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Effectiveness of blended learning in higher education. Case of Astana IT University.

Globalization and informatization of society are important indicators of the 21st century which influenced people's lives in all spheres and educational spheres included. The educational system and methods have always been subject to constant change throughout the history of teaching. The most crucial changes started to emerge in the past 20 years since the advancement of technologies which made the process of teaching easier enriched the tools for instructors and gave the opportunity for students to study independently. The traditional format of teaching is now slowly shifting to a more flexible half online mode which is called Blended learning. The study undertaken in framework of this article is aimed at evaluating the student's English language performance at Astana IT University. The research included 285 participants: first-year undergraduate students between16-18 years old. Study used a paired t-test to identify if there is a statistical difference between before and after incorporating blended learning into the educational process. Analysis revealed that the p-value (0.001) is less than the alpha level (0.05), thus it was concluded that the scores are higher after implementing Blended learning in the course; furthermore, it is suggested that this format benefits not only the students but instructors as well.

Keywords: Blended learning, synchronous, asynchronous, traditional education, offline, Internet, online, a paired t-test, p-value.

Introduction

Education is a life-long process and is subject to constant changes in the methodology of teaching. In the last 20 years since the beginning of the millennium pivotal changes shaped the world. The rise of the Internet, advanced technology developments, fast communication methods affected the people's ordinary lives and thus affected educational process by creating new learning environments which "make it simple for students and teachers to communicate in non-traditional methods" [1]. Approaches in the educational process change over time — outdated teaching models are replaced by new, more advanced ones. The need to change teaching approaches caused by multiple factors such as "rapid changes and increased complexity of today's world" [2]. These ongoing changes put new requirements and impose challenges on the educational process and teaching methods. To comply with the changes and meet the requirements traditional methods applied for years, which were effective, now, slowly morph into contemporary ones. One of the contemporary methods which is widely used in the educational process is called Blended learning.

The appearance of Blended learning is possible thanks to the Internet as Osguthorpe and Graham (2003) [3] noted the Internet expanded the educational possibilities available to students and instructors. The term of Blended learning in the higher education field has been introduced as a possibility to improve the teaching and learning process by equalizing the advantages and shortcomings of traditional (offline) and online learning settings. Lanham, et al. (2005) [4] state that Blended learning is a mix of traditional face-to-face learning with online learning, it also presumes that lessons will be conducted in asynchronous and synchronous modes of teaching.

As Blended learning combines two modes of education: traditional face-to-face and online it usually involves the best practices from each mode to get optimal learning outcomes. It is "characterized by the introduction of flexible and innovative teaching and learning technology into teaching (2001) [5]. It is worth noting that the term "Blended learning" is still taking its form as it is a rather new notion. As a matter of a fact there is ambiguity when it comes to defining this term. The complexity and different definitions of what Blended learning makes us reflect on it (2006) [6]. Likewise, Chew, et al. (2008) [7] stated the varying needs and requirements of individual students or educational institutions shape the definition of Blended learning depending on the purpose of the course.

The brief overview of the definitions revealed that there are many ways to define it. Based on the review it can be summed up that Blended learning is a teaching mode which combines best practices and tools from offline and online modes of teaching to achieve the maximum effective learning outcome at the end of the course. The suggested definition reflects on the core idea of what Blended learning is as a combination of teaching and learning; underlines the crucial role of Internet-based technologies in blended learning.

Another question in the field of Blended learning is the proportion of the classes which should be delivered online and offline. Allen, et al. (2007) [8] research showed that substantial proportion (30 to 79%) of the content is delivered offline in blended educational courses as shown in the table below (Table 1).

Table 1

Proportion of the course Delivered Online to Offline

Proportion	Teaching mode
0%	Traditional
30 to 79%	Blended
80+ %	Online

Blended learning combines the advantages of both traditional and distance learning methods. This proportion is beneficial from two standpoints:

From the standpoint of the traditional method, Blended learning gives the teacher and students many opportunities to interact during class. The teacher explains assignments, observes, evaluates and receives feedback from students. Learning becomes more intense and effective due to the close interaction between the teacher and students. For students, the traditional method provides many opportunities to learn, observe, ask questions, and receive feedback from the teacher. This intensive interaction creates a favorable environment for development.

From the point of view of online learning, the blended model provides more flexibility in the implementation of the educational process; it provides more flexibility in the implementation of the educational process. For example, instructor has the opportunity to divide all the materials into several parts which are delivered during class sessions, and can be obtained by students through independent work with the use of various platforms such as Teams, Zoom, etc. Additionally, Blended learning gives instructors more flexibility and freedom in control and evaluation of students. The teacher can conduct online testing, post assignments and tests. This opportunity is good for both the teacher and the students. The teacher has more time to assess student performance, and students can work on their assignments from anywhere without coming to the classroom.

Instructors of Foreign Language in Astana IT University utilize this proportion in their classes with a slightly more percent of online lessons; 3 lessons delivered synchronously and 2 lessons asynchronously — per week. The course lasts for 10 weeks and consists of 50 lessons. Proportionally speaking it is 40 to 60%. To evaluate the learning effectiveness, we suggest implementing a paired t-test analysis. Based on research it will be evident to witness the correlation in the academic achievement of students during the course.

Methodology

The present study uses quantitative research, inferential statistics to focus on collecting numerical data to test whether blended learning has significant effects on students' English language performance. The study conducted an experiment in which students had to take a mandatory course titled "English for Academic purposes" by using blended learning design. In other words, that is when the course is based on both in-class and online lessons. Students used two learning management systems during the 10-week trimester, namely Moodle and Microsoft Teams. Three hours per week were delivered offline, while two hours — online. The experiment took place at one of the IT Universities in the country. The reason behind the choice of the site is because of the easy access to the data.

The population is the first-year undergraduate students (16-18 years old) with different educational backgrounds specializing in spheres of Information Technology (IT) such as Cyber Security, Big Data Analysis, Software Engineering, Mathematical and Computational Science, Smart Technologies, IT Management and IT Entrepreneurship. The participants were chosen based on a random sampling technique with a confidence level of 95%. Most participants major in Cyber Security (CS — 43%), Software Engineering (SE —

35.8%), and others — 26,8% (Fig. 1). Female learners only take more than 23% of participants, while male students — 77% (Fig. 2).

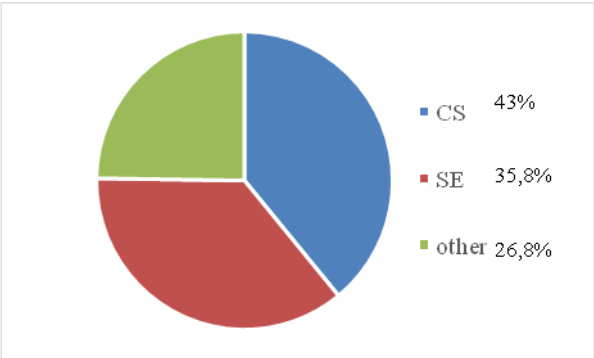

Figure 1. Specialization of participants

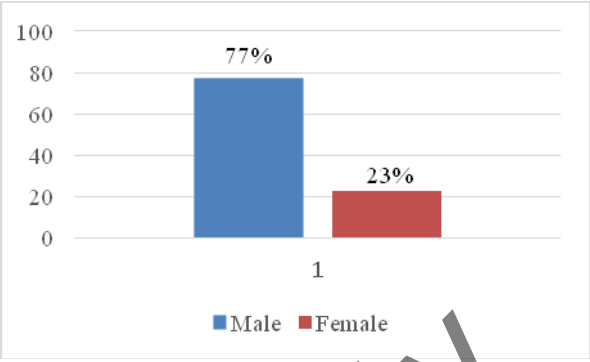

Figure 2. Gender of participants

From a random sampling of 307 participants, 22 students were removed from the study because they failed the course, and this factor could have affected the results of the research. According to the policy of the course, students with an attendance rate less than 70% or with a registered grade less than 50% are not eligible for the final exam; in other words, the data of 22 students with "0" scores for the course were not used in the present study. Consequently, the final number of participants was 285 (n=285).

To measure the performance of students before and after implementing the blended-learning technique, we decided to use an assignment and a list of criteria for assessment. More specifically, learners had to prepare a presentation about any IT invention before and after experiencing the mixed learning method. The presentation assignment required students to use different skills, including listening, reading, critical thinking, research-related skills, self-study, using citation style and academic vocabulary. The assessment criteria of the presentations were based on the same skills, such as the ability of students to analyse materials of chosen IT invention, use in-text citations and list of references in APA style, use a range of grammar appropriately, use appropriate signposting language, deliver the presentation in an interesting manner and other criteria. The data was collected based on students delivering the presentation before experiencing the blended-learning method and the presentation after implementing the mixed-learning technique. The data went through data clearing and validation processes.

For the data analysis, the study used a paired t-test to determine if there is any statistically significant difference between before and after incorporating blended learning into participants' routines. Paired t-test is used to compare two variables of the same group [9]. In this case, the first variable was English language performance before blended learning, and the second variable was students' performance after the mixed-learning method. The paired t-test or, in other words, dependent sample t-test allows accepting or rejecting the null hypothesis. In this study, the null hypothesis states that the difference between the participants' English language performance before and after implementing the blended-learning method is equal to zero. The alternative hypothesis argues that there is a significant difference in the English language performance of learners between pre and post-blended learning design.

Ho=0, the difference between before and after implementation of blended learning equals zero;

Ha≠0, there is a statistically significant difference between before and after the implementation of blended learning.

Results and Discussion

According to the results of this study (Table 1), the mean score for the pre-experiment group is 75.7 and for the post-experiment group is 81. The Pearson correlation between the two groups is 0.46. In the context of the paired t-test, the Pearson correlation coefficient is used to assess the degree of association between the pre-experiment and post-experiment scores. A positive correlation coefficient (r = 0.46) indicates that there is a weak to moderate the positive linear relationship between the two sets of scores.

The standard deviation before implementing blended learning of 11.8 means that the data points in the sample are, on average, 11.8 units away from the mean of 75.7. The standard deviation of 9.1 shows that the scores are approximately 9.1 points away from the mean score of 81 after incorporating a mixed-learning design. Based on the empirical rule, we can estimate that about 68% of the data falls between 63.9 and 87.5,

about 95% falls between 52.1 and 100, and about 99.7% falls between 40.3 and 100. The observed standard effect size is small (0.5). This indicates that the magnitude of the difference between the average and the expected average the differences are small.

The results show a significant difference between the pre-experiment and post-experiment results. The p-value (in this case, 0.001) is less than the alpha level (typically 0.05), which suggests that we can reject the null hypothesis of no difference between before and after blended learning technique. Therefore, we can conclude that there is a statistically significant difference between the two results, and the scores after implementing blended learning are significantly higher than the scores before the mixed-learning method.

Table 2

Paired t-test

Data	Mean	Pearson correlation	Standard deviation	Standard effect size	p-value
Before blended learning	75.7		11.8		
After blended learning	81		9.1		
Before and after blended learning		0.46		0.5	.001

The Academic English course was delivered using a blended learning approach, which included face-to-face instruction, online learning activities, and assessments. The results of the study indicated that students who participated in the blended learning course achieved significantly higher academic English scores compared to the same group of students before implementing the approach. These findings suggest that blended learning can have a positive impact on freshmen students' academic English performance.

The current study supports the positive impact of blended learning on academic performance found by Kintu, et al. (2017) and Sakina, et al. (2020) [10, 11]. According to the article "Blended learning effectiveness: the relationship between student characteristics, design features and outcomes", blended learning has a statistically significant effect on the performance of students. Unlike this study, the authors investigated specific characteristics of students that may have affected learning outcomes in the mixed-learning method. Computer competence, family and social support for learners, and learners' ability to balance study and work tend to be the driving factors of effective blended learning outcomes. Satisfaction of students with online learning, collaborative learning, and student-teacher interactions are found to be moderately vital factors in efficient blended learning. Anthony, et al. [12] also propose the following predictors of blended learning efficiency: achievement, engagement, involvement, retention, and cognitive outcome.

Furthermore, our study also found that blended learning improved students' communication and presentation skills, which aligns with the results of Lim, et al. (2020) [13]. The blended learning approach facilitated opportunities for students to collaborate on group projects, which improved their communication and presentation skills.

Similar to our study, the research by Eryilmaz (2015) [14] claims that blended learning positively affects students' learning outcomes. The research compared the face-to-face learning approach to a mixed learning method (n=110) and found that learner cooperation is more active in the blended learning approach, meaning students are likely to gain knowledge and create new ones by interacting with their peers. The participants showed interest in online applications used for studies and mixed learning.

Conclusion

The conducted study revealed that efficacy of Blended learning is of no doubt beneficial both for students and for instructors. Bended learning allows us to create a new educational product by mixing different formats and approaches in teaching. It is based on a combination of online learning and classroom activities, which are combined in such a way that each participant receives and develops certain knowledge and skills by the end of the course. The statistical analysis demonstrated that students' academic performance excels. It is evident that Blended learning will be used ubiquitously in all educational environments and will continue to be shaped and enriched by online tools.

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З. Мажит, М.Р. Аманжол, Г.Ж. Жумагалиева, М.М. Смагулова

Жоғары оқу орындарында аралас оқытудың тиімділігі (Astana IT University мысалында)

Жаһандану және қоғамды ақпараттандыру — барлық салаларда, соның ішінде білім беру саласында да адам өміріне әсер еткен XXI ғасырдың маңызды көрсеткіштері. Тілді оқытуда қолданылатын әдістер мен тәсілдер оқыту тарихында үнемі өзгерістерге толы болып келеді. Әсіресе соңғы 20 жыл ішінде оқыту процесін жеңілдететін, оқытушыларға арналған оқыту құралдарының қатарын көбейткен және оқушылардың өздігінен білім алуына мүмкіндік беретін технологиялардың дамуына байланысты көптеген маңызды өзгерістер енгізілді. Дәстүрлі оқыту форматы енді бірте-бірте аралас оқыту деп аталатын икемді жартылай онлайн режиміне өтуде. Осы мақаланың аясында жүргізілген зерттеу Астана IT университеті студенттерінің ағылшын тілі пәні бойынша үлгерімін бағалауға бағытталған. Зерттеуге 285 адам қатысты. Олар 16-18 жас аралығындағы бакалавриаттың бірінші курс студенттері. Зерттеу барысында білім беру үдерісіне аралас оқытуды енгізгенге дейінгі және одан кейінгі статистикалық айырмашылықтарының бар-жоғын анықтау үшін жұптық t-тест қолданылды. Талдау нәтижесі p-мәні (0,001) альфа деңгейінен (0,05) төмен екенін көрсетті. Сондықтан аралас оқыту курсын енгізгеннен кейін балл көрсеткіштері жоғары деген қорытынды жасалды; демек бұл формат студенттерге ғана емес, оқытушыларға да тиімді болады деген болжам жасалды.

Кілт сөздер: аралас оқыту, синхронды, асинхронды, дәстүрлі білім беру, офлайн, Интернет, онлайн, жұптастырылған t-тест, p-мәні.

З. Мажит, М.Р. Аманжол, Г.Ж. Жумагалиева, М.М. Смагулова

Эффективность смешанного обучения в высшем образовании (на примере Astana IT University)

Глобализация и информатизация общества являются важными показателями XXI века, которые повлияли на жизнь людей во всех сферах, в том числе и в сфере образования. Образовательная система и методы, используемые в обучении языку, всегда подвергались постоянным изменениям на протяжении всей истории преподавания. Наиболее важные изменения начали происходить за последние 20 лет в связи с развитием технологий, которые упростили процесс обучения, обогатили инструменты для преподавателей и дали возможность студентам учиться самостоятельно. Традиционный формат обучения сейчас постепенно переходит в более гибкий полуонлайн-режим, который называется смешанным обучением (*Blended learning*). Исследование, предпринятое в рамках данной статьи, направлено на оценку успеваемости студентов по английскому языку в Astana IT University. В исследовании приняли участие 285 человек: студенты первого курса бакалавриата в возрасте 16–18 лет. Был использован парный t-тест, чтобы определить, есть ли статистическая разница между до и после включения смешанного обучения в образовательный процесс. Анализ показал, что *p*-значение (0,001) меньше *альфа*-уровня (0,05), по этой причине был сделан вывод, что баллы выше после внедрения в курс смешанного обучения; кроме того, определено, что данный формат оказался полезен как студентам, так и преподавателям.

Ключевые слова: смешанное обучение, синхронность, асинхронность традиционное образование, офлайн, Интернет, онлайн, парный t-тест, значение *p, Blended learning.*