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Blended E-Learning: A Review of Scientific Studies

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ABSTRACT
This research paper aimed to review scientific studies in the field of blended e-learning using an analytical approach to documents. It sought to identify the nature of using blended e-learning in the academic stages. The reviewed studies explored its use in all stages of education. It also attempted to specify the study subjects or courses used in blended e-learning. The main findings indicated that its use in most academic subjects suffers a weakness in the purely theoretical subjects. The paper also aimed to define the electronic systems used in the application of blended e-learning. The multiplicity of the e-learning systems is shown. Then the paper concluded with other findings deduced from the review of scientific studies in the field of blended e-learning.

Introduction

With the increase in the global openness and the speed of life developments, resulting in development in the technical field and the subsequent renewal in lifestyle, the educational process should invest this development and keep pace with these changes. E-learning is one of the recent trends in the educational process, especially with new developments and events with the coronavirus (Covid-19) and its variants. Taking into account the multiplicity of features of e-learning, but in some cases it does not eliminate all the negatives that hinder the educational process. Chang's study (2004) confirmed the insufficiency of the complete e-learning model, with an emphasis on the need to find new teaching approaches aimed at employing e-learning. This confirms Fuller's study (2000) indicating learners' dissatisfaction with the e-learning model as revealed by the results of a later study (Chang, 2004): the insufficiency of e-learning to improve and increase the level of academic achievement, with an emphasis on the need to seek new teaching approaches aimed at employing e-learning technology (AL MANSOORI, ALSAUD, & YAS, 2021). That is why the so-called "Blended E-Learning" appeared; its philosophy is based on blending traditional education based on face-to-face interaction of the teacher and students, and the different types of e-learning - benefiting from some of its applications - within the traditional classroom, under the supervision and guidance of the teacher.

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Blended e-learning concept

Blended e-learning is regarded as one of modern terms that can be used in multiple meanings. Giving a general overview of the above definitions, the researcher concludes that blended e-learning is based on the combination and utilization of the advantages of regular education and e-learning, whether the use of a single model in all the educational process or the exchange between them in the educational situation. Blended e-learning is a combination of modern trends that have importance in the educational process, which created a new educational environment that combines the advantages of e-learning with the advantages of classroom education, helping to develop education and achieve its goals.

That is why the current scientific paper came to review scientific studies on the topic of blended e-learning and trying to answer the following questions:

1. What is the nature of the educational stage in which blended e-learning is used?
2. What is the nature of the study subjects in which blended e-learning is used?
3. What type of electronic system is used?

Study methodology

The study used document analysis.

Blended e-learning and the educational stage:

By reviewing the relevant scientific studies, the use of blended e-learning becomes evident at all educational levels, but it is more prevalent at the university level. Most of the previous scientific studies indicated the application of blended e-learning at the university level, and some scientific

studies also pointed to its application at the secondary level (Wahyuni, Gusti Made Sanjaya, & Jatmiko, 2019; Korkmaz & Karakus, 2021; Deechai, Sovajassatakul & Petsangsri, 2019; Renee, 2016; Sholikh, Sulisworo, & Maruto, 2019). However, one study included it the elementary stage as in (Hasani, Niusha, & Salibi, 2016). It can be argued that e-learning is valid for all educational levels, for male and female students. The majority of studies that indicated applying e-learning at the university level can be explained: the nature of the university phase; the age of those enrolled in it; mental maturity; the unnecessity of a full attendance throughout the study period; the large number of practical applications and experiments in the academic curricula. This grants e-learning ease of simulation, application of experiments, no association with laboratories and material cost. Applying blended e-learning to the primary and secondary levels opens up possibility of combining the advantages of e-learning and regular education, especially at the primary stage. This satisfies the child's need for social aspects, and helps him/her learn some social skills from classmates under the supervision of the school.

Blended e-learning and study subjects

By reviewing previous studies in the field of blended e-learning, the advantages of blended e-learning are evident with the possibility of applying it to most academic subjects, whether theoretical or practical. In clinical activities and nursing, da Silva Ezequiel et al. (2019) and Hee-jung and Sun-Yeun (2016) noticed that subjects with a practical skill is compatible with e-learning. Additionally, Suphamart and Thanongsak (2020) and Jou, et al. (2016) used it in subjects such as computer and information technology; even in the subjects of design and the use of educational materials, blended e-learning is very suitable (Akyüza, & Samsa, 2009). In terms of of teaching and developing basic skills, Fola-Adebayo (2019) and Svenningsen, and Pear (2011) applied it to reading and writing skills course, and essay writing training. In the theoretical and practical courses, as in science, geography and physics, the use of e-learning is widely used (Wahyuni, Gusti Made Sanjaya, & Jatmiko, 2019; Alotaibi, 2013; Korkmaz & Karakus, 2021; Renee, 2016; Hasani, Niusha, & Salibi, 2016). Thus, it can be concluded that e-learning is used in all academic subjects, as it has been used in medical, computer technology, basic subjects, science and English language. The researcher notes the near absence of some purely theoretical courses, such as philosophy and religions.

Type of e-learning system

Since the philosophy of blended e-learning is based on the use of e-learning and benefiting from the advantages of regular education, previous studies in the field of e-learning have been diversified into the educational process, using e-learning systems and electronic platforms, whether using open-source e-learning systems or systems that include formal institutional subscription; or some computer-assisted technical applications (H. Khudhair, A. Jusoh, A. Mardani, & K. Nor, 2019). The use of the blackboard was mentioned in Alotaibi's study (2013) while Hasanah and Malik's study (2020) used Edmodo. Svenningsen and Pear (2011) used individual learning using computer. Chat rooms and forums was adopted in Akyüza and Samsa' study (2009). Moodle is one of the electronic systems that was used in Fola-Adebayo (2019) and Bolandifar (2017). This is a feature of blended e-learning with the multiplicity of e-learning systems and platforms, so that each educational institution or teacher chooses what is commensurate with the nature of the course and the circumstances of the learners (Harith Yas, Jusoh, Abbas, Mardani, & Nor, 2020). The transition towards blended e-learning does not mean just using technology, rather the complete transition of blended e-learning to suit teaching, learning and evaluation methods and techniques, together with taking security precautions in the electronic system (H Yas, Alsaud, Almaghrabi, Almaghrabi, & Othman, 2021). The more features and facilities provided by the electronic system and the level of technical support and its suitability for the educational process, the more feasible it is to use and invest in education. Hasanah and Malik's study (2020) used e-learning synchronously or asynchronously.

A review of previous studies can be summarized as in the following Table 1:

Based on data shown in Table 1, the following points can be concluded:

- The multiple advantages of blended e-learning, as it can be used in all academic levels.
- Blended e-learning is not limited to specific study subjects, but can be offered in all academic subjects, although previous scientific studies were few in the purely theoretical subjects.
- Blended e-learning is neglected in the field of training, except in one study (Straus et al., 2013). It is considered an appropriate field for employing blended e-learning.
- One of the advantages of blended e-learning is to facilitate experimentation, applications, and simulations in electronic environments and

- technical applications, thus saving effort and time.
- The use of blended e-learning is expected to expand and exceed traditional education, especially in emergency events such as corona pandemic (Covid-19).
- It is crucial to carry out comparative studies on regular education, e-learning and blended e-learning.
- The need to study blended e-learning standards and indicators of successful use in the educational process.
- The importance of studying the ethics of using blended e-learning concerning the teacher and the learner.
- The importance of involving the student's guardian in the elementary stage in the e-learning system.

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Table 1. **Summary of previous studies concerning the use of blended e-learning**

No.	Study	Stage of education	Course/Subject	Type of electronic system (Platform)
1.	(Hasanah & Malik, 2020).	University	Electronic Engineering, Entrepreneurship	Blended learning model based on the Edmodo platform as an alternative to science learning to stimulate and improve scientific critical thinking skills
2.	(Wahyuni, Gusti Made Sanjaya, & Jatmiko, 2019).	Secondary	Science	Blended learning models based on Edmodo platform
3.	(Svenningsen, & Pear, 2011)	University	Preparatory year courses requiring writing an essay	The individualized computer-assisted education system in developing knowledge and critical thinking in blended learning courses
4.	(da Silva Ezequiel et al., 2019)	University	Clinical activities	Collaborative concept maps
5.	(Mosalanejad, Alipor, & Zandi, 2010)	University	Psychiatric Diseases Course	A general structure that offers both formal continuing educational events and informal continuous blended learning activities
6.	(Suphamart & Thanongsak, 2020)	University	Computer and Information Technology Course	The model has five components: 1) cooperation, 2) preparation, 3) process, 4) evaluation, and 5) reflection
7.	(Alotaibi, 2013)	University	Geography	Blackboard
8.	(Korkmaz & Karakus, 2021)	Secondary	Geography	Hybrid / blended learning through a webpage
9.	(Akyüza, & Samsa, 2009)	University	Design and use of educational materials course	Blended learning environment, the course is supported in chat rooms and forums.
10.	(Fola-Adebayo, 2019)	University	Critical reading and writing skills	Moodle
11.	(Marheny et al., 2019)	University	Cell biology	Blended learning based on problem solving
12.	(Minoru et al., 2020)	University	Psychology of Natural Disaster Mitigation and Prevention	Online discussion activities using a Moodle-based LMS and an online discussion board
13.	(Fitria et al., 2020)	University	Violin Course	Online Discussion Forum; e-learning
14.	Mosalanejad, 2014)	University	Psychiatry	Online reflective journal entries
15.	(Bolandifar, 2017)	University	English Language	Moodle
16.	(Mosalanejad, Mahdi & Alipor, (2011)	University	Mental Illness Course	World Wide Web (Web- based learning (WBL), problem-based learning (PBL)
17.	(Hee-jung, & Sun-Yeun, 2016)	University	Nursing	The content included watching a simulation video on nursing skills, discussion class and application of nursing examples using standardized patients.
18.	(Jou, et al. 2016)	University	Industrial Education	This study suggested an integrated learning environment that includes useful web applications: Google Plus
19.	(Deechai, Sovajassatakul & Petsangsri, 2019)	Technical Institutes	Vocational Education	The aim of this research was to assess the need to develop blended learning to foster critical thinking in students.
20.	(Straus et al., 2013)	In-service professional development	Advanced Operations Course for the Command and General Staff School	Blended distributed learning requires great teacher-student interaction and student-student interaction but completely distributed
21.	(Renee, 2016)	Secondary	Geosciences Course	This study analyzed the effects of different levels of technology use in the Earth Sciences class at the secondary level on students' performance in the scientific thinking test
22.	(Hasani, Niusha, & Salibi, 2016)	Primary	Dimensions of epistemological beliefs students	Blended learning strategies, critical and creative thinking
23.	(Sholikh, Sulisworo, & Maruto, 2019)	Secondary	Physics lessons in energy and business	Online learning with a blended cooperative learning strategy assisted by Google Classroom
24.	(Marnita, 2020)	University	Physics	Problem Based Instruction learning model based on Blended Learning: The use of the web or computer-based in learning