

Blended Learning as a Model of Learning Technology in the Digital Era and Industrial Revolution 4.0

Misnawaty Usman¹, Syukur Saud², Nurming Saleh³, Ernawaty Usman⁴
{Misnawatyusman10@gmail.com}

Universitas Negeri Makassar, Indonesia^{1,2,3}
Universitas Tadulako, Indonesia⁴

Abstract. This study analyzes how the Blended Learning Model affects writing skills, language and attitudes. We employes a quasi-experiment using a posttest-only control group design. The population of this study was high school students consisting of 10 classes. Of the 10 classes, 4 classes had equal abilities. The 4 classes with equal abilities became the samples. Two classes were the experimental group, and the others became the control group. We applied the blended learning model in the experimental group, a blended learning model was applied, while in the control group, a direct learning model was applied. Findings show the following. There are differences in learning outcomes between the control and experimental groups. There are differences in learning outcomes for students with high independence of the control and experimental groups. There are differences in learning outcomes for students with low independence of the control and experimental groups. Independence plays an important role in successful learning. Students with high independence excel in blended learning, a more student-centered approach. Students with low independence show no better outcomes at direct learning, which is more teacher-centered.

Keywords: Blended learning; learning technology model; digital era; industrial revolution 4.0; education

1. Introduction

The use of mobile devices as one of the learning media has started since the development of E-Learning (Electronic Learning) as a learning step to be able to facilitate students so that learning can be done anywhere and anytime. Using a mobile device that can be used anywhere and easily along with the times. This is also supported by data from research conducted by United Nations agencies and UNICEF with the Ministry of Communication and Informatics and Harvard University published in Kompas.com that half of the 400 respondents (52%) are students with an age range of 10 to 19 years using a smartphone to access the internet. This learning allows students to deepen their knowledge of what has been learned in the classroom with the terminology of a room with four walls that limit it. Mobile-based learning helps students develop learning situations where they present flexible, effective, interactive, and interesting, making learning more meaningful. The

mobile-based learning helps students choose their preferred learning model. They also find it easier to access the information they need.

The information and communication technology advances quickly; the millennial generation and generation Z accept that easily. This generation is synonymous with the technology; almost all affairs are carried out with and from technology-based media. They do anything, from reading, searching for information, enjoying music, and looking for answers to school assignments, to displaying works of art and creativity through their smartphone devices. Teaching students of the 21st-century generation requires teachers to adapt strategies, models, and teaching methods to the characteristics of that generation. Teachers can no longer teach with standard and mediocre learning strategies. According to [1], [2], teachers must be creative and innovative, enrich and update knowledge and skills to be able to present interesting learning activities by utilizing technology through e-learning. According to [3], [4], distance learning returns students to their respective homes. They study, access subject matter, receive teacher explanations, or do and send assignments from their computers or gadgets with internet support.

According to Kholifah et al. (2020), technology-based learning by utilizing the internet network gives a new perspective on learning activities that have so far relied on teachers. However, e-learning during blended learning began to be lacking. Students admit that they have difficulty understanding the subject matter, parents complain about the condition of children who are not always disciplined in participating in learning, and many worry about learning loss due to the lack of direct interaction between students and teachers. Basically, teachers cannot be replaced by technology. Because in addition to teaching science, teachers also educate and familiarize students with values, ethics, and good character. According to [5], teachers are also role models for the personality development of students. Thus, educational goals that include cognitive, moral, social, emotional, and spiritual aspects can be realized properly.

According to [6], [7], through blended learning, teachers can still interact with students and carry out their functions as educators, but at the same time, they can take advantage of technology through the use of e-learning. Thus, in carrying out vis-à-vis learning, teachers also utilize technology-based learning to meet students' needs by interacting directly with the teacher or surfing through gadgets or computers to explore the subject matter. According to [6], [7], blended learning combines direct activities and offline and online computer-based learning. Learning with this model is considered effective because it can minimize the shortcomings contained in each model so that students can feel the benefits of both vis-à-vis learning models and technology-based learning. Students can still communicate with teachers directly; on the other hand, they also have the flexibility to access various learning resources from cyberspace. Blended learning is the answer to a learning model that is in accordance with the characteristics of 21st-century learners.

Several previous studies have discussed the effect of blended learning models on the learning process and students' perceptions of learning through blended learning [6]–[8]. However, in this study, we did not only apply the blended learning model but also focused on students' attitudes towards the learning model applied. In addition, Telegram messenger is also used in the blended learning model, making our study different from previous research. Therefore, this study aims to reveal the effect of blended learning on writing ability, the effect of language attitude on students' writing ability, and the effect of blended learning and language attitude on students' writing ability.

2. Literature Review

2.1 Blended Learning

According to [1], blended learning combines the advantages of vis-à-vis and virtual learning integratedly. According to Fazal and Bryant (2019), blended learning combines the features of traditional and electronic learning. Furthermore, according to [4], [9], blended learning has 5 keys, namely: (1) live event (synchronous direct or vis-à-vis learning within the same time and place or the same time but different places); (2) self-paced learning (combining with independent learning that allows students to learn whenever and wherever online); (3) collaboration (teacher-student collaboration and collaboration between students); (4) assessments (a combination of online and offline assessments, both test and non-test); (5) performance support materials (learning materials in digital form, accessible to students both online and offline).

According to [4], blended learning integrates vis-à-vis and distance learning using online resources; thus, the learning process can combine various physical and virtual sources. According to [8], the model combines many teaching methods and digital technology. This model is effective if it is applied based on the requirements agreed upon by all parties. The model helps students to experience meaningful learning since materials are suited to their needs. This model applies to vis-à-vis and non- vis-à-vis, either at school, home, or other places with internet access. According to [1], [4], [8]–[10] blended learning can increase study time; by repeating materials, students can improve their mastery of the subject matter by repeating studying the learning material several times, practicing the questions both individually and with classmates. In addition, this blended learning simplifies and speeds up the constant communication process between teachers and students.

According to [4], [9], [11], blended learning needs appropriate media, one of which is Moodle. Moodle is a Learning Management System (LMS) used in online learning. Moodle uses text, graphics, animation, simulation, audio, and video. Learning media that can display animation can ease students in learning. Animation helps us make analogies to visualize an abstract matter. Conceptual visualization, including animation and analogy, assists students in understanding the lesson.

The teacher is the main figure in education. The teacher's job is not only to teach but also to educate. Knowledge transfer in teaching can be done through media such as the internet, but the task of educating requires a direct touch of the teacher. The content of values, ethics, and character is difficult to measure and educate students if learning only relies on technology-based media. Educating is the main task of a teacher. That's why any learning model cannot replace vis-à-vis learning. vis-à-vis learning will always be relevant and needed, as stated by [6]–[8] that through vis-à-vis learning, students can interact with teachers and their peer groups in an environment where facial expressions, voice, and gestures contribute to enriching the communication process. The presence of teachers is needed to generate active participation and involvement of students in learning activities and let them experience a dynamic world change. The Covid-19 pandemic, starting in early 2020, has stopped vis-à-vis learning. According to [12], [13], internet-based online learning or e-learning is a choice that must be made by teachers even without adequate preparation. The application of online learning for more than a year has caused many student complaints. This proves the lack of e-learning, as described above.

Blended learning is a solution to today's learning problems. The e-learning element is maintained; however, vis-à-vis learning is also carried out while adhering to health protocols. Blended learning is designed to combine vis-à-vis learning and online learning; the definition varies greatly. According to [6], [7], blended learning presents an opportunity to bring together innovation and technological advancement offered by online learning with the interaction and participation of traditional learning. [4], [8] define it as a meeting point between traditional vis-à-vis learning and computer learning. [6]–[8] define it as an integrated combination of traditional learning with an online-based approach. One element in blended is vis-à-vis, while the other is delivering material remotely through technological devices. So, it is learning that combines vis-à-vis class meetings with integrated activities facilitated by computers, the internet, and various other learning media. The advantages of the two models combined in blended learning provide great benefits for students in understanding the learning material. In its application, there are no limits specifically about the percentage of vis-à-vis and the use of computer technology or the internet.

Teachers can use vis-à-vis learning with additional Internet media prefer to use online learning by occasionally conducting vis-à-vis activities to discuss assignments or subject matter. In normal learning situations the teacher has the flexibility to choose which method is most appropriate in accordance with the characteristics of the subject and the basic competencies that must be mastered by students. According to [5], [14], teachers can design learning designs by determining the percentage of internet utilization both online and offline. In addition, the teacher can also mix a combination of assignments, tests and non-tests, or projects and products. Applying blended learning in a pandemic like today is recommended through synchronous and asynchronous methods. This is because vis-à-vis learning still has to be done on a limited basis. According to [15], synchronic or vis-à-vis learning is carried out by some students in class, while others learn from home (online) at the same time virtually via zoom or gmeet. Meanwhile, asynchronous is done by giving students the flexibility to access or work on assignments at a time that does not have to be the same, so it is more flexible. Blended learning makes students more flexible in learning because the lesson materials that the teacher has prepared are stored in an e-learning format so that they can be accessed anytime and anywhere. Blended learning also enriches the quality of students by challenging them to be actively involved in learning. Millennials are known to be familiar with gadgets—this can be used positively for.

Blended learning will further enhance the development of Information Technology competence or digital literacy, one of the characteristics of 21st-century society. According to [4], [11], blended learning opens insight and grows students' independence because they can access various online learning resources through computers or gadgets. On the other hand, they also will not lose the 'touch' of the teacher and can interact with the teacher if they have difficulty understanding the subject matter. Learning on students' motivation and learning achievement. We intended to analyze the effect of blended learning compared to the vis-à-vis model. Results indicated that blended learning could increase students' motivation and learning achievement by increasing student learning outcomes which is quite significant compared to students given vis-à-vis learning treatment. [10] mention that school management and government support for the implementation effectiveness of blended learning are also very important. The government provides internet quota support for students while schools are responsible for regulatory mechanisms, content management, and maintenance of internet systems and networks in schools so that blended learning activities can take place comfortably. With the characteristics as described above, it can be understood that the

use of e-learning will make it easier for students to learn because they can search, find information, and add information, material enrichment, as well as update knowledge and skills. This aligns with the principle of active student learning, where students fully participate in learning. According to [4], [9]–[11], [15], some of the advantages of using e-learning include accelerating the occurrence of learning and teaching process; develop creative thinking; foster a sense of always ‘curious’, independent spirit, and more active in learning; and can make the learning process teach more efficiently. However, the use of e-learning is also often criticized. Learning using e-learning causes the growth of values to be slow in students due to low direct interaction between students and teachers or between students.

3. Research Method

Our study was a quasi-experiment with a posttest-only control group design. We had high school students consisting of 10 classes as our population. Four of the 10 classes had equal abilities and were used as research samples—two received the intervention, and the other did not. We applied the blended learning model in the experimental group, a blended learning model was applied, while in the control group, a direct learning model was applied. Moodle was used in the experimental groups for presenting learning materials, giving assignments, and evaluating. The followings were the steps for blended learning: (1) the teacher uploaded the learning objectives, subject matter, assignments and practice questions, and evaluation questions on the Moodle application, (2) the teacher informed students to study the material uploaded, either directly or indirectly (via email, chat or cellphone), (3) the teacher checked the success of students doing their assignments well, (4) the teacher checked student attendance, (5) the teacher motivated and guided students to collect information, experiment, group and class discussions, and problem-solving regarding materials, and (6) the teacher provided an evaluation through Moodle.

The learning steps with the direct learning model were as follows: (1) the teacher presented the objectives, background information, and the importance of the lesson, (2) the teacher prepared the students to learn, (2) the teacher demonstrated the correct way of doing things, or presented information step by step, (3) the teacher planned and provided initial training guidance, (4) the teacher checked student assignment and provided feedback, (5) the teacher managed for further explanation for more difficult tasks daily.

4. Findings and Discussion

The research instrument consisted of (1) an inventory of student independence using a Likert scale to measure the level of student independence and (2) a learning outcome test using a multiple-choice format with 5 alternatives to measure student learning outcomes after the treatment was given. Before being used, the student independence inventory instrument and learning outcomes test were validated by two content experts (objective validity) and tested to determine the reliability, discriminating power, and difficulty index. The Cronbach’s Alpha of the student independence inventory instrument was 0.8764. The test, to measure learning outcomes, was stated valid by two

content experts with a reliability of 0.8974. The differentiating power and difficulty level of learning outcomes test items are in the range of 0.4 to 0.8, which is calculated using the ULI formula. Data were analyzed according to the analysis function as a hypothesis tester. The hypotheses tested are (1) differences in learning outcomes between students who are taught using blended learning and direct learning, (2) differences in learning outcomes between students who have high independence and low independence, and (3) an interaction between learning outcomes and independence seen from student learning outcomes.

Our findings are elaborated as follows. In the blended learning model, students were led to learning independently and given learning materials designed specifically to arouse their interest. According to [4], [11], learning materials are delivered with the help of electronic media delivered using the Moodle application. Electronic media are designed in such a way that they function as fully as possible. The abstract subject matter is visualized so that students understand it more easily. The blended learning model took place both in the classroom and outside. Learning outside the classroom was delivered via the internet; students could access the materials at any time to provide students with more learning time compared to direct learning. With more learning time, students could learn the materials repeatedly. Blended learning helps students to be more active, with the teacher functioning more as a facilitator to create enjoyable learning situations. According to [9], [10], [15], the teacher provides material in the Moodle software, and students had to study, answer questions, or solve problems, both individually and in groups. Students had to upload their assignments before the specified deadline. This will motivate students to learn the materials. Thus, students do not procrastinate on their tasks. In blended learning, students could re-learn the material on the Moodle application, study groups, or ask the teacher. This interaction does not occur in direct learning that is delivered vis-à-vis. The teacher dominates the learning activities. Students cannot decide to learn at their own pace and way because the teacher directs everything.

Student learning outcomes in blended learning are better than direct learning, contributed by learning activities as described above. This supports [16], [17], stating that applying information and communication technology in education with Moodle-based blended learning leads to more effective learning. Blended learning helps students effectively gain skills and knowledge at their own decided pace. [18] mentions that e-learning allows the introduction of education with new formulations obtained from mixed-model learning between traditional learning and e-learning (online). [19] stated that blended learning with video-based blogs is effective for students. Blended learning helps improve literacy.

The learning paradigm has shifted along with the times. Early learning was more emphasized teaching that focused on teacher activities (teacher-centered), placing the teacher as the center of teaching activities. With the development of various psychological concepts and educational philosophies, teaching activities have shifted to student-centered learning. This requires students to be actively involved in developing all their potential. The role of teachers has changed; they are no longer the only source of learning. However, the teacher remains the guide to the process of learning. The rapid development of technology began to be applied in our education. Learning methods began to utilize various forms of electronic and internet applications, known as e-learning-based learning. Through e-learning, students can access various learning resources and information that support the learning process. Blended learning is an option to overcome the weaknesses that arise from the vis-à-vis learning method dominated by the teacher and learning that lacks direct teacher involvement. Blended learning that combines vis-à-vis learning methods and computer-based learning is an

alternative learning model nowadays. On the one hand, blended learning still presents the teacher figure students need. On the other hand, it also accommodates the needs of students as the millennial generation to better freely access the diversity of learning resources from the internet through communication technology devices anytime and anywhere. As a suggestion in this article, first, schools should facilitate teachers in implementing blended learning by enriching teaching skills and improving the ability of teachers to master various learning models. Second, schools increase bandwidth so that the range of internet access becomes better, completing infrastructure facilities, including providing LCDs in each classroom. Additional laboratory space is also carried out to provide better service to students. Third, teachers are regularly given the opportunity to conduct training and skills in utilizing various online learning facilities from various educational content, to strengthen and enrich e-learning learning.

High-independence students participating in blended learning are eager to get the best results. This will lead to optimal learning outcomes. In direct learning, more learning activities are teacher-centered in the classroom. The teacher is the center of learning. In direct learning, students' initiative will be shackled, and competition between students to show the best results does not get space in learning. Students in this group are less motivated to participate in learning, so learning outcomes are not optimal. It is different for students with low independence, characterized by, among others: not being confident, pessimistic, lack of enthusiasm in completing assignments and relying heavily on others to benefit from blended learning. Students with low independence who take blended learning feel burdened by the tasks given online. Thus, the advantages that become the potential of blended learning, such as learning flexibility and great opportunities for collaborative learning, do not occur in students with low independence, so their learning outcomes are less than optimal. Students with low independence also benefit less from the direct teacher-centered learning model. This is reflected in the absence of differences in the learning outcomes of groups of students participating in blended learning and direct learning.

5. Conclusion

The findings lead us to the following conclusions. First, the students in the experimental groups show a higher average score of learning outcomes than those in the control groups. Second, learning models and student independence affect learning outcomes. Third, high-independence students in the experimental groups score higher than those in the control groups. Fourth, there is no difference in the average score of learning outcomes between low-independence students in the experimental and control groups. Student independence plays an important role in successful learning. Independence significantly affects successful learning. High-independence students excel in blended learning because it is more student-centered. Thus, teachers need to consider this finding when teaching. Future researchers are encouraged to explore this topic.

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