in learning and understanding science. Addressing to more senses provides more permanent learning. There is an important consideration about how to use ICT so that it supports learning and teaching. In this study, we utilized the narratives (maybe called as fables) and supported them by ICT. Technological devices and software served as tools that support learning. We developed a new instructional strategy with ICT support by including the narrations which the students already familiar. Therefore, we improved the learning outcomes in learning cycle model by using the stories in the phases of the cycle.

Consequently, there are a lot of study emphasized the importance technology (ICT) usage and effect of story based approach in education. Therefore, in this research the use of ICT supported scientific narratives that make visually and aurally contribution as teaching materials and their effects on students were investigated.

A limitation of the present study was the relatively small sample size. Therefore, the generalization of the results is difficult. Further research is needed to better understand the potential effects on learning and attitudes towards science and self-efficacy perceptions of science. Though the stories is challenging and attractive, preparing them requires computer skills and abilities and software knowledge and time. This was another limitation of the present study and the further research. We transformed them into computer animations by the help of a computer expert. There was a cost of this process for this study. If the researchers can provide a found or they have adequate computer ability or knowledge, this should not be seen as limitation.

Although use of ICT supported narratives did not increase the student achievement excessively, it improved the students' attitudes towards science positively. According to this result, this new material was recommended for the other science specific content and concepts even other disciplines (social science, mathematics, etc.). In this study, effect of ICT supported narratives on achievement, attitudes and self-efficacy was investigated. For the future research, investigating the effect of this instrument on different variables is recommended.

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APPENDIX A (The narratives and the Screenshots from the Animations)

The Narratives	Screenshots

Atik & Petek

The story of Atik and Petek includes the gains related to "an object moving on a straight line with a constant velocity". In the story of Atik and Petek, the part showing that Atik travels a 200-meter path in 40 seconds, whereas Petek travels the same path in 100 seconds, includes the gains such as; "explains the relationship between the distance travelled, the elapsed time and velocity" and "measures the distance travelled by the object and the amount of time spent". The part which includes the word of Queen as "it took much longer to travel the same distance, thus Atik is faster than you" in reply to Petek's objection as "I reached the same flower and brought the pollen, this is injustice", also includes the gains as "calculating the velocity of the object by using the distance travelled and the time elapsed" and "refers to the unit of velocity and use it".

Ant Force

The story of the Ant Force includes the gains related to "forces to be applied to objects". In the ant force story, the part includes the saying of Ant Kazım to Elephant Fikret as; "You five-person family and my five-person family will pull a rope" includes the gains of "observation of more than one force can be applied to an object" and "the diagrams that show the direction of the forces applied to the object". The part that includes the saying of Fox Veli as; "yes dear audience, since no one is moving, then the forces are balanced" covers the gain of "if the net force on an object is zero, then the object is under the influence of balanced forces", "making some estimations about the required force to be applied to an object to make it fixed if one or more forces are acting upon the object, and testing the estimations" and "concludes as a fixed object is under influence of balances forces". In this part, everybody is so surprised, because five ants were pulling five huge elephants away. The part includes the saying of Fox Veli as; "yes dear audience, since the balance is broken, you observe the unbalanced forces" also includes the gains of "if the net force acting upon an object is less or more than zero, then the object is under the influence of unbalanced objects". The part includes the saying of ants as; "there were 100 moles right behind us pulling the rope, and we won the competition with the help of them" includes the gain of "the net force (resultant force) can be considered as one force, where two or more forces are affecting an object, but their total force implies as one".

Jinni Ali and Fleshy Ayşe

The sorty of Jinni Ali and Fleshy Ayşe covers the topics related to "weight subject". In the story, the part includes the saying of Ayşe as; "I feel very light, I think this trip made me lose some weight, look I can jump easily", and saying of Ali in return as; "your weight is 600 N on Earth, but only 100 N on Moon; that is the reason why you feel so light" also includes the gain of "explanation of the weight differences of the same object in different planets while the mass of the object is always constant". The part includes the saying; "This 60 kg is our mass. It will not change either on the Moon or on Earth. Even if we go to Saturn, it won't change. What has changed is our weight. Weight is a result of the gravity of Earth.", also includes the gains of "the force bounding the objects to Earth is called Gravity" and "the gravity force acting upon the object is called weight".