The Role of Mobile Technologies in Blended Learning Environments

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Abstract: Mobile technologies exist in a wide spectrum and have a great impact on today's world. One of the reasons of mobile technologies' becoming a vital part of everyday life may be various features they possess such as easy access to content with no time and limit boundaries. This has brought up the question whether they may assist language learning. Considering Web 2.0 tools in the context of mobile technologies, for this study a well-known Web 2.0 tool has been chosen to investigate its effects, Duolingo, on students' academic performance when used in blended learning settings to support formal language education. The academic performance levels of students are determined before and after the intervention in a high school in accordance with an instructional design prepared to support students in and out of school hours. Data were analyzed by using descriptive analyses techniques. The results of the study are discussed considering the significant difference in students' academic performance after the intervention. It can be concluded that there are possible advantages of integrating a Web 2.0 tool in blended learning contexts.

Keywords: Mobile Technologies, Technology Integration, Web 2.0, Blended Learning, Duolingo

Harmanlanmış Öğrenme Ortamlarında Mobil Teknolojilerin Rolü

Öz: Mobil teknolojiler geniş bir yelpazede yer almakta ve günümüz dünyasında büyük bir etkiye sahiptir. Mobil teknolojilerin günlük hayatın vazgeçilmez bir parçası haline gelmesinin nedenlerinden biri de içeriklere zaman ve limit sınırı olmaksızın kolay erişim gibi sahip oldukları çeşitli özellikler olabilir. Bu, mobil teknolojilerin dil öğrenimine yardımcı olup olamayacağı sorusunu gündeme getirmiştir. Web 2.0 araçları mobil teknolojiler kategorisinde değerlendirildiğinden bu çalışma için, formal dil eğitimini desteklemek için harmanlanmış öğrenme ortamlarında mobil teknolojiler kullanıldığında öğrencilerin akademik performansı üzerindeki etkilerini araştırmak için iyi bilinen bir Web 2.0 aracı olan Duolingo seçilmiştir. Öğrencileri okul saatleri içinde ve dışında desteklemek amacıyla hazırlanan bir öğretim tasarımı doğrultusunda bir lisede müdahale öncesi ve sonrası öğrencilerin akademik performans düzeyleri belirlenmiştir. Veriler betimsel analiz teknikleri kullanılarak analiz edilmiştir. Araştırmanın sonuçları, müdahaleden sonra öğrencilerin akademik performansındaki anlamlı fark dikkate alınarak tartışılmıştır. Sonuç olarak bir Web 2.0 aracının harmanlanmış öğrenme ortamlarına entegre edilmesinin olası avantajları bulunmaktadır.

Anahtar Sözcükler: Mobil Teknolojiler, Teknoloji Entegrasyonu, Web 2.0, Harmanlanmış Öğrenme, Duolingo

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With the rapid growth of technology, mobile technologies have started to dominate the lives of individuals of almost all ages. By using a smart device people can access to information in seconds. This rapid transition from convention to relatively advanced use of technologies, has been an interest of research in education to improve the learning and teaching environments. Because mobile devices are portable, easy to carry, allow easy access to information and basically, they are 'smart', has led to the examination of their use in language education.

In today's world mobile technologies may facilitate language learning by motivating them with the support of a learning environment which is not stuck in certain place and time (Pengnate, 2020). In this sense, the term mobile assisted language learning (MALL) has started to be widely used by focusing on utilizing and investigating the effects of mobile technologies. Because of their indispensable role in recent years, the use of the internet and the advancement of new technologies attracted a lot of attention in the field of language instruction which paved way to coin the term MALL (Mobile Assisted Language Learning). In the study of Kukulska-Hulme and Shield (2008), MALL is defined as language learning by using mobile devices which are more personalized without time and place restrictions. Furthermore, the definition of MALL portrays using mobile phones or similar devices with wireless connection in teaching and learning (Rodríguez-Arancón, et al., 2013). MALL is also defined as applying m-learning to language learning (Dağdeler et al., 2020). Mobile-assisted language learning is gaining more and more interest and is suggested to have a great impact on second language education (Pachler et al, 2010) which resulted in the appearance of blended learning.

In terms of blended learning, there are various definitions with many different assumptions (Khan, 2005; Stein & Graham, 2014). One of the most basic definitions refer to blended learning as combining face-to-face learning with online methods for the benefit of teachers and students (Osguthorpe & Graham, 2003) and in language education many studies suggest positive outcomes of blended learning (Banados, 2006; Kobayashi & Little, 2011). With its possible benefits like increasing students' motivation and engagement via mobile technologies blended learning is usually used in teaching and learning environments to answer the needs of today's digital generation (Harun & Hussin., 2018; Ginaya, et.al., 2018) Blended learning has been utilized in English language classes in many different contexts a study by Yang and Kuo (2021) is a case in point. They mentioned that utilizing blended learning in EFL classes could assist language learning especially in terms of literacy as students are more engaged in online interactions. Another finding in another study also suggest that technology-based instruction is the most popular blended learning strategy used in English teaching and learning settings (Ramalingam et al., 2022).

In this context, another term that this study uses begs for a definition, which is Web 2.0. To put simply, Web 2.0 tools are used to utilize mobile technologies and basically refer to platforms that facilitate the production of information and enable users to easily share and alter via the internet (Chugh & Ruhi, 2018). Hence, Web 2.0 is considered part of mobile technologies just like the tool this study uses, namely Duolingo. Parallel to their increasing popularity, Web 2.0 tools are investigated to a great extent within the scope of mobile technologies and there is considerable research investigating use of various Web 2.0 tools for education (Alsmari, 2019; Durak; 2017; Rosell-Aguilar, 2018).

In terms of language education, it can be claimed that the effects of mobile technologies have grown and made an impact on language learning in many different settings (Kukulska-Hulme, 2009). However, as mobile technologies are very diverse in scope, there is also research highlighting the negativity that comes with many applications and tools such as affecting students' attention by playing a distractive role and students' not having a high opinion of technology use (Cakir & Solak, 2014). Still, technology integration in foreign language education revealed success (Golonka et al., 2014). Yet, English language teaching has begun to accept technology as a pedagogical tool and a source of learning due to the ongoing and rapid advancements in technology (Khezrlou, 2019). Additionally, even earlier, studies indicated that technology integration by using mobile tools in learning environments had a great impact and found to be beneficial between years 1993 and 2013 (Sung et al., 2015). They also argued that the majority of language learners who use a mobile device would perform better than the learners who do not.

Naturally, there can be no specific conclusion to mobile technologies' being effective and carrying a supportive role. In this sense, in order to utilize language learning with optimal opportunities, research needs to focus on the affordances of technology (Plonsky & Zeigler, 2016). Hence, how mobile technologies are utilized and whether they can be of any use in language education maintains its significance and requires further study to explore the potential of mobile technologies that may be of great assistance in language classes as part of blended learning and that is what this study is aiming to address.

The Present Study

One of the main concerns of technology integration is the lack of access to online sources due to inadequate finances to have access as well as teachers' lack of necessary skills and knowledge. In the case of mobile assisted language learning, studies that investigate their effectiveness in learning a second language are rather limited (Loewen et.al, 2019). Yet, Web 2.0 tools are still approached with great caution by teachers in many parts of the world and there are concerns regarding how their use affect the success of students. Therefore, the research questions of this study are formed as:

1. What are the effects of Duolingo-based activities on the academic performance of students in English classes?

2. What are students' opinions regarding Duolingo-based activities?

The Program and the Participants

This is a mixed-method study which utilized quantitative and qualitative methods. In determining the participants, purposive sampling method was used and 48 students of a private school participated in the study. It was a private school and made use of technology to a great extent so each class had a computer with smart board and internet access. Two teachers volunteered to use Duolingo in their English classes. They were introduced to use the application and continued using it as part of their classes for eight weeks.

Duolingo

This study focuses on using a well-known language learning application Duolingo and examines its effects on students' academic performances. Duolingo was formed in 2011 and allows free access to language materials through mobile devices as well as PCs and laptops by using the internet worldwide. Users are enabled to work on mainly four skills as reading, writing, listening and speaking with a section for translation. Apart from the language program, users are also given the opportunity of having interaction with other users as well. Duolingo connects lessons with video games as well in order to arouse interest in learning a language as well as including audio, visuals and questions about vocabulary and grammar. Duolingo is claimed to promote peer-to-peer collaboration, giving the users the opportunity to challenge each other (Carneiro, & Simao, 2011). With its game-based activities, Duolingo is claimed to keep users engaged and more motivated which is supported by considerable amount of research (Nushi & Eqbali, 2017; Werbach, 2014; Vesselinov & Grego, 2012).

Methodology

Research Design

Mixed method design was used for this study. In mixed method models quantitative and qualitative methods are used together highlighting the strong points of each method (Creswell & Plano Clark, 2017). By combining both approaches, researchers can better understand complex phenomena and generate more nuanced and comprehensive findings.

Participants

Participant students and their teachers were informed and their consent was received before the study started. Because the participants were young, their parents were also informed and asked for their consent. Participant students of this study were 'digital natives' in the sense Prensky (2001) referred and had smart

phones. The participants did not have any problems regarding access to the internet or technological tools. There were 24 9th graders studying English as part of their continuing education and had the same teacher as their main teachers. Both groups' teachers had teaching experience of over eight years. In the control group there was also a class of 24 students studying in a different campus of the same school. The students were informed that answering the questions in the interview would only be on a voluntary basis and they could leave the study if they wanted. Seven students volunteered to give their opinions at the end of the study in follow-up interviews.

Instructional Design

First, the teachers were trained to find out about the application Duolingo to plan the instructional design. The instructional design was formed with the teachers and the researcher according to the ongoing program of the school. The intervention was carried out by including Duolingo-based activities both in and out of class at the first term of the academic year for eight weeks.

In-class Instruction

The school that agreed to conduct the study used an eclectic approach in language education and evaluated students' success with various tools such as quizzes, portfolios, common exams and end of term exams which would eventually lead to obtain international exam scores such as Fliers, KET and PET as the students were encouraged to take one of these exams depending on their levels. Therefore, there were many mock exams carried out and activities aimed to include all the language skills. The teachers regularly checked students' scores and depending on their need and their parents' consent, students were referred to extra language studies carried out after school. The students were asked to use Duolingo-based learning activities in class hours twice a week with their teachers' supervision for two hours.

After-class Instruction

The activities carried out via Duolingo were supposed to target the objectives of the class in accordance with the topics used in class. The activities were designed to keep students engaged and encouraged them to use the application more. The activities also covered all the skills with the aim of supporting students' overall performance. One of the main points of the after-class instruction was that the students themselves decided on the amount of time to attain for the activities on Duolingo after class. However, the teachers had a checklist and followed the participation of the students regularly.

Intervention

The intervention was planned to facilitate English language classes in blended learning environments with a Web 2.0 tool, namely Duolingo, so students were asked to make use of the application both in and after school hours according to the activities assigned to them. The participant students were supported with Duolingo for eight weeks by being assigned the activities at the beginning of every week. They were also allocated to use the application in school hours for two hours as well. The topics and activities assigned were parallel and supplementary regarding the ones covered in class in line with the syllabus of the school. Two examples of the activities suggested in the application can be seen in Figure 1 below.
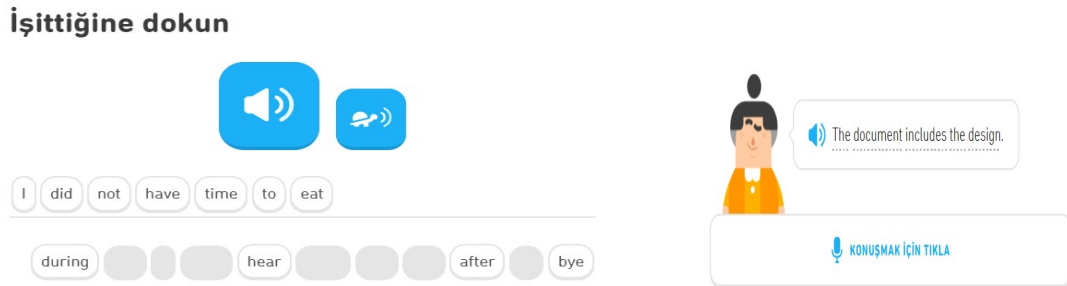

Figure 1. Examples from Duolingo

Data Collection Tools

Data came from an adapted version of Cambridge KET (Key English Test) applied before and after the intervention. Students were also asked to give their opinions regarding whether they found the application beneficial or not in follow-up interviews.

Exams

Oxford Placement Test (OPT) and Key English Test (KET) are both internationally well-recognized exams with its proven validity and reliability. OPT (Oxford Placement Test) was already applied to the students at the very beginning of the term by the school before the intervention in order to place the students with sticking to homogeneity. Therefore, the groups are considered to be homogeneous at the beginning.

The school referred the students to take the Cambridge exams depending on their levels at the end of the year so an adapted version of KET was applied before and at the end of eight weeks after the intervention in order to gather data that served as pre and post- tests and compare the academic performances of the students. The KET consists of reading, writing, listening, and speaking sections.

Follow-up Interviews

In order to get a better understanding of students' opinions about using Duolingo as part of their English classes, students were asked to reflect on whether they found the intervention based on Duolingo beneficial or not by giving their reasons.

Data Analysis

Data were analyzed descriptively. The exam results of the participant students are evaluated and the tables are formed. Students' responses are explored in an interview and direct quotations are provided in findings. Instead of students' real names, codes as S1, and S2 are used when reporting students' remarks in the interviews.

Findings

As aforementioned, the groups are considered to be homogeneous as they were already placed as mixed groups in a homogeneous way according to their OPT results by the school.

For the KET exams, two scorers evaluated the writing and the speaking tests. The interrater reliability for the speaking part was not calculated as the raters were official examiners of Cambridge Young Learners Exams but for the writing part interrater reliability was found to be .87 at the .001 significance level.

Table 1. *Results of the Post-tests of KET for the Experimental and Control Groups*

KET	Exp. Group Mean pre	sd	Control Group Mean post	sd	d (Effect size)	P
Listening	19.8	4.8	16.2	3.8	1.01	0
Speaking	9.8	2.6	7.4	2.6	0.83	0
Reading	28.9	4.9	28.2	5	-0.1	0.60
Writing	14.8	3.2	12.9	3.2	0.27	0.23

As can be seen in the table, the experimental group's scores increased significantly in all skills except reading. The difference in reading was not significant as the scores were nearly the same after the intervention for reading. This may be interpreted as Duolingo-based activities assisted students in increasing their overall academic performance with the exception of reading.

As for the interviews, the students mentioned positive remarks regarding Duolingo use in English classes and found the application beneficial. One of the students, S2 mentioned "I think it was cool and I really liked it. I just needed more time especially when I was doing it in class. I could easily follow the tasks as well". Another student S3 reflected "I don't know about the others but I liked the app. I collected lots of streaks (it is a kind of reward provided by the application). I have lots of English apps on my phone. My mum keeps telling me but I didn't like them at all. Everyone else in my class was doing so we had a lot to talk about". The experience of Duolingo is stated in the words of S5 as "It was something to do. It was good practice. I could

talk to my friends about their scores and wanted to gain more streaks. I learnt lots of words also. It was kind of OK you know easy". S1 also mentions "We sometimes get bored in class especially when there is an exam or something and I looked forward to using Duolingo in class hours. At home also my mum said I could use it as much as I wanted. She wouldn't normally say this when I am using the computer or my mobile and it made me smile you know". S4 mentioned about another aspect which is expressed as "The end of school hours in the school bus is usually very loud and I usually feel very tired. And I have a long way to go home from school. So Duolingo was very entertaining there. I didn't even hear my friends' noise in the bus sometimes you know". With all the positive remarks, in addition to finding the intervention useful one of the students, S3, also added a negative remark when answering the questions in the interview by expressing that they were distracted and sometimes lost track of what to follow. S3 added "It is not a good idea to keep the notifications on. I got so many notifications reminding me what to do so it was kind of confusing because I already set my alarm to remind me so many things".

Discussion and Conclusion

The results of the study suggest that using a Web 2.0 tool is beneficial and may be of assistance to facilitate learning English in blended learning environments as the academic performances of the students increased after the intervention except reading.

The results of the study in terms of the effectiveness of mobile technologies in language education are in line with many studies in the field. This can be seen in the study of Agca and Özdemir (2013) who found that learners considered technology as a means to help for their learning. Similar result can be seen in another study which suggest that technology integration in English classes increase participation (Balula et al., 2020). Moreover, mobile assisted language learning is found to be effective in many other studies in the field (Xu & Peng, 2017; Thornton, et al. 2005). This has been claimed in many different contexts from teaching and practicing vocabulary (Lu, 2008) to practise pronunciation (Ducate & Lomicka, 2009). For the use of Duolingo in particular, the application is considered to be convenient in learning English according to digital resources standards (Mahmudah, 2015). Duolingo's being effective in improving listening skill and vocabulary is also found in the literature (Anaraki, 2009; Putri & Islamiati, 2018). Moreover, the game-like features of Duolingo such as gaining streaks may increase students' motivation (Huynh et al., 2018) and this may have helped the students in this study to increase their performance. Besides, students' finding the application easy to use is also aligned with the studies in the field (Marques-Schafer & da Silva Orlando, 2018).

Furthermore, it is seen that students who experienced Duolingo as part of their English classes found it beneficial suggesting positive outcomes of the intervention. This is also seen in the overall academic performance of the students. Yet, research highlight possible benefits of integrating new technology. Eppard et al. (2019) also indicated that even though it is arduous to accept a new technology into the educational context, it could bear various benefits such as mastery of learning, collaboration and critical thinking under the right circumstances and implementations. The negative response that came from one student may be interpreted as it might be challenging to focus on the tasks for students because of facing many distractions, which is also aligned with studies in the field (Gafni et al., 2017).

As for the results of reading, it has come as a surprise to find the results of students' reading scores insignificant. Various interpretations may be given to explain this result such as students' being overloaded with the assignments of reading tasks in school hours as well as homework. It has also been observed that students were already responsible for reading two novels and presenting a summary of each in their own language in relatively short period, every two weeks. Being assigned readers in their own language as well as English may have demotivated students to read more via Duolingo. Another reason might be suggested as the students' not having a high opinion of the reading activities placed in the application during the intervention. Giving students an opportunity to choose the reading texts may have helped to overcome the problems of reading.

Considering learning and teaching in the 21st century, it can be claimed that mobile learning may be

turned to when the issue of space wants to be overcome and more interaction is desired (Lindaman et al., 2016) to facilitate learning (Saran et al., 2008). The benefits of blended education have been elaborated by Osguthorpe and Graham (2003) with various terms such as access to knowledge, personal agency and cost-effectiveness as well as allowing easy revision. In this context, at the end of this study, it can be asserted that using a Web 2.0 tool may support English language education. To further elaborate, mobile technologies may serve as a beneficial way to facilitate teaching and learning process (Khaddage et al., 2009) especially with applications such as Duolingo that present various activities to help students learn in a fun way (Munday, 2016) as well as being more accessible, cost-free and allowing interaction (Viberg & Grönlund, 2012). Since students have not been negatively influenced but found the application beneficial and the teachers welcomed and supported integrating it, Web 2.0 tools like Duolingo may be added to the curriculum to provide a more flexible teaching and learning environment that can be accessed easily. Teachers can create alternative language programs by integrating tools with various features in order to improve students' language performance.

On the whole, this is a small-scale study and it would not be wise to jump to higher expectations and generalizations. While it was found in this study that mobile devices may enhance academic performance in language education, the actual impact of mobile learning programs needs to be enhanced by longer intervention durations, closer integration of technology, curriculum, and further assessment of higher-level skills without overstating their possible contributions. As Hockly (2013) reflected, technology is not what enhances teaching and learning, but rather the usage of it in those processes. It is important for the teachers to remember to carefully choose the appropriate technology-based tools and materials to facilitate learning English. Therefore, as a concluding comment, it should be reminded that it is not about the tool itself but how tools are integrated to the program. Hence, all the tools used in the context of educational technology should be evaluated in detail with a carefully planned instructional design before put into practice.

Limitations

This is a small-scale study with relatively small number of high school students so the results should be taken suggestive without making overgeneralizations. Moreover, the intervention lasted for eight weeks which can also be considered as a rather short period. The study was conducted in a private school that already supported using technological tools and prepared trainings accordingly. Conducting the study in another context with groups at different language levels may reveal different results. More research is needed to investigate the possible use and potential benefits of mobile technologies in various settings.

Declarations

Ethics: The ethics committee's approval was taken from Yildiz Technical University with date and number as 28/02/2022.22

Conflict of Interest: The author has no conflict of interest with anyone involved in the study.

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