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Developing E-Learning Materials for a Blended Learning Environment: A Case Study

Firda Lutfiani[1*], Halimatus Sakdiya[2], Aisah Maharani Adinda Safitri[3]

[1,2,3]Universitas 17 Agustus 1945 Banyuwangi, Indonesia

Abstract	Using a case study approach, this research investigates how e-learning can be a strategic solution to increase the flexibility and effectiveness of learning in the digital era, especially in blended learning environments, which combine online and face-to-face learning methods. The purpose of this research is to create flexible and interactive e-learning materials that can be used for blended learning. This research shows that well-designed or created e-learning materials can increase student participation, material comprehension, and learning independence. In addition, this research also found the main challenges in applying e-learning to blended learning, such as technology readiness, teacher support, and student participation. The results of this research are expected to provide practical guidance for educators and students.
Keywords	*E-learning, Blended Learning, Strategy*

(*)Corresponding Author
Firda Lutfiani
Universitas 17 Agustus 1945 Banyuwangi, Indonesia; firda.lutfianii@gmail.com

1. INTRODUCTION

E-learning continues to evolve along with advances in information and communication technology. Especially for distance education, e-learning was originally intended to increase the accessibility and flexibility of learning. (Agustina et al., 2016) explain that although e-learning offers many opportunities for education, its implementation still faces several problems, such as infrastructure limitations, user readiness, and institutional support. In addition, the success of e-learning also depends on several things, such as content quality, user engagement, and sufficient technological support.

Instead, the blended learning approach, which combines face-to-face learning and e-learning, is gaining popularity to produce a more thorough learning experience. In the research he conducted, blended learning-based informatics E-learning was created by (Rachim, 2020) using the Revo 4.0 model. He emphasized how important it is to incorporate technology into the educational process. To increase student participation and understanding, this approach allows the incorporation of digital learning and live interaction. By considering the various challenges and needs in e-learning

development, this study aims to further explore effective strategies to implement blended learning in an innovative way.

To implement blended learning in higher education institutions, it is important to consider learning theories to balance students' learning abilities in the digital era (Rohman, 2020) study emphasizes that an in-depth understanding of learning theory is essential in hybrid learning design. This is especially true for improving students' ability to adapt and use technology in the learning process. With the accelerating development of technology, it is important to optimize the teaching-learning process and produce competent graduates in the digital era, educational institutions must develop appropriate e-learning and blended learning approaches.

If e-learning is used in the wrong way and designed without taking into account the learning subject, the student, the use of e-learning will not be very helpful for the learning process. To meet the demands and global competition, e-learning development is necessary, with the selection and application of appropriate models, methods, and approaches to improve the success of learner-centered learning. This is what attracts researchers to conduct research on how to create an e-learning informatics course that can be used by educational institutions.

In this paper, the author will discuss the problems faced by various parties when building e-learning, including teachers, students, and technology developers, although there are many advantages of using e-learning in the learning process and technological advances that support it as a learning medium.

2. METHODS

This research uses a qualitative approach to understand the experiences and views of teachers and students about creating e-learning materials. This approach allows researchers to thoroughly study how e-learning materials can be combined with blended learning. This case study will focus on one or more schools that implement blended learning along with e-learning materials.

3. FINDINGS AND DISCUSSION

a. History and Success Factors in E-learning Development

"Online learning" and 'virtual learning' are terms that have been in use since 1990, when they were used for the first time in a CBT system seminar. However, the basic idea of "e-learning" dates back to the 19th century. Today's technological advances offer new ways to teach. Both distance and in-person learning now require technology in their teaching. Distance learning, or e-learning, is a new educational approach that gives students access to electronic media to improve their knowledge, skills and performance. To know the history of e-learning. The following is a summary and overview of the development of e-learning over time:

1) The beginning (1960s - 1970s)

Programmed Learning Programs: The idea of programmed learning is the basis of e-learning, which involves using computers to deliver lessons. PLATO

(Programmed Logic for Automatic Teaching Operations), developed at the University of Illinois, is one early example. Use of Computers: Computers began to be used in education in the late 1970s, but only in a few schools (Cope & Kalantzis, 2023).

2) Multimedia Development (1980s)

Multimedia Introduction: With the advancement of computer technology, learning materials began to use multimedia, including sound, text, and images. CD-ROM: The use of CD-ROM as a storage medium also allows more people to disseminate learning materials.

3) Internet and Distance Learning (1990s)

The rise of the Internet: E-learning began to develop rapidly with the development of the internet, and in 1995, various online learning platforms began to appear. Web-Based Training: The concept of web-based training was introduced, allowing students to access learning materials from anywhere.

4) Learning Management System (LMS) (2000s)

LMS : Learning management systems (LMS) such as Moodle and Blackboard are gaining popularity, which enable more effective management of online courses. E-learning as an Industry: With many content providers and platforms, e-learning started to develop as an industry.

5) Mobile and Social Technology Developments (2010s)

Mobile Learning (m-Learning): Mobile learning is becoming a new trend as smartphone usage increases, allowing students to access learning materials anywhere. Social learning: Social Learning, Social platforms are starting to be used to support collaborative learning, where students can share experiences and knowledge with each other.

6) Recent Trends (2020s)

COVID-19 pandemic: The pandemic accelerated the adoption of online education worldwide. Many educational institutions are shifting to online learning. Adaptive Learning and Artificial Intelligence: More personalized and adaptive learning has been created through the use of new technologies such as artificial intelligence.

E-learning has evolved from the use of simple computers for programmed instruction to a complex industry with a variety of technologies and methods. This development continues to drive innovation in the field of learning and teaching.

There are many factors that have been discussed by researchers during the e-learning development process. The following are some of the factors that are considered important for the successful utilization of e-learning:

1. The school has used e-learning extensively. Here are three succes factors that can help the use of e-learning:

    1) Teachers' characters, their views on current technology, and their teaching methods

    2) Student character, ability to use computers, student-teacher interactive collaboration, content, and design used in online learning

3) One important component of e-learning success is technology, i.e. existing infrastructure and ease of access to e-learning content.

2. Although e-learning is an alternative to conventional education, there are several factors that affect the level of user satisfaction with e-learning, namely:

   1) Learner Dimension. It is expected that students become more interactive and less anxious when using online learning.

   2) Teacher Dimension. It is expected that teachers will be very interested in using e-learning as a teaching method.

   3) The dimension of learning materials, where the diversity and creativity of teachers will make e-learning more interesting, will encourage students to learn more.

   4) The technology dimension, where the level of student satisfaction will be affected by the ease of use of the technology.

   5) How e-learning works will be influenced by many factors, including the education service provider institution and the environment that supports students.

3. In some ways, e-learning can be said to be effective and efficient when supported by several factors including the quality of teachers and students, the quality of information technology, the support of educational institutions, student interaction, and good learning materials.

4. Success factors that can influence the success of e-learning implementation consist of computing, student content, student collaboration, technology, and infrastructure. Student collaboration with educators is the most significant factor in determining the success of e-learning (Agustina et al., 2016)).

There are several challenges that both teachers and students must face. In order to use e-learning successfully, educational institutions have to face various hurdles. The following are some of the issues that can be found in different literature research :

1. Schools should address key challenges, such as knowledge of the benefits of e-learning, conflicts between educators and students when using it, and technical issues. One of the important issues in e-learning is the design issues that pose a challenge in the system. It is possible to prioritize the use of social networks in e-learning to keep participants using and interacting with the system.

2. Another challenge is how students can let go of their strong dependence on the learning module provided by the teacher. Teachers focus more on teaching students to be more independent in finding information by themselves.

3. In addition, as resources are still lacking in some locations, regional infrastructure such as electricity and telephone lines face challenges. To upgrade laboratories to include technology-based learning technologies, substantial funding is required. This is a particular problem for internet-based education.

4. Five major issues arise during the e-learning development process. They include the following: ease of access to learning activities, flexibility, teacher and student

confidence in the learning process, student and teacher attitudes towards e-learning, and student satisfaction levels.

5. The three challenges that must be faced when implementing e-learning include human resources, facilities, and supporting infrastructure. This learning process will be successful if the three challenges support each other.

According to some of the literature above, one of the issues that must be addressed when using e-learning as a learning tool is how ready educational institutions are to use it. In addition, to attract students to stay excited in the teaching and learning process, teachers should always be creative in choosing lesson themes. In addition, there is the issue of how the government and educational institutions can help students with e-learning because e-learning requires a good internet connection, and many places in some areas of Indonesia currently have poor internet connections.

b.   Implementation of Blended Learning

In the current industrial revolution 4.0, advances in digital technology have changed many things and affected human life, including education. Up to the current digital era, the learning process continues from time to time. The world of education, especially in Indonesia, is significantly affected by the digital era of this century. The implications of globalization greatly affect the way teachers teach their students.

At first, the term blended learning was also referred to as a hybrid concept, which combines face-to-face, online and offline learning. However, the term eventually changed to blended learning. Blended means mixture or combination, and learning means learning. Graham also states that blended learning is a combination or blend of different types of learning. It combines traditional learning methods commonly used by teachers with face-to-face or in-person learning. Students can also gain additional information through online and offline learning that prioritizes the use of technology. Information and communication technology has changed the world of education, especially learning, into a modern learning system. After using traditional or face-to-face concepts, experts developed learning developments. E-learning ultimately comes from computer media and its internet network.

E-learning, also referred to as IT-based learning (Information Technology), allows students to choose the courses they want. This makes learning engaging, fun, and not boring. They also have the ability to learn anytime and anywhere, without being limited by space or time. Blended learning, which is growing in colleges and training industries in North America, the UK, and Australia, is now very popular. In addition, many educational institutions in Indonesia have adopted this blended learning approach. Blended learning involves combining different educational resources. Examples include software that enables real-time learning, online web-based learning programs, and other applications that integrate system management information into the learning environment (Rohman, 2020)

(Wicaksono, 2018) by utilizing case studies conducted at STMIK Indonesia Mandiri and STIE-STAN Indonesia Mandiri Bandung. Data was collected through

observation, interviews, and documentation. In addition, this study measured the effectiveness of blended learning by tracking learning outcomes and student satisfaction from this model. Learning Management System (LMS) is a web-based software used to plan, implement and evaluate the learning process. The LMS allows educational institutions to present learning materials online, facilitate interaction between teachers and students, and provide real-time feedback. This LMS allows students to access content, assignments and exam results online. Some of the challenges encountered include the inability of some students to adjust to technology and limited technological infrastructure in some places.

The results and impact of the research show that blended learning improves students' understanding of the material, although there are difficulties to implement it. Students have more freedom and can study whenever they want, which increases their desire to learn. The author concludes that blended learning is an effective method if implemented with the support of adequate facilities and training. Lecturers and students need more intensive training to improve their technological capabilities in utilizing this technology.

The implementation of blended learning, also known as blended learning, is an educational method that combines face-to-face learning with online learning to combine the advantages of both methods, thus providing students with a richer, more flexible and effective learning experience. Mixed learning is becoming increasingly popular in various educational institutions due to the development of information and communication technology in modern education.

A. Concept of Blended Learning

Blended learning is a combination of traditional classroom learning with online learning. In this model, students not only learn from teachers directly, but also use digital platforms that offer assignments, learning materials, and interaction with teachers and other students. The idea centers on developing a more interactive and personalized learning experience where students can interact with teachers and learn in a more personalized way.

B. Key Components of Blended Learning

Face-to-face learning is the traditional component where teachers and students meet face-to-face in the classroom. In this session, the teacher can provide explanations, encourage discussion, and interact directly with students.

a) Online Learning ,this section covers the use of digital platforms to deliver lessons, such as videos, interactive modules, quizzes and discussion forums. Students can access lessons anytime and anywhere, which gives them flexibility in the learning process.

b) Technology Integration: In blended learning, information and communication technology (ICT) is essential. This includes learning management systems (LMS), learning apps, and online collaboration tools that help students and teachers interact with each other.

c) Continuous Assessment: In the blended learning model, assessment is done through final exams and quizzes, online assignments, and participation in discussions. This allows educators to have a better understanding of their students' progress.

d) Flexibility and Personalization: Blended learning gives students the opportunity to learn in a way that best suits their learning style. They can also access additional materials as per their needs.

C. Steps for Blended Learning Implementation

a) Curriculum Planning: Planning the curriculum to combine face-to-face and online learning is the first step in implementing blended learning. Educators need to determine what topics will be delivered in person and what will be delivered online.

b) Platform Choice: It is crucial to choose the right LMS platform to support online learning. The platform should be easy to use, have the necessary features, and be accessible to all students.

c) Content Development: Educators should create high-quality learning content to be presented online. This should include videos, interactive modules and relevant assignments.

d) Teacher and Student Training: It is imperative that teachers and students are trained to use the technology and online learning platform for successful implementation.

e) Implementation of Learning: Once all the preparations are complete, the teacher can start the blended learning. Periodically providing feedback and tracking student progress is essential.

f) Evaluation and Adjustment: After implementation, educators should assess how effective blended learning is. Students will have a better learning experience in the future if they can collect their feedback and make the necessary changes.

D. Challenges in Blended Learning Implementation

1. Technology Limitations: Some students may not have sufficient access to devices and internet connection, which may hinder them from participating in online learning.

2. Resistance to Change: Some teachers and students may be used to traditional learning methods and unwilling to adapt to new methods. This can be a barrier to implementing blended learning.

3. Content Quality: Online learning materials should be relevant and of high quality. Poor content can reduce the effectiveness of learning.

4. Training and Support: Students and educators should get adequate training to use online learning technologies and platforms effectively; without proper support, they may struggle to utilize all the benefits.

5. Time Management: Students must have the ability to manage their time for learning between face-to-face and online learning. Without the ability to manage their time well, students may have difficulty keeping up with the learning.

Blended learning, also known as blended learning, is an important step in meeting the challenges of education in the digital age. By combining the advantages of face-to-face and online learning, blended learning offers better flexibility, engagement and personalization for students. While there are challenges to be faced, with careful planning, adequate training, and the right support, blended learning can be a viable solution to problems. This approach is not only important in a changing world, but also necessary to prepare students for the problems of the future.

c. E-learning Development Strategy

Electronic learning, also known as e-learning, first emerged in the 1970s. Terms such as online learning, internet-enabled learning, virtual learning and web-based learning are some of the terms used to describe electronic learning. One of the ways internet technology aids learning is e-learning. E-learning allows teachers to post lessons, give assignments and quizzes for evaluation, and communicate and track students through the internet. Therefore, learning can be done anywhere and anytime(Suartama, 2015)

The education system in schools and universities will return to the normal learning model when entering the "New Normal" era. Therefore, a system that can integrate all aspects of learning, from in-person, offline, and online learning, while still following the prevailing protocols in Indonesia. Indirectly, higher education institutions must consider the policies that apply in the "New Normal" era. In addition, the curriculum, learning system, school infrastructure, and teacher competencies must be considered. The education process will be different from the normal era before the pandemic, so the education world uses a blended learning model for the pandemic time. Not all educational institutions require a face-to-face learning model. However, teachers can use online and blended learning models, which is a combination of online and face-to-face learning.

One of the ways in which the use of the internet can enhance the role of students in education is online courses, also known as online lectures. Online learning models have emerged to change conventional learning methods, which will indirectly impact teacher performance. On the other hand, online learning emerges as one of the educational options that does not require students to be present in class and will help students learn independently and encourage interaction between students and their educators. (Muhammad Ansarullah S. Tabbu et al., 2023)

As shown by the wide use of e-learning in educational institutions such as schools, courses, and universities, e-learning is currently becoming very popular around the world. E-learning is a type of learning system that allows students to learn through the internet, intranet, or other computer network media. E-learning is a learning process that uses information and communication technology (ICT) as a tool that can be accessed anywhere when needed, overcoming the limitations of time and space. E-learning offers a new alternative to solve most educational problems. It has purposes

that can be customized according to needs. For example, they can be used as an adjunct, complement, or substitute for existing subject matter in the classroom.

The following are some examples of how the principles of behaviorism are used in online education:

1) Learning objectives must be displayed.
2) Learning should be evaluated.
3) Materials should be sequenced from simplest to most complex.
4) Feedback needs to be given.

The following are some examples of how the concept of cognitivism is used in online education:

a. The screen should have important information.
b. To attract attention, important information should be displayed.
c. To avoid excessive memory load, information should be displayed gradually.
d. The subject matter should be presented in a way that suits the student's learning style.

The following are some examples of how the principles of constructivism are used in online education:

A. E-learning should be interactive.
B. Exercises and examples should be significant.
C. Learners have the ability to control the learning process.

Developing feasible e-learning is expected to be achieved by developing e-learning based on design principles and following systematic steps. By utilizing feasible e-learning in learning activities, it is expected to produce high quality and effective learning that helps students solve their learning problems in the most effective way. (Suartama, 2015)

4. CONCLUSION

The development of online learning has grown rapidly since the 19th century, with the culmination of innovations in this digital era enabling distance learning through Internet technology. Online learning offers enormous flexibility and accessibility, allowing students to learn anytime and anywhere without any limitations. However, the implementation of online learning faces a number of challenges, including the readiness of educational institutions, the technical capacity of teachers and students, as well as inadequate infrastructure in some areas and the need to overcome students' dependence on teacher advice. The success of online learning actually depends on many different factors, such as teachers' technological skills, engaging content design, adequate technological support, and the level of interaction between students and teachers. Blended learning is also a solution that integrates face-to-face and online learning, thus providing more flexibility in the teaching and learning process and increasing students' interest in learning.

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