

Literature Study on The Application of Blended Learning In Biology Subjects In Schools

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ABSTRACT

This study aims to reveal the effectiveness of Blended Learning as an online and mixed learning strategy by analyzing various research studies related to Blended Learning obtained from the Google Scholar database. The method used in this study is a method with a library approach or what is known as a literature study from research articles for 2020-2022. Article selection is carried out through the process of identification, screening, and eligibility. So that 10 articles are relevant to the objectives and problems of the literature study. Based on the literature study that has been carried out, the results show that the use of Blended Learning by utilizing several digital technology-based applications as learning support can be said to be effective for increasing literacy skills, critical skills, problem-solving abilities, and cognitive learning outcomes of students.

KEYWORDS

Blended Learning,
Study,
Literature,
Biology,

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1. Introduction

Learning in the 21st century cannot be separated from the influence of the 4.0 education era, the 4.0 industrial revolution, and the 5.0 social revolution. Moreover, this influence was accelerated by the COVID-19 pandemic. All lines of education, from early childhood education to universities, are advised to use distance learning technology. This is in line with what UNESCO suggested that for education in the era of the COVID-19 pandemic to continue to run smoothly, it is necessary to use various platforms and applications that can facilitate distance learning on a large scale (UNESCO, 2020). Even though the pandemic has passed, the trend of using distance learning platforms and applications will continue.

The government in implementing the Independent Curriculum also requires educators to integrate technology into learning, one of which is biology. The concept of education in the Free Learning Curriculum integrates literacy skills, knowledge skills, psychomotor skills, and attitudes, as well as mastery of technology. Through this concept, students are given the freedom to think to maximize the knowledge that must be taken (Ariga, 2022).

One of the technologies used in distance learning is mobile technology. This is under what was conveyed by Firman (2020), that the use of mobile technology has made a major contribution to the world of education, including the achievement of distance learning. Mobile technology provides flexibility for its use where in the implementation of learning, all learning resources on the internet can be accessed easily anytime and anywhere. The use of mobile technology is also very flexible because it shortens the process of instruction between educators and students. Therefore, when learning has returned to face-to-face, many educators want to carry out learning using this mobile technology.

Face-to-face learning based on mobile technology such as smartphones and tablets is a learning strategy known as blended learning. Blended learning is considered the most effective and popular learning strategy adopted by educational institutions due to its perceived effectiveness in providing flexible, timely, and continuous learning (Rasheed,

2020). Through blended learning, it is hoped that educators can provide quality service to students following the times.

Research on blended learning has been carried out quite a lot by researchers and academics in Indonesia. Various articles and research journals seek to explore the application or use of blended learning so that it can provide a lot of information related to blended learning. Based on this, we are interested in uncovering the effectiveness of blended learning as an online learning strategy and mix by analyzing various research studies related to blended learning obtained from the Google Scholar database.

2. Method

The method used in this study is a method with a library research approach or what is known as a literature study. Literature study or literature study is a series of activities starting from collecting library data, reading and recording and processing research materials (Zed, 2004). This literature study was obtained from research articles for 2020-2022 using Google Scholar. Writing this article is aimed at the application of online and mixed learning of biology subjects at schools. Therefore, the search for articles focused on the keywords "Implementation of Online Learning and Mixing in Biology Subjects in Schools" found 442 articles. Article selection is carried out through the process of identification, screening, and eligibility. So that 10 articles were selected that were relevant to the objectives and problems of the literature study.

In literature study research or literature study there are four main characteristics: First, the writer deals directly with text or numerical data, not with direct knowledge of the field. Second, the literature data is "ready to use", meaning the author does not go into the field because he is dealing directly with the data sources in the article. Third, the literature data is a secondary source, namely, the author obtains data from secondhand and not original data from first data in the field. Fourth, namely, the condition of the literature data is not limited by space and time (Zed, 2004). Based on this, the authors collect research data by reviewing and exploring several national and international journals, books, and data sources that are considered relevant to the research or study to be further analyzed and presented in the form of results and discussion so that conclusions can be drawn from the research conducted. have been done.

3. Results and Discussion

Based on the results of 442 articles after identification, screening, and eligibility then 10 articles are relevant to the research objectives. This article focuses on the application of online learning and a mix of biology subjects in schools. Analysis 10 the articles are shown in table 1.

Table 1. Data Analysis Results of 10 Articles

No	Author and Title	Methods and Instruments	Results
1	Reza, Olviana (2022). "Pengaruh Pembelajaran Blended Learning Berbasis SETS Berbantu Zoom Pada Mata Pelajaran Biologi terhadap Literasi Sains Peserta Didik MAN 1 Lampung Tengah".	This research is a type of research quantitatively using the Quaisy Experiment method, subjects consists of 30 students divided into two class groups namely experimental class and class control. The design used in this study Posttest Control Group Design. Research instrument using a test in the form of literacy questions science.	The use of models blended learning zoom-assisted SETS-based can improve the literacy of student science. Based on research that has been done at MAN 1 Central Lampung there is an influence significant on the models blended learning zoom-assisted SETS-based in biology subjects on the scientific literacy of the participants students of MAN I Central Lampung.

No	Author and Title	Methods and Instruments	Results
2	Maulina, D., dkk. (2022). "Pengaruh Pembelajaran Problem Based Learning Berbasis Bauran terhadap Keterampilan Berpikir Kritis Siswa Kelas X SMAN 1 Kuripan".	This research is a research experiment with approaches quantitative. The experimental method used in this research is Quasi Experimental (experiments pseudo). The research design used is a pretest-posttest control group design. Which instrument used to measure deep critical thinking skills this study is a test instrument in multiple choice form choice) with a total of 20 questions.	Based on Tests of Between Subjects Effects obtained critical thinking skills Value <i>Fhitung</i> = 0.41 with a level significance 0.002 ($p < 0.05$), which shows that there is the effect of problem learning mix-based based learning on thinking skills critical thinking and literacy of class X students SMAN 1 Kuripan academic year 2022/2023.
3	Jannah, M., & Nurdiananti, N. (2021). "Pengaruh Pembelajaran Online Berbantuan Google Classroom terhadap Hasil Belajar Peserta Didik pada Materi Sistem Peredaran Darah pada Manusia Kelas XI SMA Buq'atun Mubarakah Makassar".	This research uses the method of experimental research with a quantitative approach. Design The research used is the OneGroup pretest-posttest design. The population in this study is class XI Buq'atun Mubarakah High School Makassar which consists of two classes. The sample of this research is class XI MIA 2 selected purposively sampling. Research variables consist of the independent variable namely learning Online while the dependent variable ie student cognitive learning outcomes. Data collection is done through the provision of pretest instruments and posttests.	The research results show the average value of the student's pretest is 50.40 with a standard deviation of 12,180 and the average value post-test is with 86.85 standard deviations of 8190. Test results Independent t-test obtained a significance value $p = 0.000 < \alpha = 0.05$. This means that H_0 rejected and H_1 accepted, with Thus the Learning model Online effect on participants' cognitive learning outcomes in class XI SMA Buq'atun Mubarakah Makassar.
4	Wahyuni, A.S. (2022). "Analisis Respon Siswa Kelas XII SMA Negeri 9 Makassar terhadap Penerapan Blended Learning dalam Pembelajaran Tatap Muka Terbatas pada Materi Pewarisan Sifat pada Makhluk Hidup".	This research uses types of descriptive qualitative research by observation method, open questionnaire, and interview. This method is used for equalizing perceptions of researchers and research objects. The instruments used are observation sheets and questionnaires accessed via the google form application, as well as the interview sheet not structured.	Application of Blended Learning in face-to-face learning face is limited to students in class XII SMAN 9 Makassar on the matter of Inheritance of Properties Sentient Beings get a good response from students. However, regarding the mechanism of face-to-face learning limited enforced research is still needed because there are related student responses to this research.
5	Triyanti, M. (2022). "Pengaruh Problem Based Learning Berbasis Blended Learning terhadap Kemampuan Berpikir Kritis Siswa di SMA Negeri 4 Rejang Lebong".	This research uses quasi-experiment and non-equivalent design (Pretest and Posttest) Control-Group Design. Method of collecting data using a thinking ability test critical students in the form of instrument questions multiple choice and description. Instrument critical thinking skills are created refers to indicators of critical thinking according to Fisher. Research data analyzed by AnkoVA test.	The research results show the presence of PBL-based influence Blended Learning against students' critical thinking skills and effective to improve several indicators of ability critical thinking students on the eye 4th State Senior High School Biology lesson Rejang Lebong.

No	Author and Title	Methods and Instruments	Results
6	Usemahu, A. (2022). "Penerapan Blended Learning dengan Pendekatan STEM untuk Meningkatkan Literasi Sains dan Kemampuan Kognitif Siswa SMA".	This study used a pre-experiment with a one-group design pretest-posttest. Which instrument used is a matter of understanding concepts and literacy questions with shapes multiple choice test. In this research Two types of observation, sheets were used namely, the implementation observation sheet blended learning method with a STEM approach and student activity. research subjects who involved were students of class XII MIA-4 at SMAN 11 Ambon as many as 36 students in the 2021-2022 school year.	Based on the results and discussion above, then you can conclude that there is an effect of applying blended approach learning STEM towards improvement scientific literacy and ability cognitive skills of class XII high school students Negeri 11 Ambon in the new era normal. As for average students' scientific literacy abilities from the application of blended learning with a STEM, the approach has a percentage of 86.53% with very category high, while ability cognitive students obtained an average N-gain value of 67.48% showing that the use of models blended learning with a STEM approach effective enough for improving the ability of scientific literacy and cognitive outcomes in class XII high school students Negeri 11 Ambon. Besides that, the STEM-based blended learning model has a good response to student learning activities.
7	Rezeki, S. (2022). "Pengaruh E-LKPD Berbasis Discovery Learning terhadap Hasil Belajar Peserta Didik pada Konsep Animalia Kelas X di SMA Negeri 2 Gowa".	This research uses a quantitative research approach with this type of research used is a quasi-experiment. The research design used is the pretest-posttest control group design. The population in this research are all students of class X IPA SMA Negeri 2 Gowa, which consists of 9 classes with a number of participants students 323. The sample used research using techniques random sampling is a technique randomly selected with no pay attention to the level. The sample selected is class X IPA 1 as the experimental class and X IPA 2 as the control class, the number of students used as a sample of 40 participants studied at SMA Negeri 2 Gowa teaching 2021/2022.	The research results show the influence of the implementation of ELKPD-based Discovery Learning on material Animalia on learning outcomes of biology students in class X IPA 1 at SMA Negeri 2 Gowa. This can be seen from the significance value obtained on the results of hypothesis data testing who use Independent Sample T-Test, which value its significance shows 0.001 (Sig>0.05). So that it can be concluded that H0 which has no effect is rejected and H1 which has influence is accepted.
8	Khairunnisa, N & Yatri, I. (2022). "Pengaruh Model Pembelajaran Blended Learning pada Masa Pandemi Covid-19 Terhadap Kemampuan Membaca Pemahaman Peserta Didik di Kelas IV Sekolah Dasar".	This research is included in a quantitative approach using quasi-research methods experimentally. A research design used is the posttest-only control design. Instruments were used in the form of a test consisting of 10 questions multiple choice and 5 questions in the form essay that has been tested for validity and reliability. The test is administered to each class that consists of 30 learners with the aim to see how far ability reading students have.	Based on data analysis the result is that there are differences in scientific attitudes significant between the posttest experimental class with class control. That way it can be concluded that there is the influence of learning models blended learning against participants' reading ability studied at SDN Lenteng Agung 07.

No	Author and Title	Methods and Instruments	Results
9	Nugroho, P.S & Septiani, D. (2022). "Penggunaan Blended Learning Mata Pelajaran IPA Terhadap Peningkatan Hasil Belajar Siswa Pada Materi Kemagnetan".	This research includes the type of research class action by adopting the Kurt Lewin model consisting of four components, namely planning, action, observation, and reflection. The sample in this research is students in class IX 2 SMP N 1 Bungaraya as many as 20 students. Inside the instrument, This study consists of instruments learning and instruments study. Learning instruments includes RPP and LKS, meanwhile, research instrument consists of cognitive test instruments and student observation sheet instruments.	Based on the data in Table 1 about the average learning outcomes IPA cycle I and Table 2 about the average learning outcomes IPA cycle II can be concluded that there was an increase in the average value of students from 56.80 to 85.60, it shows that the Blended Learning method applied to make an impact significant effect on the results learn students. Meanwhile, graph 3 gives an overview of us that has happened increase in the percentage of completeness owned by class IX.2 of Cycle I and Cycle II of 70% which was 25% of participants completed education to 95%. The percentage increased significantly this is what convinced me that that method implemented really effectively. Based on the description above can be concluded that the Blended Learning method can improve learning outcomes for students significantly.
10	Martia, A.D. (2022). "Pengaruh Model Pembelajaran Blended Learning Menggunakan Google Classroom Terhadap Kemampuan Pemecahan Masalah Pada Materi Pencemaran Lingkungan Kelas VII di SMPN 02 Blambangan Umpu".	The research method used namely using a research design Pre-experimental one of the Pre experimental used namely One Group Pretest Posttest Design. This research was conducted in class VII SMPN 02 Blambangan Umpu using the capture technique sample simple random sampling with a sample of two classes consisting of class VII A control class applying learning models conventional and class VII B applying learning models Blended Learning. Which instrument is used in the form of test questions given to students in classes VII A and VII B.	Based on the results of data analysis obtained by the calculation results two-sample t-test that does not correlated and a significant level of 5% obtained value so rejected and accepted. Conclusions that can be drawn from these calculations is there is a model effect Blended Learning Learning using Google Classroom on the ability to participate in problem-solving education.

Based on table 1. there is a research article from Olviana Reza (2022), getting results that the use of SETS-based blended learning models with the help of zoom can improve students' scientific literacy. Based on research that has been conducted at MAN 1 Central Lampung has a significant influence on the blended learning model SETS-based zoom assisted in biology subjects on the scientific literacy of MAN I students Central Lampung. Maulana, et al (2022), found that based on the Tests of Between Subjects Effects, the ability to think critically was obtained. The value of *Fhitung* = 0.41 with a significance level of 0.002 ($p < 0.05$), which indicates that there is an influence of problem-based learning based on the mix of critical thinking skills and literacy of class X SMAN 1 Kuripan academic year 2022/2023. Research by Jannah & Nurdianti (2021), shows the results that the average pretest score of students is 50.40 with a standard deviation of 12.180 and the average posttest score is 86.85 with a standard deviation of 8190. Independent t-test test results obtained a significance value of $p = 0.000 < \alpha = 0.05$. This means that H_0 is rejected and H_1 is accepted, thus the Online Learning model affects the cognitive learning outcomes of Class XI SMA Buq'atun Mubarakah Macassar. Research by Wahyuni (2022), shows that the application of Blended Learning in face-to-face learning is limited to class XII students of SMAN 9 Makassar on the material Inheritance of the Nature of Living Things gets a good response from students. However, regarding the limited face-to-face learning mechanism that is enforced, further studies are needed further because of the various student responses related to this in this study.

Triyanti (2022) states that PBL based on Blended Learning has an effect on students' critical thinking skills and is effective in improving several indicators of students' critical thinking skills in Biology subject at SMA Negeri 4 Rejang Lebong. Usemahu (2022), gets the result that based on the results and discussion above, it can be concluded that there was an effect of the application of blended learning with the STEM approach to increasing scientific literacy and cognitive abilities of class XII students at SMA Negeri 11 Ambon in the future new normal. The average scientific literacy ability of students from the application of blended learning with the STEM approach has a percentage of 86.53% with a very high category, meanwhile, students' cognitive abilities obtained an average N-gain value of 67.48% indicating that the use of blended learning models with the STEM approach is quite effective for improving scientific literacy skills and cognitive outcomes in class XII students of SMA Negeri 11 Ambon. In addition, the STEM-based blended learning model has a good response to student learning activities. Rezeki (2022), obtained the result that there was an effect of the application of Discovery Learning-based ELKPD on Animalia material on students' biology learning outcomes in class X IPA 1 at SMA Negeri 2 Gowa. This can be seen from the significance value obtained on the results of hypothesis data testing using the Independent Sample T-Test, in which value the significance shows 0.001 ($\text{Sig} > 0.05$). So it can be concluded that H_0 does not exist influence is rejected and H_1 which has influence is accepted.

Research by Khairunnisa & Yatri (2022), shows that the results of data analysis are there there is a significant difference in scientific attitude between the posttest experimental class and the class control. That way we can conclude that there is influence of the blended learning model learning on students' reading skills at SDN Lenteng Agung 07. Nugroho & Septiani (2022), stated that the Blended Learning method applied had an impact that is significant on student learning outcomes, namely an increase in percentage completeness possessed by class IX 2 from Cycle I and Cycle II was 70% before 25% of students completed to 95%. It is this significant percentage increase that is reassuring that the method applied is truly effective. Martia (2022), also stated that from the results The analysis data obtained shows that there is an influence of the Blended Learning model Learning using Google Classroom on students' problem-solving abilities. The results of other studies also show that the application of blended learning in biology learning can improve scientific literacy skills (Mas' ud, Sundari, Azahraa, 2022).

Based on the results of research and discussion in this literature study, it can be seen that all the research used as material for literature studies on blended learning is a lot conducted to determine the influence or effectiveness in learning, the most design mostly used is quasi-experiments in 5 articles followed by one group pretest-posttest design in 3 articles, and learning using blended learning is effective to improve results learning in 3 articles, scientific literacy in 3 articles, critical thinking skills in 2 articles, and problem-solving ability in 1 article.

4. Conclusion

Based on the results of a literature study of the 10 articles, it can be seen that the use of Blended Learning learning models by utilizing several technology-based applications digital as a learning support can be said to be effective in improving abilities literacy, critical thinking skills, problem-solving abilities, and cognitive learning outcomes learners. The Blended Learning learning model can be used in various conditions and does not have to be done face-to-face at school. From the results of a literature study, there are many types of applications that can be used by teachers as learning support media such as Google classroom, zoom meeting, Google Forms, and so on. In addition, the use of Blended Learning can also be used in various materials in Biology or Natural Sciences either from elementary, middle, and high school levels.

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References

- Ariga, S. (2022). Implementasi Kurikulum Merdeka Pasca Pandemi COVID-19. *Edu Society: Jurnal Pendidikan, Ilmu Sosial, dan Pengabdian Kepada Masyarakat*, Vol 2(2): 662-670.
- Firman, & Rahman, S. R. (2020). Pembelajaran Online di Tengah Pandemi Covid-19. *Indonesian Journal of Education Science*. Vol 2 (2): 81-89.
- Jannah, M., & Nurdiyanti, N. (2021). Pengaruh Pembelajaran Online Berbantuan Google Classroom terhadap Hasil Belajar Peserta Didik pada Materi Sistem Peredaran Darah pada Manusia Kelas XI SMA Buq'atun Mubarakah Makassar. *Jurnal Riset Dan Inovasi Pembelajaran*, 1(1), 75-84.
- Khairunnisa, N & Yatri, I. (2022). Pengaruh Model Pembelajaran Blended Learning pada Masa Pandemi Covid-19 Terhadap Kemampuan Membaca Pemahaman Peserta Didik di Kelas IV Sekolah Dasar. *Jurnal Cakrawala Pendas*, Vol 8 (4): 1104-1111.
- Martia, A.D. (2022). "Pengaruh Model Pembelajaran Blended Learning Menggunakan Google Classroom Terhadap Kemampuan Pemecahan Masalah Pada Materi Pencemaran Lingkungan Kelas VII di SMPN 02 Blambangan Umpu". Skripsi, UIN RADEN INTAN LAMPUNG.
- Mas' ud, A., Sundari, S., & Azahraa, I. F. (2022). Characteristics and Effectiveness of Blended Learning Through Reality Laboratory and Virtual Laboratory Activities in Genetics Course. *Journal of Biology Learning*, 4(1), 31-38.
- Maulina, D., et al. (2022). "Pengaruh Pembelajaran Problem Based Learning Berbasis Bauran terhadap Keterampilan Berpikir Kritis Siswa Kelas X SMAN 1 Kuripan". *Jurnal Ilmiah Profesi Pendidikan*, 7 (2b): 554 – 558.
- Nugroho, P.S & Septiani, D. (2022). "Penggunaan Blended Learning Mata Pelajaran IPA Terhadap Peningkatan Hasil Belajar Siswa Pada Materi Kemagnetan". *Jurnal Wacana Akademika: Majalah Ilmiah Kependidikan*, Vol 6 (2): 227-236.
- Rasheed, A. (2020). Challenges in the online component of blended learning: A systematic review. *Computer & Education*. V 144. (Online). (Challenges in the online component of blended learning: A systematic review - ScienceDirect). (Diakses 20 Januari 2023).
- Reza, Olviana (2022). "Pengaruh Pembelajaran Blended Learning Berbasis SETS Berbantu Zoom Pada Mata Pelajaran Biologi terhadap Literasi Sains Peserta Didik MAN 1 Lampung Tengah". Diploma thesis, UIN RADEN INTAN LAMPUNG.
- Rezeki, S. (2022). Pengaruh e-LKPD Berbasis Discovery Learning terhadap Hasil Belajar Peserta Didik pada Konsep Animalia Kelas X di SMA Negeri 2 Gowa. *Hybrid*, Vol 1(1): 1-11.
- Triyanti, M. (2022). Pengaruh Problem Based Learning Berbasis Blended Learning terhadap Kemampuan Berpikir Kritis Siswa di SMA Negeri 4 Rejang Lebong. *LP3MKIL*, Vol 2 (1): 67-76.
- UNESCO. (2020). 290 Million Students Out of School Due to Covid-19: UNESCO Releases First Global Numbers and Mobilizes Response. (Online). (<http://en.unesco.org/news/290-millionstudents-out-of-school-due-covid-19-unesco-releases-first-global-numbers-andmobilizes>). (Diakses 19 Januari 2023).
- Usemahu, A. (2022). Penerapan Blended Learning dengan Pendekatan STEM untuk Meningkatkan Literasi Sains dan Kemampuan Kognitif Siswa SMA. *Biosel*, Vol 11(2): 184-194.

- Wahyuni, A.S. (2022). Analisis Respon Siswa Kelas XII SMA Negeri 9 Makassar terhadap Penerapan Blended Learning dalam Pembelajaran Tatap Muka Terbatas pada Materi Pewarisan Sifat pada Makhluk Hidup. *Jurnal Biogenerasi*, Vol 7 (1): 23-29.
- Zed, M. (2004). *Metode Penelitian Kepustakaan*. Jakarta: Yayasan Obor Indonesia.