The Impact of Information Communication and Technology on Students' Academic Performance: Evidence from Indonesian EFL Classrooms

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Abstract

The present study examined the impact of Information Communication Technology [ICT] on a group of university students' academic performance in an Indonesian English as a Foreign Language (EFL) classroom. As the platform of the ICT usage in this current study, English learning websites was used as the independent variable. Academic performance (students' score on pre and post test) was used the dependent variable. The participants in the study were 60 students of the Department of Public Health at the State University of Gorontalo, Indonesia, i.e an experimental group of 30 students (n=30) and a control group of 30 students (n=30). They took English courses as one of the compulsory subjects in the university curriculum. This study used a mixed method of a quasi-experimental and a qualitative interview approaches. Based on the result of the quantitative method of data collection, t-tests of this study indicated that students in the experiment group performed significantly better than the students in the control group. Test results also showed that there was a significant difference between students' score on the pre- and post-test. The students' score in the post test and post test in the control group, however, were not significantly different. As interview results showed, participants expressed their positive learning experience with technologies, growing motivation in English learning, and positive feeling and confidence on their language performance.

Key words: ICT, English for Foreign Language, English learning websites

Introduction

The demand for teachers to be confident and competent users of ICT for their personal and professional lives is continually growing due to rapid changes in Information Communication technology (ICT). Teachers of English are facing a growing pressure to be more professional and highly capable of creating more engaging classrooms in order to respond to their students' needs in the digital era. ICT integration, therefore, should be an integral part of their teaching instructions (Hubbard, 2013). Over the past few decades, numerous studies have confirmed the benefits of ICT in language teaching and learning. The effective use of technology in teaching and learning increases the benefits of ICT to enable students to become active learners and to develop their problem solving, critical-thinking, and creativity skills (Hubbard, 2013; Jung, 2006; Kean, Embi, & Yunus, 2012; Klimova & Semradova, 2012). In addition, ICT offers students and teachers a more flexible and broader access to information and learning resources. Therefore, improving students' literacy in ICT is

fundamental to their personal and academic life. ICT can equip students with the necessary skills to be a lifelong learners and global citizens of the 21st century.

In higher education, a range of technologies appears to provide an exceptional opportunity to improve learning and teaching within the higher education system. At present, however, opinions are divided over the efficacy of such an approach and the extent to which technology should be embraced in teaching. In recent years, various teaching models have been developed -- including the blended learning mode -- which combines face-to-face approach and technology use. Some scholars believe that blended learning can improve teaching and learning, and support the curricular objectives (Hubbard, 2013; Peeraer & Van Petegem, 2011; Son, 2009).

Restructuring the classroom to address 21st century skills is important to meet the needs of students. Various studies have established that technology integration into classroom instruction is a slow and complex process influenced by many factors, including the amount of support the technology requires (Inan & Lowther, 2010). The U.S Congressional Office of Technology Assessment (OTA, 1995) recommended that effectively integrating technology into the teaching and learning process is one of the most important steps a nation can take to make the most of the past and continuing developments. Integrating newer technologies into education can play an important role in leveraging productivity and efficiency. The teachers who learn to integrate technology into existing curricula teach differently than teachers who did not have such training or support from the institution (Christensen, 2002). Although many educational systems have quickly embraced digital technologies, the effective inclusion of these technologies into teaching practice has encountered, and continues to encounter, practical and pedagogical barriers (Wood, Specht, Willoughby, & Mueller, 2008). However, evidence shows that barriers and challenges behind ICT integration in the classroom still exist, particularly to what extent ICT integration benefits students' academic performance. The purpose of the present study was to examine the impact of ICT integration on students' academic performance in one of Indonesia's higher education institutions in Gorontalo Province by blending ICT into traditional face to face teaching instruction.

Literature review

The rapid advancement of Information Communication Technology (ICT) has dramatically increased technology use in language teaching and learning. With the Internet/World Wide Web creation and progression, for example, teachers now have more options to create effective and innovative instructional materials and teaching methods. Hubbard (2013) argues that teachers have a pivotal role in the adoption and implementation of ICT in their teaching and learning as they are the key to making learning happen. With the complexity and the richness of possible learning resources that the Internet offers, teachers face considerable challenges to create effective and efficient teaching approaches. The ultimate goal of creating this learning environment is to boost learning outcomes. Education reforms require teachers to adopt new roles as more responsibilities for learning are given directly

to the students. This change require that teachers be proficient in advising and guiding students through more autonomous, self-directed learning processes, while the same time monitoring curriculum standards achieved by students (Klimova, B. F., & Semradova, I. 2012; Hew, K. F., & Brush, T. 2007).

A number of recent studies have shown a positive relationship between the use of technology and academic achievement. Scholars and researchers found that students in technology rich environments experienced positive effects on achievement in all major subject areas (Watson, 2006). Students showed increased achievement in preschool through higher education for both regular and special needs children (Kean et al., 2012). Students' attitudes toward learning and their own self-concept improved consistently when computers were used for instruction (Walsh, 2010). Sun and Metros (2011) investigated issues of the digital divide and its impact on academic performance. The results of their study show that students' academic performance is a function of many complex and interrelating factors (Sun & Metros, 2011). Although technology use is linked to socio-economic status and academic performance, Sun and Metros suggested that educators should try to identify whether the cause of low or high academic achievement directly results from technology use, and how technology usage interacts with and affects other factors. As a result of multi-factors, some scholars argued that achievement increased not only by incorporating technology, but by also addressing instructional design, software design, and technology capabilities.

McMahon (2009) in his study Western Australia high schools examined the relationship between students working in a technology-rich environment and their development of higher order thinking skills. He found that there are statistically significant correlations between   studying within a technology-rich learning environment and the development of students' critical thinking skills. Length of time spent in the environment has a positive, non-linear effect on the development of critical thinking skills. Students with better developed computing skills scored higher on critical thinking activities (McMahon, 2009).

Transforming teaching and learning by increasing access to and use of technology in classrooms has been at the center of most recent teaching reforms agenda (Cuban, 2001). Computers have also been introduced as breakthrough methods particularly in the language teaching and learning fields. In the middle 1980s, educational technology included more basic electronic and non-digital tools (e.g., chalkboards, overhead projectors, video cassette recorders). The assumption by school leaders was that these technologies required little additional training (Hofer, & Swan, 2011). However, as the second millennium begun, digital technology use increased around the world. In the education sector, technology integration started gathering momentum in 1994 and has continued. Educational technology can help students get the best education possible and make a smoother transition to the work force. Technology can act as a bridge to help students move beyond theoretical understanding (Cuban, 2001)

The primary motivation for integrating ICTs into teaching and learning is the belief that it supports students in exploring and articulating thoughts, knowledge construction and theory building (Scardamalia & Bereiter, 1991), collaboration, negotiation of meanings, reflection on meaningful learning through accessing authentic information and immersing themselves in complex and contextualized learning situations (Jonassen et al. 1999). The belief that technology can have a positive impact on student learning has spawned a proliferation of studies in the past three decades, such as research studies on ICTs in education, demonstrating that the use of technology can help improve students' self-concept and motivation and their performance in problem solving (Hew & Brush, 2007). A study conducted by Jung (2006) investigated 591 Chinese students and found that the economic and sociocultural context in which the students came from greatly influenced their language learning experience through technology.

Despite the efforts that have been made, ICT uses in classrooms have been reported repeatedly and relatively low (Ministry of Education & Culture, 2013; Machmud, 2012). Literature reveals that it is important to examine teachers' understanding what it means to meaningfully integrate ICT into the classrooms. Some evidence from the previous studies on technology integration in English as a Foreign language classrooms in Indonesia shows that teachers are too much focused on what the technology can do, or the degree to which technologies are used in the classroom as tools, and not at how these technologies can be well-integrated into pedagogy. The fact shows that the way how ICTs are developed and marketed to Indonesian schools in way that try to alter pedagogy rather than be an effective teaching tool need to be evaluated. The ultimate goal of integrating ICT in Indonesian EFL classrooms as well as in a broader context of Asian schools should address how teaching and learning can be enhanced and how students' learning outcome can be boosted. A study conducted by Machmud (2012) on a group of EFL teachers' technology integration in the Indonesian province of Gorontalo, for example, revealed that teachers most frequently used technologies for non-instructional purposes. These findings support *meaningful* ICT integration as one of the main recommendations for teachers to improve their students' academic performance in language learning.

The present study aimed at examining whether the use of technology in Indonesian EFL classrooms in at the university context directly contribute to the academic performance improvement by taking into account some key aspects of instructional design, technology capabilities, supportive learning environment and the cultural aspect of learning as suggested by the previous researchers.

Method

Participants

The participants of the study were 60 students of Department of Public Health, the State University of Gorontalo, Indonesia who took General English course. They took this course as one of the general and compulsory subjects they undertake at their first year of their

undergraduate study. They were divided into two groups, i.e., an experiment class (n=30) and a control group (n=30).

Data Collection

A mixed method of a quasi-experimental and a qualitative interview approaches was used to collect and analyze data. Using a quasi-experiment with the pre-post test design with the control group, intervention was given to the treatment group. The control group, however, received the conventional face to face classroom instruction. A set of pre-test questions of the English proficiency which contains a four-major skills of English test was given to the group of participants both in control and experimental groups. This test was conducted to determine their existing language proficiency. The pre-test questions were the same as the ones that had been used for the post-test.

The treatment group undertook 8 meetings with the intervention of ICT usage of English learning websites and Facebook (FB) group discussion integrated into every single lesson of the meeting over a period of 8 weeks. Each participant in this treatment group joined the FB group where they would have received updated postings regarding the topic being discussed in the class. Every week, the link of the particular topic from the selected English learning website was supplied to the FB group so that they could learn and play and replay the materials. For the purpose of this study, Randal's English learning website (http://www.esl-lab.com) was selected for several reasons, such as its content, practicality, variety of language learning activities, and the flexibility of language user leveling adjustment. With the selected English learning website, participants were assigned to integrated-language skills activities, i.e., listening, reading, writing and speaking. The topics varied in every session, and were designed to suit their interests as well as being relevant to their course. Some warm up activities were done as part of the instruction on the website to introduce and familiarize the topic. The main activity of the class combined online and conventional activities. For listening activities, for example, the participants were assigned to comprehend to the conversation from the learning website and answered the questions. The questions on these websites have a variety of forms such as a multiple choice, and matching test. Participants could check their answers and clicked the score they got at the same time. They could repeat this listening exercise as many times as they liked to get a higher score. For reading activities, participants read short paragraphs online, and answered the questions based on what they read. They could try again if they made a wrong answer. Writing and speaking activities were also integrated during the session. For example, they practiced and drilled the conversation they had heard from the listening. Some speaking exercises and writing activities were also provided in the website.

After the completion of the 8-session treatment, the post-test, which contained the same set of questions in the pre-test, was given to the participants. Comparing results of the pre- and post-test of the participants in both groups was done to see if there were significant differences between these two groups.

Interview

To investigate more about the extent to which ICT integration enhances students' learning experiences and their academic performance, a follow up qualitative interview was done to 12 students who consented to the interview. The following 3 main points guided the interview: 1) students' confidence to use ICT in learning activities, 2) students' experiences feelings and perspectives on how technologies benefited their learning experiences and language improvement. 3) students' lessons learned and recommendations

Results

Results from a Quasi Experiment Method

This section presents the result of statistical analysis of the present study data. The sample of 60 students of Public Health Department, State University of Gorontalo Indonesia, i.e an experiment group of 30 students (n=30) and a control group of 30 students (n=30) was examined through their pre- and post test. Descriptive statistics for the academic achievement as dependent variables measured from the participants' result of pre- and post test are shown in Table 1. The data obtained from the pre- test were statistically analyzed using SPSS software. The data presentation and analysis can be seen below:

Table 1. Participants' pre-test score in Experiment and Control Group

	Group	N	Mean	Std. Deviation	S.E Mean
Pre Test Score	Experiment Group	30	61.50	9.299	1.698
	Control Group	30	59.17	9.010	1.645

Table 2. Independent t-test samples on pre-test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Conf Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pre Test Score	Equal variances assumed	.066	.798	.987	58	.328	2.333	2.364	-2.399	7.065
	Equal variances not assumed			.987	57.942	.328	2.333	2.364	-2.399	7.065

The results showed that t-value of pre-test was 0.98, with the significant level greater than .05 (see Table 2). It indicates that the experiment group (M=61.50, SD=9.29) performed not significantly different to the control group (M=59.17, SD=9.01). Thus, the null hypothesis was accepted.

Table 3. Participants' post-test score in Experiment and Control Group

	Group	N	Mean	Std. Deviation	Std. Error Mean
Post Test Score	Experiment Group	30	79.00	7.812	1.426
	Control Group	30	61.83	10.042	1.833

Table 4. Independent t-test samples on pre-test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Conf Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	SE Difference	Lower	Upper
Post Test Score	Equal variances assumed	3.754	.058	7.390	58	.000	17.167	2.323	12.517	21.816
	Equal variances not assumed			7.390	54.694	.000	17.167	2.323	12.511	21.822

The results showed that t-value of post-test was 7.39, with the significant level less than .05. It indicated that the experiment group (M=79.00, SD=7.81) performed significantly higher than the control group (M=61.83, SD=10.04). Thus, the null hypothesis was rejected. Overall, the results of this study suggest positive and significant relationships between the use of ICT in the English classroom and the students' academic performance.

Interview Results

This study revealed that students' confidence to use ICT in their learning activities improved over time. At the first place, students were struggling to deal with online study and were slightly nervous in terms of their own ICT skills. However, they gradually overcame this situation as the program continued:

> "the first time when I was assigned to study online with the learning website, I was a bit nervous and confused. I was not confident if I could do it. But then during the class, I was kind of adjusting myself, especially during the first meeting. I started to become comfortable on the second meeting or so." [S3, L6 – 9]

Students found that working with other students really helped them to deal with their skills and confidence in using ICT.

> "I looked at my other friends next to me who might be able to help. I was happy as I always had a chance to ask others. I was not that good with the computer and internet things, but thanks God, I have got friends who are happy to help me." [S2, L 12 – 14]

With the variety of activities provided by the learning websites, learning English challenges students in positive ways. Students found that there was a lot of excitement learning a language with computers and via the internet.

"To me, learning with technologies was a bit challenging. Learning English and in the same time learning new things with computer and internet are not always easy. However, I found it so much fun, especially when you hear people talking in English." [S1, L 21 – 23]

Another point raised by the participants was that they had positive perspectives on how internet technologies benefit them to enrich their language learning experiences.

"I learnt much from the internet, especially pronunciation. It was a bit difficult how to pronounce some English words, as they are different from Indonesia. I learnt lots from what I heard on the conversations in the website. And sometimes I found what I was looking for, ahaa..that was what I am looking for, hehehe." [S 5, L 12 – 14]

To sum up this section, interview results showed that participants expressed their positive learning experience with technologies, growing motivation in English learning, and positive feeling and confidence on their language performance.

Discussion and conclusion

Elements in the literature review recommend the importance of meaningful infusion of ICT into English classrooms to enhance teaching and learning (Hubbard, 2003). Studies have demonstrated that if ICT can be integrated into a meaningful way, it can significantly improve students' academic performance, particularly students' language skills (Alazam, Bakar, Hamzah, & Asmiran, 2012; Kean et al., 2012; Klimova & Semradova, 2012; McMahon, 2009; Nair et al., 2012). The results of the present study indicate that in the period of time, the integration of ICT in the traditional face to face English classrooms can significantly improve students' language proficiency. However, further studies with broader samples, different context and treatments still need to be done to confirm these findings. In addition to this, this current study also found that ICT can facilitate a more positive, supportive and conducive learning environment which ultimately boost students' motivation to learn more. This is in line with the previous study findings (e.g Sun and Metros, 2011; Jung, 2006; Kean, Embi, & Yunus, 2012).

This study findings suggest that the learning website / Internet provides the fundamental condition for the EFL learners to enable them expose themselves to the target language so the language acquisition process occurs in the same way. Empirical studies, as mentioned in the previous section, suggest that engaging EFL learners in authentic communication and putting them in the target language exposure as much as they could becomes an indispensable condition for successful foreign language learning. From the language theory point of view, language acquisition occurs when the learner is engaged in an active interaction with the target language resources and authentic materials. It is believed that by having this condition, EFL learners will more likely acquire languages for real life in a more authentic situation so they can use it in a more meaningful way.

As to the main research questions of this study, it is possible to suggest that the careful use of ICT in English classrooms can impact on the outcomes of EFL learners'

achievement. Further, the use of ICT seems to increase with students' positive feeling about the extent to which they benefit from ICT integration. The results showed that the more positive the students' feeling, the more they engaged with the learning activities. This outcome then stimulates their learning motivations as the pre-condition for the improvement of their academic performance. Finally, teachers' total ICT use was related positively to their stances toward technology in the classroom. This study, however, has limitations in aspects such as the size of participants, the procedure of data collection, and the frequency of the treatment. Therefore, this study calls for further investigations with more representative sizes and participants' background,

The present study aimed at examining the impact of ICT integration on students' academic performance in English subject. The context of the study was the State University of Gorontalo in the Indonesian province of Gorontalo. Overall, results reveal that the ICT integration into English classrooms can significantly improve students' language proficiency. This study also suggests that infusing ICT into English classrooms in a meaningful way provides a supportive learning environment for the students.

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