

Development of Virtual Blended Learning Based on Edmodo with Problem-Solving for Basic Physics

M. Y. Kua*, F. X. Dolo, N. W. Suparmi

Science Education Study Program
STKIP Citra Bakti, Flores, NTT, Indonesia

Received: 23 October 2020. Accepted: 22 November 2021. Published: June 2022

Abstract

This research is based on the problem of changing learning patterns from face to face to online due to the COVID-19 pandemic. The objectives of this study were to develop virtual blended learning based on Edmodo with problem solving in Basic Physics courses and to describe the effectiveness of product based on trials data analysis. This research was conducted in Ngada Regency, East Nusa Tenggara province. The subjects in this study were the lecturers and students of the STKIP Citra Bakti science education study program. The measured aspect was the quality of the virtual blended learning product consists of content, presentation, and language which developed following the problem-solving learning model phase. The data obtained in this study were analyzed descriptively qualitatively to explain product quality. This product was developed with the ADDIE model proposed by Lee and Owen. The results showed that the product development had reached the evaluation stage with a mean validation score of 4.53 and was in the very good category. Otherwise, the quality of the results of the virtual blended learning trial based on problem solving from lecturers and students is in the very good category. Based on the information, developed virtual blended learning based on Edmodo with problem- solving was good to be implemented in Basic Physics courses.

Keywords: basic physics, virtual blended learning, edmodo, problem solving

INTRODUCTION

The world is currently faced a difficult problem related to the spread of the corona virus which has caused many deaths. This virus spreads very quickly and has spread to almost all countries including Indonesia. Several provinces in Indonesia have adopted policies to implement PSBB (Large-Scale Social Restrictions) which of course have an impact on the social and economic life of the community. The government continues to voice the corona virus prevention protocol to be heeded by all levels of society to break the chain of the spread of this corona virus.

Referring to the decision of the World Health Organization (WHO) which finally changed the status of COVID-19 transmission from the

Public Health Emergency of International Concern to pandemic status, the Ministry of Teaching and Culture of the Republic of Indonesia issued Circular Number 2 of 2020 dated March 9, 2020 concerning the Prevention of the Spread of Corona Virus Disease (COVID-19) in Higher Education, The Ministry of Teaching and Culture, which one of the points is organizing distance learning according to the conditions of each College. Following up on the circular, all universities then implemented work from home (WFH) for lecturers and staff as well as study from home (SFH) for students. Changing the pattern from face-to-face learning to online learning is a demand that must be implemented (Laksana, 2020; Durnali, 2020). Of course, this is not an easy thing, considering that many universities including STKIP Citra Bakti are not used to conducting online lectures. Even so, the implementation of quality lectures remains a requirement that all elements in the teaching system must pay attention to.

*Correspondence Address:

E-mail: yulianakua03@gmail.com

The teaching era that was influenced by the industrial revolution 4.0 currently offers many new things in the world of teaching, including the blended learning model. Tham (2011) explains that blended learning is a formal education that allows students to learn through content and instructions that are delivered online with independent control over time, place, sequence, as well as learning speed. Furthermore, Syarif (2013) also explains that blended learning is an innovative learning model that combines technology and information-based learning with class/face-to-face learning. The aspects that are combined in this learning can be in the form of methods, media, resources, environment, and learning strategies to achieve a quality learning process. Improving the quality of teaching can be done by improving the quality of learning (Degeng, 2014; Ule, Kua, Laksana, & Rewo 2021).

Problem-solving learning model is a learning model that provides opportunities for students to develop problem-solving abilities in their life environment based on their own or group study skills and gain broad knowledge (Kua, 2018). Furthermore, Gok (2010) explains that the steps in the problem-solving learning model are very important for students to use to solve problems so that they can increase creativity and understanding of the material being studied. Thus, it is very good to be able to combine blended learning with problem solving models so that students are always motivated to be able to solve the problems presented in learning.

Edmodo is one example of social learning site can be called Social Learning Network (SLN) (Balasubramanian, Jaykumar, & Fukey, 2014; Bicen, 2015). SLN is designed specifically for educational environments and includes the main components of LMS like library, quiz, and assignment. SLN can give students and teachers a chance of using social networking tools by getting rid of inappropriate content and minimizing privacy and security concerns (Brady, Holcomb, & Smith, 2010). Edmodo application is a social media platform that is often described as Facebook that supports the blended learning process. Edmodo is a free and secure learning platform designed by Jeff O'Hara and Nick Borg in 2008 for teachers, students, parents, schools, and districts, and is available at www.edmodo.com (Edmodo, 2015). Students, teachers and parents can easily register with the system (Çankaya, Durak, & Yünkül, 2013).

Dharmawati (2017) explains that Edmodo was developed based on the principles of group-based class management and social media.

Edmodo is very comprehensive as a course management system like Moodle which can be used as a learning medium for all materials that do not use direct activity and observation (Suriadhi Tastra, & Suwatra, 2014). Edmodo makes the educational environment accessible both for teachers and learners, and also for parents from any place at any time (Durak, 2017). Edmodo can be used in education in two ways; 1) executing the whole course online via Edmodo, and 2) using Edmodo to support a course taught on face-to-face basis (Durak, Çankaya, & Yünkül, 2014). Edmodo can assist students effectively regarding engagement and taking responsibility of learning if certain features of Edmodo are used (Sanders (2012). The use of virtual blended learning through the problem solving-based Edmodo application provides flexibility for students in choosing the time and place to access the material to be studied and to solve the problems presented in the material. Students will have more time to solve problems and can build discussions with the teacher regarding things that are difficult to understand and solve without being tied to schedules such as in face-to-face classes.

In this study, by developing virtual blended learning through the problem solving-based Edmodo application in the Basic Physics course hopefully students always have broad access to increase their understanding of physics material even though they are in the COVID-19 pandemic period.

METHOD

This type of research is development research. The product developed in this research is in the form of virtual blended learning based on problem solving in Basic Physics courses. Digital learning media in the form of virtual blended learning was developed with the ADDIE model proposed by Lee and Owen. This model consists of five steps (A Lee & Owens, 2004), namely: 1) analyze, (2) design, (3) development, (4) implementation, and (5) evaluation. The choice of this model is based on the consideration that this model is developed systematically and is based on the theoretical foundation of learning design. This model is arranged in a programmatic manner with a systematic sequence of activities.

The development of virtual blended learning begins with the Analyze stage. At the analyze stage, the activities carried out include (a) analyzing student needs in Basic Physics courses during the Study From Home (SFH) period; (b)

analyzing material for basic physics recovery within the curriculum framework of the STKIP Citra Bakti Science Education study program. At the design stage, the activities carried out are in the form of drafting a conceptual and theoretical framework based on the results of needs analysis and material analysis to obtain an overview of the product to be developed which includes elements that make it easier for students to learn basic physics material independently with audio-visual assistance in virtual blended learning class. At the development stage, it is carried out by making virtual blended learning based on problem solving. In the implementation stage, activities carried out in the form of product validation by material experts, learning media experts, and linguists as well as limited trials of using virtual blended learning based on problem solving in Basic Physics courses for lecturers and students. Furthermore, in the evaluation stage, an evaluation is carried out in the form of a revision of the limited trial results.

This research was conducted at STKIP Citra Bakti, Golewa District, Ngada District, East Nusa Tenggara Province. The subjects in this study were the curriculum of the science education study program as well as 5 lecturers and 26 students at STKIP Citra Bakti. Meanwhile, the

object under study is virtual blended learning based on problem solving. This research is limited to the stage of producing virtual blended learning products based on problem solving and has not yet reached the stage of field trials to determine the effectiveness of the product on student learning outcomes.

The data collected in this study were analyzed descriptively qualitatively as follows: (1) Data regarding the quality of virtual blended learning products based on problem solving results from reviews from material experts or content experts in Basic Physics learning, learning design experts, and linguists were analyzed qualitatively. The analysis technique is carried out by classifying the information obtained in the form of critical input and suggestions to produce quality products. (2) Data regarding product quality in the form of limited trial results for lecturers and students in the use of problem solving-based virtual blended learning in Basic Physics courses arranged in several questionnaires related to content, presentation, and ease of use of the product were analyzed through score conversion. The results of the assessment were changed from a qualitative form to a quantitative scale of 5. The product development scheme is presented in Figure 1.

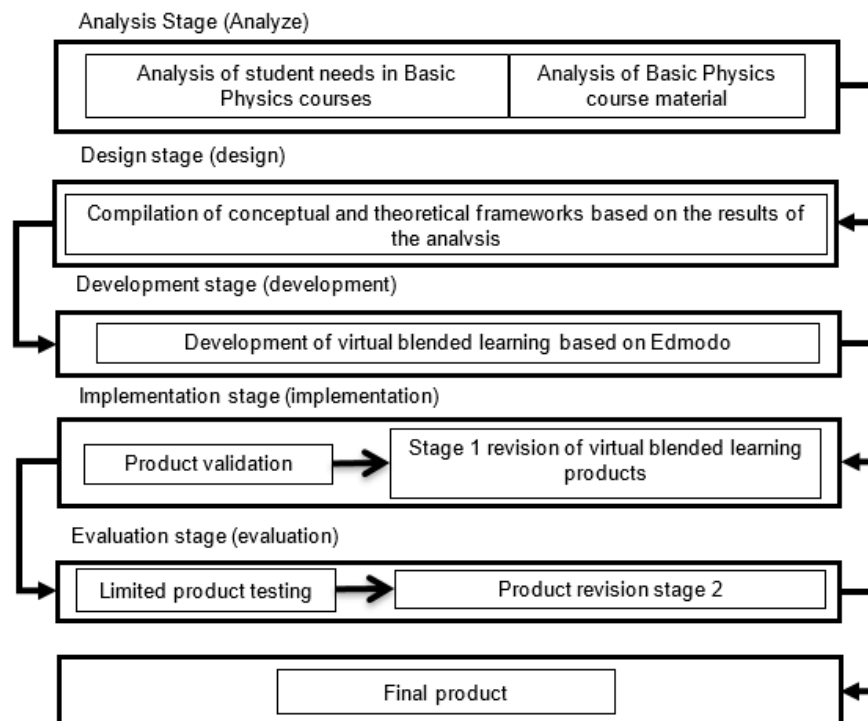


Figure1. Product Development Procedure

RESULT AND DISCUSSION

This development research begins with an analysis of student needs in the online learning process in the Basic Physics course. The lecture process that occurred during the COVID-19 pandemic demanded the right learning strategy so that changing learning patterns from face to face to online did not cause a decrease in the quality of basic physics learning (Prawiradilaga, 2016; Sadikin & Hakim, 2019) In the curriculum of the Science Education Study Program at the Teacher Training and Education College, Citra Bakti, the Basic Physics course includes Physics concepts about: (1) one-dimensional motion; (2) two-dimensional motion; (3) dynamics; (4) effort and energy; (5) rotation; (6) balance, (7) fluid mechanics; (8) vibrations and waves; (9) sound; (10) optics. The material provided in Basic Physics courses through virtual blended learning is One-dimensional Motion material consisting of Rectilinear Motion (GLB) and Non-Rectilinear Motion (GLBB). Learning through virtual blended learning uses Edmodo's Social Learning Network (SLN) feature to complement the implementation of online learning (Lara, 2013). This online class presents material content, motion simulations, discussion questions, and practice questions by following the problem-solving learning model phase.

In the early stages of this research, a product in the form of problem solving-based virtual blended learning was produced that could answer student needs and provide a quality lecture experience even though it was conducted online. The characteristics of the virtual blended learning media developed are as follows:

1. This product combines delivery methods, teaching methods, and learning styles that provide opportunities for all participants to build active interactions in the learning process that occurs online through the Edmodo e-learning platform.
2. Learning through virtual blended learning provides opportunities for students to get quality lecture processes independently without being limited by time.
3. This product displays the content of the material, motion simulations, discussion materials, and practice questions following the phase of the problem-solving learning model which consists of formulating problems,

analyzing problems, formulating hypotheses, collecting, and classifying data as material for proving hypotheses, proving hypotheses, and making choices completion. Students will be given instructions for entering each stage of learning.

4. The problem-solving learning model used in this online class will provide opportunities for students to gain knowledge, understanding, and skills that can be used to solve problems. Thus, students will be required to develop analytical, systematic, and logical thinking skills to find alternative solutions to problems through empirical data exploration
5. A few case examples, motion simulations, and animations provided in this virtual blended learning will provide an interesting and fun learning atmosphere without reducing the value of quality learning.

This problem solving-based virtual blended learning media was further validated by 3 expert lecturers consisting of material experts, learning media experts, and language experts. The results of the assessment of the products developed from the three validators are in the very good category. The data on the mean score of the validation results from the three validators is presented in Figure 2.

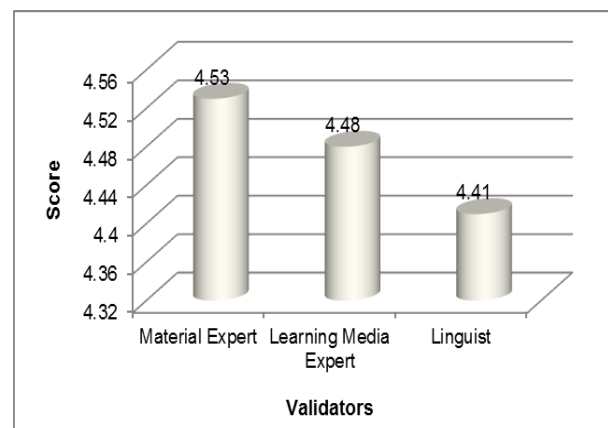


Figure 2. Mean Score of Product Validation Results

The data shows that the basic physics recovery material made is in the very good category with the average score obtained from material expert of 4.53. Assessment from learning media expert related to the development of digital learning media in the form of virtual blended learning is also in the very good category with the

average score obtained is 4.48. Meanwhile, the assessment of linguist regarding the use of Indonesian in relation to the presentation of material / information in the media is in the very

good category with an average score of 4.41. Thus, the average score obtained by researchers from the three validators was 4.47 and was in the very good category.

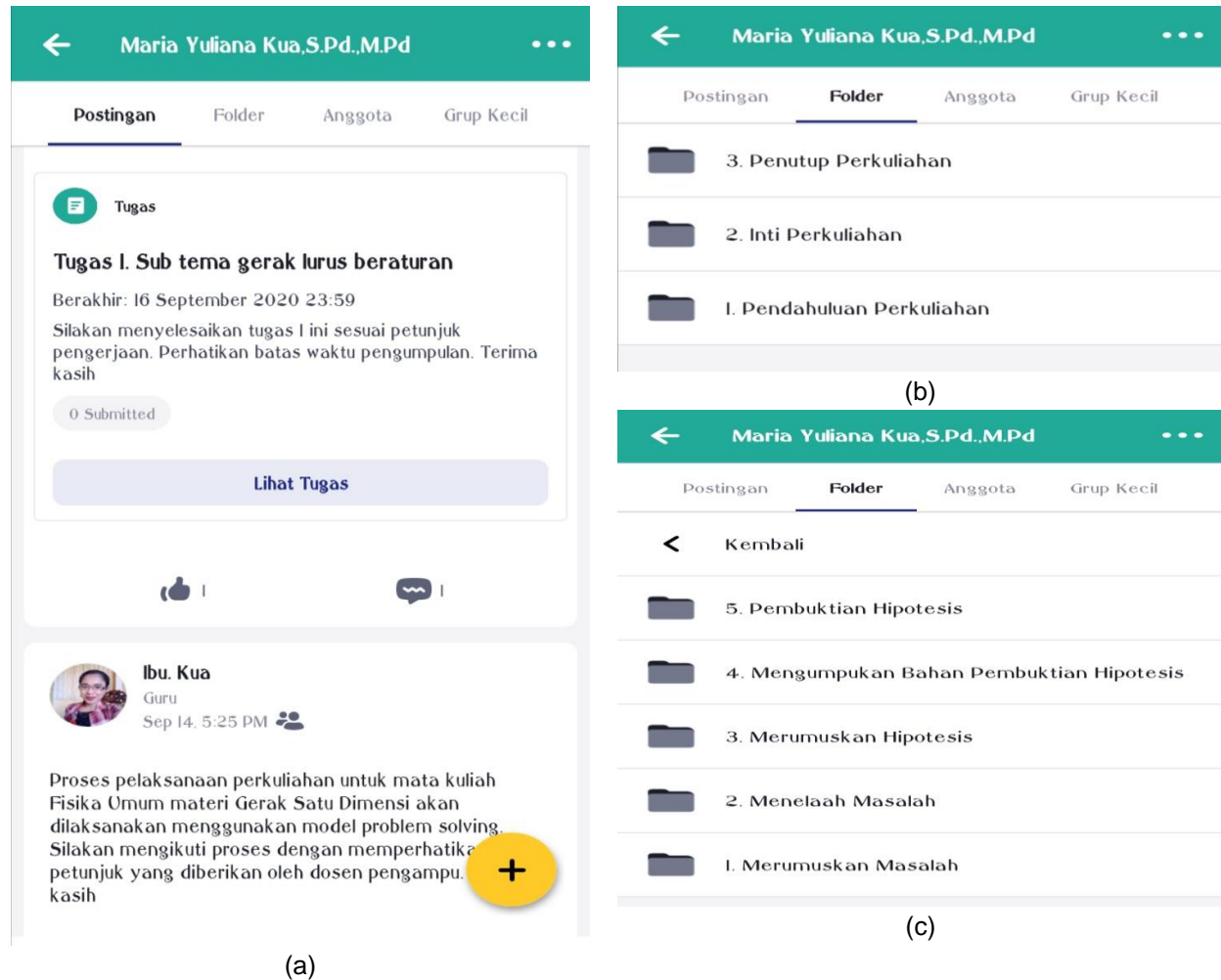


Figure 3. Edmodo with Problem Solving

Figure 3 shows the Edmodo application that has been developed in basic physics courses with problem-solving. Figure 3(a) shows instructions given by the lecturer to the students regarding the implementation of basic physics courses. Figure 3(b) shows the folder containing the college steps. Students will be directed to open each folder and follow the guidelines found within the beginning with the introduction, core, and conclusion. Meanwhile, figure 3(c) indicates the level of administering the lecturer on the core based on the phase model of problem-solving.

Figure 4 shows the result of the development of the virtual learning process of basic physics, one-dimensional motion materials displayed on Edmodo application. Figure 4(a) shows the Home view of virtual learning application consist of Subject Identity, 2) Learning Activities, 3) Rectilinear Motion (GLB), 4) Non-Rectilinear Motion (GLBB) 5) Discussion Materials, 6) Evaluation. Figure 4 (b) shows an example of the animated motion of objects. Direct students' understanding of one-dimensional motion. Figure 4 (c) shows an example of the animated motion of objects.



Figure 4. The Product of Virtual Blended Learning

This learning media was then tried out on a limited basis through small groups consisting of 5 lecturers and 26 students. Data from limited trial results, lecturer responses to the use of problem solving-based virtual blended learning media can be seen in the table. Based on the data in Table 1, it is found that the responses of 5 lecturers to the use of media from the aspects of the material, presentation, and language are in the very good category with the average score obtained is 4.5.

Meanwhile, the data on the test results of student responses to the use of problem solving-based virtual blended learning media are shown in Table 2. The data in Table 2 shows that 26 students' responses to media use in Basic Physics courses are in the very good category with the average score amounting to 4.6. This shows that the existence of this digital learning media has a

positive impact on both lecturers and students, including encouraging student motivation to take basic physics lessons. In general, the development of virtual blended learning consists of 5 main parts that describe the entire learning process up to the evaluation stage leading to the problem-solving learning model phase. The five sections include: 1) Subject Identity, 2) Learning Activities, 3) Motion Simulation, 4) Discussion Materials, 5) Evaluation. The description of the five sections is as follows:

1) Course Identity

In this section students are given information related to the identity of the course which includes the name of the course, learning objectives, material achievements, course credits, semester, and lecturers.

2) Learning Activities

This section presents a series of learning processes based on phases in the problem-solving model. The learning process at each phase will lead students to the ability to think analytically, systematically, and logically to find alternative solutions to the problems given.

3) Motion Simulation

The material in learning activities using virtual blended learning consists GLB and GLBB. Therefore, a motion simulation of GLB and GLBB is also presented with the aim of increasing students' comprehensive understanding of one-dimensional motion.

4) Material for discussion

The discussion material presented in this section emphasizes critical thinking skills and problem-solving abilities. Presented examples of cases, pictures, and short videos related to One Dimensional Motion material as well as some guiding questions to guide students in solving the problems presented.

5) Evaluation

In this section, students must complete several questions individually. Three types of tests are presented to measure students' abilities. The second test can only be taken if you have completed the first test by reaching the predetermined minimum score. Likewise, with the third test. The practice tests given are intended to determine the level of student understanding of the material that has been studied.

The development of virtual blended learning based on problem solving is carried out to provide easy access to learning for students during the COVID-19 pandemic. Changing learning patterns from face-to-face to online requires the right learning strategies so that learning activities can run effectively and efficiently for the achievement of optimal learning outcomes (Adedoyin & Soykan, 2020; Ogunmokun, Unverdi-Creig, Said, Avci, & Eluwole, 2020). The quality of a learning process is also determined by the ability of teachers to develop learning activities such as formulating learning objectives, designing learning materials, determining learning strategies, learning media, and evaluating learning (Northcote

Gosselin, Reynaud, Kilgour, & Anderson, 2015; Ogunmokun et al., 2020; Laksana, Seso, M. A., & Riwu, 2019).

Choosing the right learning strategy will affect the quality of learning (Kua et al., 2019; Songkares et al., 2021). Therefore, it is important for a teacher to know exactly what the learners need for a good learning process. In relation to the physics learning process, most students can easily accept knowledge about physics but find it difficult to apply knowledge flexibly in solving problems. Therefore, a teacher needs to try to create a conducive learning atmosphere that can support students to be actively involved in finding problems, analyzing, and solving problems based on the physics concepts learned (Diana, Muntean, & Muntean, 2020; Kua, Suparmi, & Laksana, 2021). The learning process with the right strategy will encourage students' enthusiasm to learn well (Nonggi, Kua, & Laksana, 2021; Samri, Rewo, & Laksana, 2020). The development of media that supports the implementation of online learning is a very important strategy for every teacher to pay attention to achieve quality learning (Sadikin & Hakim, 2019; Kumari, Hemalatha, Ali, , & Naresh, 2020).

The development of instructional media is included in the technology domain which has the aim of translating design specifications into physical form. The development of digital learning media that is equipped with good audio-visuals will help students receive messages/information including material provided clearly to minimize misconceptions (Thuneberg, Salmi, , & Bogner, 2018; Dinatha & Kua, 2019; Dolo, Kua, & Djawaria, 2022). The development of virtual blended learning based on problem solving was developed based on the results of the analysis of the needs of students and lecturers in learning Basic Physics. Lecture poses that require students to explore problem-solving skills with logical and systematic thinking will encourage active student involvement and interaction (Halim, Yusrizal, Susanna, & Tarmizi, 2016; Putri, Jumadi, Ariswan, & Kuswanto, 2019). Thus, the existence of this digital learning media must answer the needs of students and lecturers for the implementation of a quality lecture process even without face to face. The results of media trials on students and lecturers are in the very good category. This means that the developed of virtual blended learning based on Edmodo with problem-solving was good to be implemented in Basic Physics courses.

Table 1. Limited Trial Data Lecturer Responses to Digital Media Virtual Blended Learning Based on Edmodo with Problem Solving

Statement	Score	Category
Material Aspect		
a. Organizing material based on scientific systematics	4.4	Very Good
b. The link between the material and the learning objectives to be achieved	4.5	Very Good
c. The stages of the learning phase with a problem-solving model	4.3	Very Good
d. Various examples of questions and discussion materials are displayed in learning activities	4.6	Very Good
e. The truth of the material presented	4.8	Very Good
f. The use of symbols and units.	4.8	Very Good
Presentation Aspects		
a. Organization of presenting the learning process in general	4.2	Very Good
b. Material presentation organization	4.3	Very Good
c. Organization of the presentation of motion simulations	4.7	Very Good
d. Organizational presentation of discussion materials	4.4	Very Good
e. Organization of the presentation of practice questions	4.4	Very Good
f. Organization of presenting learning activities per phase in a problem-solving model	4.5	Very Good
g. Student involvement actively in learning activities virtually	4.5	Very Good
h. Various ways of delivering material	4.3	Very Good
i. The accuracy of using animation with the material being taught	4.6	Very Good
j. Pay attention to the code of conduct and copyright	4.2	Very Good
Aspects of Language		
a. Use of good and correct Indonesian based on improved spelling.	4.4	Very Good
b. Understanding of the material presented from the aspects of the Indonesian language used.	4.3	Very Good
c. Understanding of the instructions given in learning activities.	4.5	Very Good
Average Scoring	4.5	Very Good

Table 2. Limited Trial Data Students Responses to Digital Media Virtual Blended Learning Based on Edmodo with Problem Solving

Statement	Score	Category
Virtual blended learning display	4.6	Very Good
The clarity of the material presented	4.4	Very Good
The clarity of motion simulation	4.5	Very Good
Clarity of discussion material	4.5	Very Good
Clarity of practice questions given	4.4	Very Good
The clarity of the images and videos presented	4.6	Very Good
Understanding of the material presented from the aspect of the Indonesian language used	4.4	Very Good
Understanding of the instructions / instructions given	4.5	Very Good
Use of font types and sizes	4.8	Very Good
Use of animation and effects	4.8	Very Good
Increased motivation to learn physics	4.6	Very Good
Increased understanding of physics material	4.5	Very Good
Usefulness in independent learning activities	4.6	Very Good
Average	4.6	Very Good

CONCLUSION

Based on the result of the study, it was found that learning through virtual blended learning combines delivery methods, teaching methods, and learning styles that provide opportunities for all participants to actively interact in the learning process that occurs online through the Edmodo e-learning platform. The learning process through virtual blended learning is based on the problem-solving model phase which consists of activities to formulate problems, analyze problems, formulate hypotheses, collect, and classify data as material to prove hypotheses, prove hypotheses, and determine solution options. This learning media displays the identity of the course, learning activities, motion simulation, discussion material, and evaluation. The results of product validation by material expert, learning media expert, and linguist are in the very good category with an average validation score of 4.53. The lecturers' responses to the use of the product are in the very good category with an average score of 4.5. Student responses to the use of problem solving-based virtual blended learning are in the very good category with an average score of 4.6. Further research needs to do an in-depth analysis of other learning materials so that the implementation of learning can also use virtual blended learning.

ACKNOWLEDGMENT

Thanks to the Chairperson of the Mandiri Community Image Education Foundation for the financial assistance that has been given, the Chairperson of STKIP Citra Bakti for his support, and the Head of the Center for Research, Community Service STKIP Citra Bakti for the information and support that has been given, and thanks to 5 lecturers and 26 students at STKIP Citra Bakti has aided researchers so that this research activity can run smoothly as expected.

REFERENCES

- A Lee, W. W., & Owens, D. L. (2004). *Multimedia-based Instructional Design*. Pfeiffer.
- Adedoyin, O. B., & Soykan, E. (2020). COVID-19 Pandemic and Online Learning: The Challenges and Opportunities. *Interactive Learning Environments*, 29(8), 1–14. <https://doi.org/https://doi.org/10.1080/10494820.2020.1813180>.
- Balasubramanian, K., Jaykumar, V., & Fukey, L. N. (2014). A Study on “student Preference Towards The Use of Edmodo as a learning Platform to Create Responsible Learning Environment. *Procedia—Social and Behavioral Sciences*, 144, 416–422. <https://doi.org/doi:10.1016/j.sbspro.2014.07.311>.
- Bicen, H. (2015). The Role of Social Learning Networks in Mobile Assisted Language Learning: Edmodo As A Case Study. *Journal of Universal Computer Science*, 21(10), 1297–1306.
- Brady, K. P., Holcomb, L. B., & Smith, B. V. (2010). The Use of Alternative Social Networking Sites in Higher Educational Settings: A case Study of the E-Learning Benefits of Ning in Education. *Journal of Interactive Online Learning*, 9(2), 151–170.
- Çankaya, S., Durak, G., & Yünkül, E. (2013). Using educational Social Networking Sites in higher Education: Edmodo Through The Lenses of Undergraduate Students. *European Journal of Education Technology*, 1(1), 3–23.
- Degeng, I. N. S. (2014). *Ilmu Pembelajaran Klasifikasi Variabel untuk Pengembangan Teori dan Penelitian*. Bandung: Kalam Hidup dan Aras Media.
- Dharmawati. (2017). Penggunaan Media E-Learning Berbasis Edmodo dalam Pembelajaran English for Business QUERY : Jurnal Sistem Informasi. *Jurnal Sistem Informasi*, 1(1), 43–49.
- Diana, B., Muntean, C., & Muntean, G. . (2020). Teaching and Learning Physics using 3D Virtual Learning Environment: A Case Study of Combined Virtual Reality and Virtual Laboratory in Secondary School. *Journal of Computers in Mathematics and Science Teaching*, 39(1), 5–18.
- Dinatha, N. M., & Kua, M. Y. (2019). Pengembangan Modul Praktikum Digital Berbasis Nature of Science (Nos) Untuk Meningkatkan Higher Order Thinking Skill (Hots). *Journal of Education Technology*, 3(4), 293. <https://doi.org/10.23887/jet.v3i4.22500>
- Dolo, F. X., Kua, M. ., & Djawaria, P. Y. (2022). Meningkatkan Pemahaman Konsep Siswa dengan Multimedia Interaktif pada Materi Pemantulan Cahaya. *Jurnal Pendidikan Tambusai*, 6(1), 484–489.
- Durak, G., Çankaya, S., & Yünkül, E. (2014). Using educational social networking sites in education: Edmodo. *Dumlupınar University Journal of Social Sciences*, 41, 309–316.
- Durak, G. (2017). Using Social Learning Networks (SLNs) in Higher Education: Edmodo Through the Lenses of Academics. *International Review of Research in Open and Distributed Learning*, 18(1), 83–109.
- Durnali, M. (2020). The Effect of Self-Directed Learning on the Relationship Between Self-Leadership and Online Learning among University

- Students in Turkey. *Tuning Journal for Higher Education*, 8(1), 129–165. [https://doi.org/http://dx.doi.org/10.18543/tjhe-8\(1\)-2020pp129-165](https://doi.org/http://dx.doi.org/10.18543/tjhe-8(1)-2020pp129-165).
- Edmodo. (2015). *About Edmodo*. Retrieved from <https://www.edmodo.com/about>.
- Gok, T. (2010). The General Assessment of Problem Solving Processes and Metacognition in Physics Education. *Eurasian Journal of Physics and Chemistry Education*, 2(2), 110–122.
- Halim, A., Yusrizal, Susanna, & Tarmizi. (2016). An Analysis of Students' Skill in Applying The Problem Solving Strategy to The Physics Problem Settlement in Facing AEC as Global Competition. *Jurnal Pendidikan IPA Indonesia*, 5(1), 1–5. <https://doi.org/https://doi.org/10.15294/jpii.v5i1.5782>.
- Kua, M. Y. (2018). Penerapan Real World Problem Solving menggunakan Setting Argumentasi untuk Meningkatkan Kemampuan Berpikir Kritis dalam Pembelajaran Fisika Siswa SMA. *Jurnal Ilmiah Pendidikan Citra Bakti*, 5(2), 93–102. <https://doi.org/10.5281/zenodo.3402640>
- Kua, M. Y., Aryani, N. W. P., & Rewo, J. M. (2019). Penerapan Model Pembelajaran Kooperatif Tipe Team Assisted Individualization dengan Real world Problem. 2(4), 169–176. <https://doi.org/10.23887/jet.v2i4.16545>
- Kua, M. Y., Suparmi, N. W., & Laksana, D. N. L. (2021). Virtual Physics Laboratory with Real World Problem Based on Ngada Local Wisdom in Basic Physics Practicum. *Journal of Education Technology*, 5(4), 520–530. <https://doi.org/10.23887/jet.v5i4.40533>
- Kumari, A. T., Hemalatha, C. H., Ali, M.S., & Naresh, R. (2020). Survey on Impact and Learning's of the Online Courses on the Present Era. *Procedia Computer Science*, 172, 82–91. <https://doi.org/https://doi.org/10.1016/j.procs.2020.05.167>
- Laksana, D. N. L. (2020). The Implementation Of Online Learning During COVID-19 Pandemic: Student Perceptions In Areas With Minimal Internet Access. *Journal of Education Technology*, 4(4), 502–509. <https://doi.org/https://doi.org/10.23887/jet.v4i4.29413>
- Laksana, D. N. L., Seso, M. A., & Riwu, I. U. (2019). Content and Flores Cultural Context Based Thematic Electronic Learning Materials: Teachers and Students' Perception. *European Journal of Education Studies*, 5(9), 145–155. <https://doi.org/10.5281/zenodo.2542946>
- Lara, V. . (2013). *The Improvement of Writing Based on a Genre Approach Through The Use of an E-Learning Platform*. University of Veracruz.
- Nonggi, F., Kua, M. Y., & Laksana, D. N. L. (2021). Pengembangan Bahan Ajar IPA dengan Real World Problem Berbasis Kearifan Lokal Ngada untuk Siswa SMP Kelas VII. *Jurnal Citra Pendidikan*, 1(4), 563–575.
- Northcote, M., Gosselin, K. P., Reynaud, D., Kilgour, P., & Anderson, M. (2015). Navigating Learning Journeys of Online Teachers: Threshold Concepts and Self-Efficacy. *Issues in Educational Research*, 25(3), 319–344.
- Ogunmokun, O. A., Unverdi-Creig, G. I., Said, H., Avci, T., & Eluwole, K. K. (2020). Consumer Well-Being through Engagement and Innovation in Higher Education: A conceptual Model and Research Propositions. *Journal of Public Affairs*, 1–12. <https://doi.org/https://doi.org/10.1002/pa.2100>
- Prawiradilaga, D. S. (2016). *Mozaik Teknologi Pendidikan: E-learning*. Kencana.
- Putri, R. Z., Jumadi, Ariswan, & Kuswanto, H. (2019). Mapping Students' Problem-Solving Skills in Physics Subject After Inquiry Learning at Class X SMAN 1 Prambanan. *Jurnal Pendidikan Fisika Indonesia*, 15(2), 60–69. <https://doi.org/DOI:10.15294/jpfi.v15i2.15246>
- Sadikin, A., & Hakim, N. (2019). Pengembangan Media E-Learning Interaktif dalam Menyongsong Revolusi Industri 4. *Jurnal Ilmiah Pendidikan Biologi*, 5(2), 131–138.
- Samri, F., Rewo, J. M., & Laksana, D. N. . (2020). Electronic Thematic Teaching Multimedia with Local Culture Based Materials and Its Effect on Conceptual Mastery of Primary School Students. *European Journal of Education Studies*, 7(2), 625–641. <https://doi.org/10.46827/ejes.v7i12.3474>
- Sanders, K. S. (2012). *An examination of the academic networking site Edmodo on student engagement and responsible learning*.
- Setiyani, Putri, D. P., Ferdianto, F., & Fauji, S. H. (2020). Designing a Digital Teaching Module Based on Mathematical Communication in Relation and Function. *Journal on Mathematics Education*, 11(2), 226–236. <https://doi.org/https://doi.org/10.22342/jme.11.2.7320.223-236>
- Songkares, M. F., Kua, M. Y., & Aryani, N. W. P. (2021). Pengembangan Lembar Kerja Siswa Multi Representasi dengan Real World Problem Berbasis Kearifan Lokal Ngada untuk Siswa SMP Kelas VII. *Jurnal Citra Pendidikan*, 1(4), 576–586.
- Suriadhi, G., Tastra, I. D. K., & Suwatra, I. W. (2014). Pelajaran IPA Kelas VIII DI SMP Negeri 2 Singaraja. *Edutech*, 2(1).
- Syarif, I. (2013). Pengaruh Model Blended Learning Terhadap Motivasi dan Prestasi Belajar Siswa SMK. *Jurnal Pendidikan Vokasi*, 2(2), 234–249. <https://doi.org/10.21831/jpv.v2i2.1034>
- Tham, K. (2011). Blended Learning-A Focus Study on Asia. *International Journal of Computer Science Issues*, 8(2), 136–142.
- Thuneberg, H. M., Salmi, H. S., & Bogner, F. X. (2018). How Creativity, Autonomy and Visual Reasoning Contribute to Cognitive Learning in a STEAM Hands-on Inquiry-Based Math Module. *Thinking Skills and Creativity*, 29.

<https://doi.org/https://doi.org/10.1016/j.tsc.2018.07.003>
Ule, L. M., Kua, M. Y., Laksana, D. N. L., & Rewo, J. M. (2021). Pengembangan Instrumen Tes Higher

Order Thinking Skill dengan Real World Problem Berbasis Kearifan Lokal Ngada untuk Siswa SMP Kelas VII. *Jurnal Citra Pendidikan*, 1(4), 554–562.

This page itentionally left blank.