

**COMPREHENSIVE DISCUSSION ON BLENDED LEARNING TOOL AND  
TECHNIQUES FOR HIGHER EDUCATION**

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**Abstract**

Now days, blended learning is becoming more and more common. Studies on blended learning in particular are still few, even if research on online learning has been done in great part. The systematic review of 103 journal research papers on blended learning is reported in this work. Reviewing the state of blended learning research and classifying its themes and categories based on their contents is the aim of this paper. Of the articles this paper has looked at, twelve themes are noted. The results indicated that these studies fall mostly into six categories: design, strategy, elements, evaluation, methodology, and review. This document reviews research in each category. Research future paths are covered.

**Keywords:** Blended learning, review, themes, categories.

**Introduction**

The phrase "blended learning" is increasingly appearing in both academic and corporate contexts. Blended learning is likely going to be the most popular teaching method in the future because it combines the best aspects of both in-person and online schooling.

Blended learning is one of the 21st century's most significant innovations. Asynchronous technologies on the Internet, such as e-mail, forums, listservs, blogs, e-portfolios, and webfolios, can offer learners more flexible and interactive learning environments that are not limited by time or location, even though traditional face-to-face learning environments are still necessary for the social component of teaching and learning. Even though the term "blended learning" or "blended e-learning" may seem unfamiliar to teachers of today, it actually has a rather straightforward meaning. This is an unavoidable trend. A "unique learning experience congruent with the context and intended educational purpose" is created by combining and optimizing the benefits of both in-person and online training in this innovative teaching approach. Because there are so many models and mixes in the blended learning framework that is now in use, educators find it difficult to come to a consensus on a single description. The authors of this work agree with Colis and Moonen's concept of blended learning, which is defined as a combination of traditional in-person and online learning where instruction takes place both in and out of the classroom and where the online component organically builds upon traditional classroom instruction. The use of blended learning and its research have grown in popularity recently. Even while a lot of study has been done on online learning, very little has been specifically done on blended learning. Thus, in order to investigate the various perspectives on blended learning that are available, a review of the literature is required. This paper aims to explore the current status of blended learning research and describe and categorize its topics based on their contents [1-6].

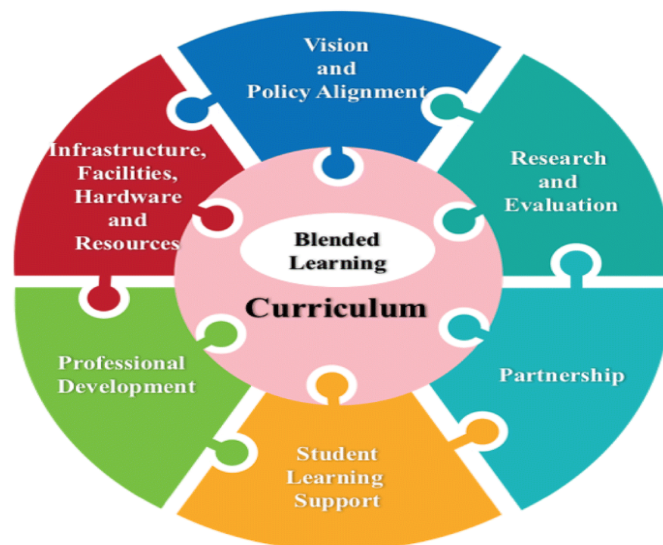


Fig.1 Driving, sustaining and scaling up blended learning practices in higher education institutions

## Methods

This paper adopts the theoretical methodology of Hemingway and Brereton for a literature evaluation. Theoretically, high-quality systematic reviews seek to: identify all relevant published and unpublished evidence; select studies or reports for inclusion; assess the quality of each study or report; unbiasedly synthesise the findings from individual studies or reports; interpret the results; and offer a fair and balanced summary of the findings

taking into account any flaws in the evidence. Searching Google for all pertinent published and unpublished data, the author found 103 Science Direct publications by searching for titles that had "blended learning" in the Social Sciences Area. A vast database of scientific research can be accessed through subscription on the website Science Direct.

## **Findings**

### **Blended Learning Design**

About blended learning design, there are 29 research papers available. Seven research papers highlight the online aspect, particularly the used online technologies. 22 articles offer programs, models, and other blended learning ideas. Three of the seven research papers stressing the online component deal with using Moodle as the online tool for blended learning. Muscarà and Beercock used the wiki feature of the Moodle open source learning management system (LMS) as a project presentation and group database management system. Jia, et al. developed the personalized vocabulary review and assessment features for English education using the open source course management system Moodle. Hertsch concentrated on effectively enriching its course system with the Moodle testing system, which provides an alternative to classical testing. Four of them stress internet elements. Derntl and Motschnig-Pitrik suggested a multi-layered architecture based on these pedagogical ideas to generate Web-based support. Based on the web tool ControlWeb, Méndez and González presented a Fuzzy Logic based controller for a blended learning approach in an introductory control engineering course. Hubackova and colleagues developed online courses based on the demands of tutors and students, the knowledge of students, the long-term experience of teachers, and, of course, the favorable attitude of ICT students (and not only of them) to new technology. In an EFL blended-format course, Miyazoe and Anderson presented empirical study on the qualitative changes in writing proficiencies in reaction to using three online writing tools: blogs, wikis, and discussion forums.

Each of the 22 papers that offer blended learning programs or models has developed a unique program or model. Köse, for instance, outlined a blended learning approach that combines a face-to-face setting with an online learning process created with Web 2.0 technologies. Yeh and colleagues created a blended learning and knowledge management (KM) teacher preparation curriculum [7-10].

### **Blended Learning as a Strategy**

Twenty-one research papers employ blended learning as a technique; six of these papers are in the medical sciences, and two of them deal with radiology. Bleiker et al. started a small-scale research effort to provide blended learning materials for radiography students' patient care instruction. Mahnken et al. looked at whether using e-learning modules in an undergraduate radiology internship either on a self-determined (intrinsic motivation) or required (extrinsic motivation) basis affected the learning outcomes. One article is about nursing education. New didactical and technical e-learning resources were developed by Pfefferle et al. for nursing education use throughout Europe. One article deals with clinical medicine. Makhdoom, et al. evaluated the usefulness of blended learning in the clinical medical science of family medicine. Intelligent virtual microscopy is the subject of one article. To enhance the learning environment of each student, Schmidt et al. created and included a cutting-edge virtual microscope, MyMiCROscope, with a face-to-face method of teaching microscopic anatomy. The subject of one article is illness during pregnancy and childbirth.

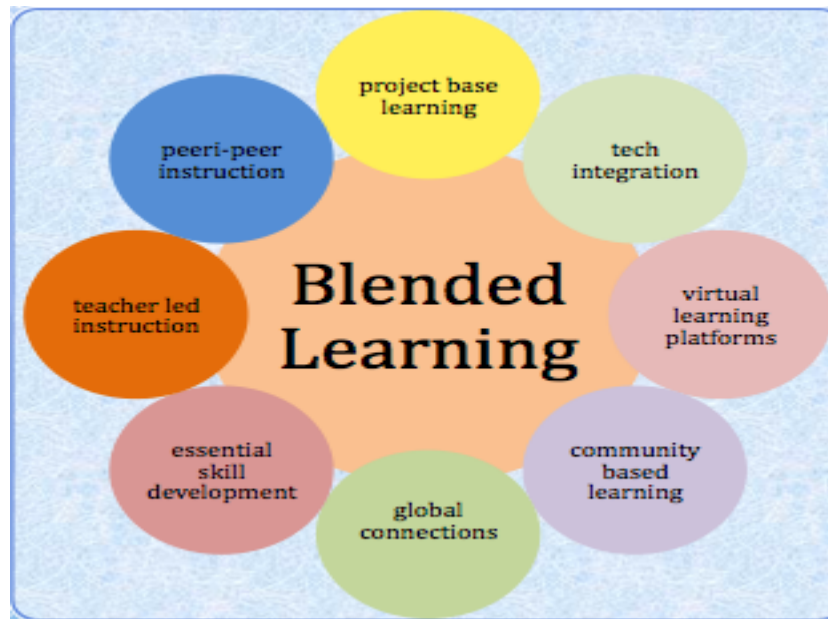


Fig 2. Blended Learning Strategies

For second year pre-registration midwifery students in England, Young and Randall described the many teaching and learning strategies that were combined to develop a module on ill-health during pregnancy and childbirth. Five articles devoted to language instruction and learning used the free source Moodle course management system to provide the customised vocabulary review and evaluation features for English instruction. To effectively enhance its course system, Hertsch concentrated on the Moodle testing system, which provides an alternative to traditional testing. Hubackova, et al. created online courses for professional English, area studies of English-speaking nations, professional German, a course for translators, written business English, and other languages to help students with their language study. Klimova and Semradova underlined the need of independent learning in the process of teaching foreign languages and enumerated the advantages of blended learning. Maulan and Ibrahim created a pilot blended learning project for English for Academic Purposes and looked at how the students felt about, engaged with, and performed in the blended learning environment. Two papers looked at blended learning in mathematics. Through a blended learning environment, Kashefi, et al. developed a methodology of teaching and learning to help students "mathematical thinking in the learning of two-variable functions." In order to help students understand multivariable calculus, Kashefi et al. also employed a blended learning environment based on mathematical reasoning and creative problem solving. Two papers looked at engineering blended learning. The learning environment for promoting students' thinking and original issue solving in engineering was discussed and suggested by Kashefi et al. A framework for blended learning (BL) application for engineering undergraduate curricula was presented by Sivakumar et al. The subject or multi-subjects of the other six articles are unclear [11-15].

#### Merits of Blended Learning

Thirteen research papers examine aspects of blended learning; eight of them deal with learner issues, and four of them address how students see mixed learning. According to Maulan and Ibrahim, pupils who participated in blended learning and those who did not did not differ significantly. At a south-west England university, Glogowska et al. created a novel blended learning-based CPD strategy for healthcare professionals. Owston and colleagues looked at how student opinions of blended learning courses related to their performance during the course. Taplin et al. examined the financial worth that students attach to having internet access to recorded lectures in a mixed learning environment. Firsthand accounts of a blended learning postgraduate degree at a nursing and midwifery school. According to Smyth et al., blended learning offers promise as a teaching method to advance nursing and midwifery practice as well as student learning. Evidence shows the way that playfulness affects students' attitudes and intentions to utilize technology varies depending on their gender. Article looked at how personal elements affect how satisfied students are with blended learning. This paper examined how enjoyment, learning style, and personality factors related to academic results in a blended learning environment. Four papers deal with institutional aspects. Graham and colleagues looked at six institutional blended learning adoption stories to identify the main concerns that should direct university administrators considering this project. Bottom-up controlled change methods were first presented by Carbonell et al. and have the benefit of allowing faculty members' creative abilities to be used in the design and implementation of blended learning initiatives. Porter and colleagues found similarities and differences in the institutional strategy, structure, and support approaches of American institutions to BL adoption. Porter et al. investigated whether the innovation adoption category of faculty members in higher education influences which measures support or hinder BL adoption. Just one paper discusses instructor aspects. In a blended-learning adult nursing program, Jokinen and Mikkonen detailed the experiences of teachers in organizing and carrying out instruction [16-19].



Fig 3. Physiological Factors influencing learning

## Evaluation

Twenty of the 38 research papers in our database that address blended learning evaluation looked at its effectiveness and came to the same conclusion. For example, blended learning increases exam outcomes, according to Deschacht and Goeman's study on the impact of blended learning on adult learners' academic success. Eight papers assessed the way that students saw blended learning. Good things came of most of them. Bentley et al., for example, found that most students were rather satisfied with the programme when they looked into their learning experiences and opinions. While Wakefield et al. discovered that students' opinions on blended learning differed. While some expressed satisfaction, others thought the subject matter or their preferred learning method did not fit well with e-learning. Three papers assessed certain tools in blended learning settings. Developing and validating an objective assessment tool, Akkoyunlu and Yılmaz-Soylu expanded the examination of learners' opinions on blended learning and its implementation process. Barnard, et al. showed that the OSLQ is a valid and reliable instrument and that it is a suitable self-regulation measure for mixed and online learning settings. With the use of fuzzy logic constructs, Dias and Diniz presented a novel model called FuzzyQoI that quantitatively calculates the QoI of users (students and professors) with the LMS Moodle in a b-learning context.

Three papers brought to light the concerns or issues that needed to be taken into account. Alebaikan and Troudi mentioned certain points that need to be taken into account before using online discussion in mixed courses. Hussain and Huey discussed the problems encountered when the student provides input and then suggested solutions. Ramakrisnan, et al. pointed out the issues with e-learning, which simply examine student interest in learning, examine relevant research models, and display the results of suitable learning strategies. Three papers compared in-person and blended learning. Smith investigated, over the course of a year, the effects of blended vs in-person tuition at an Auckland, New Zealand, K–12 school. Yigit and colleagues evaluated students' performance in computer engineering courses offered in both traditional and mixed formats. Barrios et al. provided early information on student evaluation, the usage of educational resources, and the academic outcomes achieved in the two enrolled groups. They also discussed the structure of the blended course in comparison to the traditional face-to face course. One article assessed three blended learning styles and concluded that one was the best.

### **Technology**

In our database there are 25 research papers whose methodology is clear. Of those, sixteen are case studies, eight of which used a single university as the case. At Ulm University, Schmidt and colleagues created and included the cutting-edge virtual microscope, MyMiCROscope, into a blended learning approach. Holley and Oliver created a model by cross-case analyzing the educational experiences of students at a university that was established after 1992. Taylor & Newton offered a case study of a regional university in Australia that looked at teaching and learning strategies and institutional procedures that would support equal access to learning for a diverse student body. With the development of blended learning at the University of Central Florida as a paradigm, Moskal et al. showed that blended learning can lead to constructive institutional change with the right planning and support. Wai and Seng looked into 120 business school students enrolled at a private university using a case study approach. Based on a survey of 360 students, interviews with three administrators and twelve teachers at Chulalongkorn University in Thailand, Koraneekij and Khlaisang created a model. Nazarenko presented a case

study research based on the experience of introducing a blended learning approach to a university lecture course for FLT methodology students at Moscow State University's Faculty of Foreign Languages and Area Studies. In a big private institution in South Korea, Park, et al. used a data-driven method to extract common activity features of 612 courses. For the remaining eight papers, Haron et al. documented how Malaysian academics were embracing blended learning. Ari and Taplamacioglu carried out a case study on adult blended e-learning on the web. Two case studies on institutional change and leadership linked to blended learning innovation were carried out by Garrison and Vaughan. Snodin carried out a case study of the various levels of autonomy attained by particular students. At a Madrid, Spain, music conservatoire, León and Castro created a project on career guidance. Based on the constructive alignment theoretical framework, Ali et al. produced a qualitative case study investigation. In their proposal for a case-based blended learning framework, Turk et al. combined textbooks, e-learning cases, and a simulated patient course in medical education. In order to investigate 16 students' experiences studying group composition in a blended learning environment, Ruokonen and Ruismäki carried out a qualitative case study. Five of the nine comparative study papers compare blended and face-to-face learning. Smith investigated, for a year, the effects of blended vs in-person tuition in an Auckland, New Zealand, K–12 school. Group comparisons were made using graded work, a poll of student opinions, and frequent teacher reflections. Ginns and Ellis investigated the connections between face-to-face and online instruction and learning and demonstrated that students' views of their learning experience are strongly correlated with the methods they use to learn and the quality of their learning that results. Sung et al. proposed that improving medicine knowledge might be achieved by combining e-learning with in-person education in the classroom. The effects of blended and traditional education on student performance in a Physical Education in Early Childhood course were examined by Vernadakis et al. Šafranjanj compared the traditional method of teaching English for Mechanical Engineering to students at the University of Novi Sad's Faculty of Technical Sciences. Two of them are comparisons of online and blended learning. Barnard et al. found that the OSLQ is a suitable self-regulation measure in blended and online learning environments after gathering data from two student populations. The formation of a community of inquiry in online and blended learning environments was the subject of a mixed method research project that Akyol, et al. described. In addition, Gupta, S., Packham et al., and Khan were compared by Ramakrishnan et al. to pinpoint the issues with e-learning. To evaluate the success of blended learning, Makhdoom et al. carried out a comparative cross-sectional university-based study. Analyze

Our database contains 10 review articles. Reviewing sample studies on blended learning in universities, Bliuc et al. took into account the research's focus, methodology, and link with the other. Arbaugh and colleagues looked at and evaluated the status of blended and online learning research in the business fields. King reviewed what was discovered to be excellent practices for developing a blended nursing pharmacology course, including both successful and unsuccessful activities. In reviewing three blended learning models—Gupta, S., Packham et al., and Khan—Ramachrinan et al. noted the issues with e-learning. In his overview of eight papers on blended learning policy and implementation, Owston made recommendations for future study in these fields. Drysdale and colleagues examined 205 master's theses and doctoral dissertations on blended learning. Halverson et al. examined what

the talks on blended learning are truly about and identified the most often mentioned books, edited book chapters, and papers on blended learning. They also identified the journals in which these highly cited pieces appeared. Kaur provided an overview of blended learning from several angles. Through considering the past, present, and future, Güzer and Caner examined and evaluated the research on blended learning. Sophonhiranrak and colleagues looked at elements influencing original problem solving in a blended learning setting using the chosen articles [19-20].

### **Discussion, Conclusion and Limitation**

The percentages show that articles on blended learning design (29 articles) and evaluation (38 articles) are the most common topics. It indicates that most papers focused on determining the efficacy of blended learning and creating blended learning since the field of blended learning research is still in its infancy. The fact that our database has the fewest review articles indicates the importance and need of our work. There is no widely accepted model for blended learning design, which may be the reason why scholars are interested in this field of study. Most of the publications attempt to create a model that is appropriate for blended learning. Some publications stress the online component, and moodle is the most popular online tool utilized by researchers at the moment. The fact that just four disciplines are covered in the papers that use blended learning as an approach indicates that it should be applied to more subjects in the future. The majority of the studies that address the elements affecting blended learning are on student factors; therefore, other elements such as teacher, administrator, policy, and cultural aspects need to be investigated in the future. The bulk of the articles evaluating blended learning concluded that it works. To enhance blended learning in the future, additional research should be done on the difficulties and problems that are covered in the three articles. Comparative study and case study are the most often utilized research methodologies in blended learning studies, and we concur that they may be the best ones available to date. There are just 10 review articles in our database; some of them just cover three or eight articles, which is insufficient for a blended learning review. This paper is important since blended learning review papers are still needed. This paper can only be used as a reference; more reviews including more research articles and from other viewpoints are still required in the future. One of the possible limitations is that it is impossible to cover all the research articles available for blended learning.

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