

The Effectiveness of Blended Learning Teaching Materials Based on Cognitive Styles to Improve Students' Learning Outcomes in Solid State Physics Subjects

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ABSTRACT

The industrial revolution 4.0 forces various sectors, including the education sector, to face rapid technological innovation changes. Universitas Terbuka, as a distance learning activity management system, has made information and communication technology a fundamental requirement for implementing learning activities at UT or PTJJ. Blended learning emerges as an effective strategy that can combine the advantages of online education or technology-based learning and face-to-face learning. This study aimed to analyze the effectiveness of blended learning teaching materials based on cognitive styles to improve students' learning outcomes in solid-state physics subjects. This research is quasi-experimental research conducted in 3 Universitas Terbuka; those are Universitas Terbuka of Surabaya, Malang, and Jember. In this study, Respondents were 11 students who were treated with blended learning teaching materials in solids state physics subjects. The data obtained are in the form of students' learning outcomes, which are then analyzed using the N-gain test. Based on the N-gain test, the test result was accepted that the average N-gain of students was categorized as medium and high. In addition to learning outcomes, data on student responses, and learning activities were also obtained using blended learning teaching materials in solids state physics subjects. The majority of students respond to learning activities with a positive response, and students actively participate in all the learning activities provided. This study implies that blended learning materials based on cognitive styles effectively improve students' learning outcomes in solid-state physics subjects.

Keywords: distance education, learning outcomes, blended learning, cognitive styles

INTRODUCTION

We are currently facing the fourth industrial revolution known as the Industrial Revolution 4.0. To deal with these changes in innovation, education is one of the critical sectors required to experience significant changes to face the Industrial Revolution 4.0. Emerging technologies have had a profound effect on education in general (Rafiola et al., 2020). Technology-based learning, such as online learning or electronic learning (e-learning), has recently become a trend for effective education in both schools and universities. E-learning has become a popular approach to effective

learning in educational settings due to the extensive use of web systems in learning. There are various benefits of technology-supported learning or e-learning. Learning with this strategy is flexible and allows learning to occur at a distance and time according to students' needs.

Universitas Terbuka, as a distance learning activity management system, has made information and communication technology a fundamental requirement for the implementation of learning activities at UT or PTJJ. The use of information and communication technology for PTJJ is the right solution to time and space constraints to improve PTJJ services and increase student learning effectiveness (Daulany, 2009). Besides, information and communication technology can also enhance the quality of the teaching and learning process through an internet-based learning system (e-learning) or to learn in cyberspace (virtual learning).

However, although online learning makes it easier for students to access knowledge at any place and any time, direct communication between teachers and students in face-to-face learning is also essential. Blended Learning is a learning system that can combine face-to-face learning with computer-mediated education or other electronic learning media (Graham, 2006). Thus, blended learning is an effective strategy that can combine the advantages of online learning and face-to-face learning.

The industrial 4.0 era also requires each individual to have high abilities and qualifications to control the rapid development of technology. Higher education graduates are expected to have adequate competencies by society's needs and the current world of work, which is oriented towards the industrial era 4.0. Competent graduates can undoubtedly be seen from the high achievement of learning outcomes.

Learning outcomes are abilities that students have, both in terms of knowledge, skills, and attitudes, after gaining experience through the learning process. Good learning outcomes can certainly be generated from significant learning activity. Designing learning activities, one must consider how learners understand new information, acquire new skills, or develop new ways of life (Wasserman et al. 2009).

Cognitive style is a way for an individual to process a stimulus or information to produce a response. In the learning process, the type of mental kind of students determines how they process the information received to solve problems related to the concepts that have been learned. Students who have a dependent cognitive style can work well with other people, focus more on the general picture, and only follow the instructions and information that has been presented (Nugraha & Awalliyah, 2016). Students who have a field-independent cognitive style will tend to find various information that is out of the box (outside the content), sort objects more quickly, more analytic, and driven by motivation from within (internal). Students' cognitive styles will positively impact or influence if the right environment and conditions are provided so that students can learn optimally (Widiyana, Bayu, & Jayata, 2017). Thus, a learning activity needs to pay attention to students' cognitive styles, such as field dependent and field independent, to learn optimally and obtain good learning outcomes.

PERSPECTIVE

Teaching Materials

Teaching materials are all forms of material used to assist teachers/instructors in carrying out teaching and learning activities in the classroom. The material in question can be written or unwritten material. In other words, teaching materials are learning tools or tools that contain materials, methods, limitations, and ways of evaluating, which are designed systematically and attractively to achieve the expected competencies (Nurdyansyah & Mutala'iah, 2018)

Learning materials take several forms (Nguyen, Duong, & Cambria, 2019), including (1) Books, which are bound sheets of paper, both written and blank, for example, textbooks; (2) Magazines, namely periodicals containing actual topics in society. According to the specialization, the contents of magazines include knowledge magazines; (3) Brochures, which are brief but complete information, in a printed form consisting of only a few pages and are folded without being bound; (4) Poster, is a placard posted in a public place in the form of an announcement; (5) Encyclopedia, namely a book or series of books containing information on various fields of science, for example, an animal encyclopedia.

Blended Learning

Graham (2006) defined Blended Learning as a learning system that combines face-to-face learning with computer-mediated learning. At the same time, Garrison and Kanuka (2004) described Blended Learning as integrating face-to-face learning experiences in the classroom with online learning experiences. Thus, it can be concluded that there is general agreement that the main component of blended learning is face-to-face and online teaching or learning.

Research shows that learning using the Blended Learning model can increase learning motivation and learning outcomes of students or learners (Nuraini, District, & Suana, 2018). Learning models that use blended learning can generate student interest or students to learn and have an effect on learning outcomes in this case in line with research which states that the views of students or learners on the mixed learning process, such as a combination of web and face-to-face use, web and face-to-face learning processes give different results according to the learning styles of students or students. Therefore, blended learning is a combination of the advantages of learning that is done face-to-face and virtually (Ardianti, Sulisworo, & Pramudya, 2019).

In Blended Learning, traditional learning will be integrated with online learning technology, such as the Learning Management System (LMS), online learning videos, video conferences, and other interactive communication tools to increase student participation and information transfer. Face-to-face learning in the classroom will be used to develop the thinking skills and attitudes needed by students. Although online learning makes it easier for students to access knowledge anytime and anywhere, communication between teachers and students in face-to-face learning is also essential. Thus, blended learning is an effective strategy that combines the real world's best methods and the virtual world.

Cognitive Style

Goldstein and Blackman define cognitive style as a hypothetical construct developed to explain the mediating process between stimulation and response. The term cognitive style refers to the distinctive ways in which individuals conceptually organize the environment (1978, 4) within

(Lucas & Froehlich, 2003). Cognitive style is an individual difference in collecting and processing information (Koc-Januchta et al. 2017). Cognitive style is usually conceptualized as a usual way individuals perceive environmental stimuli and organize and provide information. Cognitive style affects how a person views the environment around them to get information, then collects and interprets the story, and then uses different interpretations that have been found to guide their actions (Guisande, Páramo, Tinajero, & Almeida, 2007). The cognitive style can be defined as a way for an individual to process a stimulus or information to produce a response. Each individual certainly has a different cognitive style.

The cognitive style dimension facilitates a qualitative approach to intellectual differences, revealing the forms of function that are consistently manifested in the mental realm. Field Dependent and Independent (FDI) field construction is one of the most studied of the various cognitive style dimensions that have emerged in the literature. FDI describes two different ways of processing information. Individuals are categorized based on their dependence on the surrounding environment, called Field Dependent (FD), and their independence on the ground, got Field Independent (FI). Individuals with extreme FD characteristics have difficulty separating incoming information from their contextual background, are more likely to be influenced by external cues, and are not selective in retrieving data. FI individuals experience less difficulty than FD in sorting out the most critical data from its context and are more likely to be influenced by internal rather than external cues and being selective in their input of information (Guisande, Páramo, Tinajero, & Almeida, 2007).

Dependent Cognitive Style

Dependent cognitive style is a learning style in which learners see all learning tasks containing many items. Students have difficulty learning other item áreas (Ebrahimi, Zeynali, & Dodman, 2013). A person who has a field-dependent cognitive style is a person who thinks in general, has a social orientation, the information and structure received by individuals with this style are already existing. In the learning process, a student who has a dependent field cognitive style can work well with others, is more focused on the general picture, and only follows the instructions and information that has been presented (Nugraha & Awalliyah, 2016).

The surrounding environment is seen by field-dependent individuals as a hint to respond to the stimulus it receives (Susanto, 2008). Changes in the situation around someone who is field-dependent are straightforward to influence because it is challenging to sort out the stimulus through the position he has. Someone who is field-dependent will also have difficulty facing problems that are out of context or out of the box. The field-dependent individual will organize what he receives as presented.

Independent Cognitive Style

Cognitively independent students can easily separate important details from complex or confusing backgrounds. They tend to rely on themselves and their thought systems when solving problems. They are not very skilled in interpersonal relationships (Ebrahimi, Zeynali, & Dodman, 2013). A person who has an independent field cognitive style has several characteristics, including; can provide an analysis of an object separately from its environment, can organize various items, prefer individual work, have an impersonal view, and prioritize motivation that comes from within (Nugraha & Awalliyah, 2016). In the learning process, someone who has a field-independent

cognitive style will tend to be able to find a variety of information that is out of the box (outside content); able to sort objects more quickly; more analytic; and driven by motivation from within (internal) (Nugraha & Awalliyah, 2016). A person with an independent cognitive field style tends to rely on cues from within themselves (Susanto, 2008). Changes in the situation have little effect on the perception of a person with an independent field cognitive style because someone who is an autonomous field is analytical to separate the stimulus based on the situation.

Learning Outcome

Learning is usually defined as a change in behavior. Education is a process carried out by a person to obtain a whole new shift in action due to his own experience in interactions and his environment (Sulfemi & Supriyadi, 2018). This means a behavior change, whether related to knowledge, skills, or attitudes, even covering all aspects of the organism or person and learning as changes in learners' knowledge due to experience (Clark & Mayer, 2016). This definition has three main elements: learning involves change, the difference is in what the learners know, and the learner's experience causes this change.

Learning outcomes are defined as a description of students' abilities after participating in the learning process within a certain period (Putri, Nirwana, & Syahniar, 2018). Learning outcomes as "the knowledge, skills, attitudes, and habits of mind that students bring from the learning experience" (Buckley & Michel, 2020). Meanwhile, Sulfemi and Supriyadi (2018) state that learning outcomes are students' abilities after receiving their learning experiences. These abilities include aspects of knowledge, skills, and attitudes. So it can be concluded that learning outcomes are abilities that students have, both in terms of knowledge, skills, and attitudes after gaining experience through the learning process.

Learning outcomes can be seen through evaluation activities that aim to obtain evidentiary data that will show the level of student ability in achieving learning objectives. This study's learning outcomes were student learning outcomes in the cognitive domain, which were obtained from the results of students' post-test scores in the Solid State Physics course.

METHOD

Participants

The sample in this study were students of the Universitas Terbuka (UT) Regional Office, Jember, Malang, and Surabaya, East Java. Respondents in this study were 11 students using blended learning resources. Samples were taken using a purposive sampling technique.

Case materials and discussion questions

The rapid development of technology has made changes in today's education world. Traditional learning activities have shifted to technology-based learning activities, such as e-learning or online learning. Blended learning emerged as a solution for combining online learning and formal face-to-face learning. Then, another thing that needs to focus on learning activities is the students' cognitive style. A learning activity needs to pay attention to the participants' cognitive style so that students can learn optimally and get good learning results. This study will compare several previous studies, both from within the country and abroad, regarding the effectiveness of blended learning and students' learning styles in education. This research was also supported by activity data, learning techniques, and student learning outcomes treated with blended learning in Solid Physics courses.

Based on this background, common problems in this study are (1) how is the effectiveness of composite learning teaching materials based on cognitive style to improve student learning outcomes in solid matter physics courses? And (2) what is the cognitive style of students in a substantial matter physics course?

DATA COLLECTION TECHNIQUE

Data Collection

The method used in this research is the quasi-experimental design method, which is the development of true-experimental design, which is challenging to implement. The characteristic of this research is that the sample selection is taken randomly from a population. The design used in this study is a pre-test and post-test control group. The experimental design in this study is shown in Table 1.

Table 1. Pre-test – Post-test Control Group Design

Group	Pre-test	Treatment (X)	Post-test
E	O ₁	X	O ₂

Description: E: Experiment group; O₁: pre-test; O₂: post-test; X: Blended learning resources

This study applies Blended Learning teaching materials to learning Solid State, which combines face-to-face learning with internet-based learning or e-learning. Students will study two modules. Before receiving the module, students are first given a pretest, and after checking the module, students return to take the test as a post-test. In addition to learning outcomes, several other aspects observed in this study were cognitive style, student response, readability of teaching materials, feasibility, and student activities.

Data Analysis

The research data were analyzed quantitatively. Student learning outcomes can be said improving according to the N-gain (post-test score - pre-test score) / (100 - pre-test score). Therefore, the criteria were set as follows: (1) if N-gain $\geq .7$ (high), (2) if N-gain is $> .3$ and $< .7$ (moderate), and (3) if N-gain is $\leq .3$ (low). To test whether the improvements in student learning outcomes existed or not with the blended learning resources, a Paired t-test against the pre-test and post-tests using IBM SPSS Statistic 22 software was done.

Instruments

This study applies the model development results, namely the blended learning of the new generation of science learning materials. The composite learning design used in stable states material combines online, offline, and print learning materials and resources in the tutorial process. The effectiveness of blended learning new generation science learning materials is supported by learning outcomes evaluated after implementing learning resources. After following the tutorial, student learning outcomes are known by using Bloom's revised taxonomy consisting of analyzing, evaluating, and creating (Barari et al. 2020; Wicaksono et al. 2017).

RESULTS AND DISCUSSION

This study shows students' learning outcomes data at the Open University of Surabaya, Malang, and Jember in Solid Substances subject. This study's results are in the form of student learning outcomes data before (pre-test) and after (post-test) following the Solid Substance course with Blended Learning teaching materials. In addition to student learning outcomes, several other aspects

observed in this study were cognitive style, student response, readability of teaching materials, implementation, and student activities.

Study of Blended Learning Research Results in Indonesia and Abroad

Research from Indonesia regarding Blended Learning that was studied was research from Ekawati (2018) entitled Application of Blended Learning with the PDEODE EDMode's Application-Based Learning Strategies to Improve Learning Achievement. Research from Setiyani (2019) entitled Blended Learning: The Effectiveness of Schoology-Based E-Learning Against Mathematical Communication Skills and analysis from Nisrina, Jufri & Gunawan (2020) entitled Development of Blended Learning-based LKPD to Improve Students' Science Literacy. The three studies obtained positive research results, where students experienced an increase in learning outcomes. Besides, students also show an interest in learning using the Blended Learning model. There are still obstacles in the research from Ekawati (2018) because the facilities and learning habits using teaching media in LMS (Learning Management System) are still lacking.

While from abroad, researchers reviewed research from Lalima & Dangwal (2017) with the title Blended Learning: An Innovative Approach, analysis from Cronje (2020) entitled Towards a New Definition of Blended Learning, and research from Dziuban et al. (2018) with the title Blended Learning: The New Normal and Emerging Technologies. The three foreign studies discuss the definition and explanation of the application of the Blended Learning model. The three studies provide positive results on the Blended Learning model. If the Blended Learning model is planned correctly and appropriately, it will become the future of the education system. This is following the research results from Dziuban (2018) that the Blended Learning model can improve the teaching and learning process in an educational environment, namely by creating an effective learning environment and significant communication structures.

Study of Research Results on Cognitive Style in Indonesia and Abroad

Research on cognitive styles from Indonesia that was studied was the research of Mirlanda, Nindiasari & Syamsuri (2020) entitled The Effect of Flipped Classroom Learning on Mathematical Reasoning Ability in terms of Student Cognitive Style, a study by Yunus, Djakaria & Hulukati (2020) entitled The Effect of a Contextual Approach on Reasoning Ability. Mathematical Judging from the Cognitive Style of Students and research by Fauzi, Rofi'i & Fatirul (2019) with the title The Effect of Self-Organizing Learning Strategies with Discovery Learning and Cognitive Style on Chemistry Learning Outcomes. These studies discuss the relationship between students' learning styles in determining the achievement of their learning goals. The three classes also agreed to obtain the results that the cognitive type of students was related to achieving their learning goals. The independent cognitive style had better reasoning abilities and obtained better learning outcomes.

Meanwhile, the research studied from abroad is Shi (2011) entitled A Study of the Relationship between Cognitive Styles and Learning Strategies, Kalyan & Mahavidyalya's (2014) research entitled Impact of Cognitive Style on Problem-solving Ability among Undergraduates, and Graff's research (2003) with the title Cognitive Style and Attitudes Towards Using Online Learning and Assessment Methods. The three studies have found that cognitive style influences the learning process of students. The integrated cognitive style was found to have good problem-solving abilities. Then, if students can recognize their respective learning styles, it will be easier for them to develop them and increase their learning and work strength.

The average pre-test and post-test results

Figure 1 shows the learning outcomes using blended learning teaching materials. The average pre-test result shows that the students' initial ability is homogeneous. Composite learning teaching materials are a solution for individuals who want to keep learning on the sidelines of busy work (Brunyé et al. 2013). Students can learn the material in tutor presentations, quizzes, videos, and interact online through the Learning Management System (LMS), which can be accessed via computers, tablets, to smartphones. On certain days, usually on weekends, students still have to be present in class to discuss the material offline or face to face with tutors and other students. The ease of learning with blended learning teaching materials provides many benefits for students. Apart from a time perspective, also in terms of costs. Student learning outcomes increase because blended learning resources can be adjusted in terms of time and cost. This study's results are supported by relevant research on the comparison of blended learning and print learning teaching materials to self-regulate learning (Broadbent, 2017).

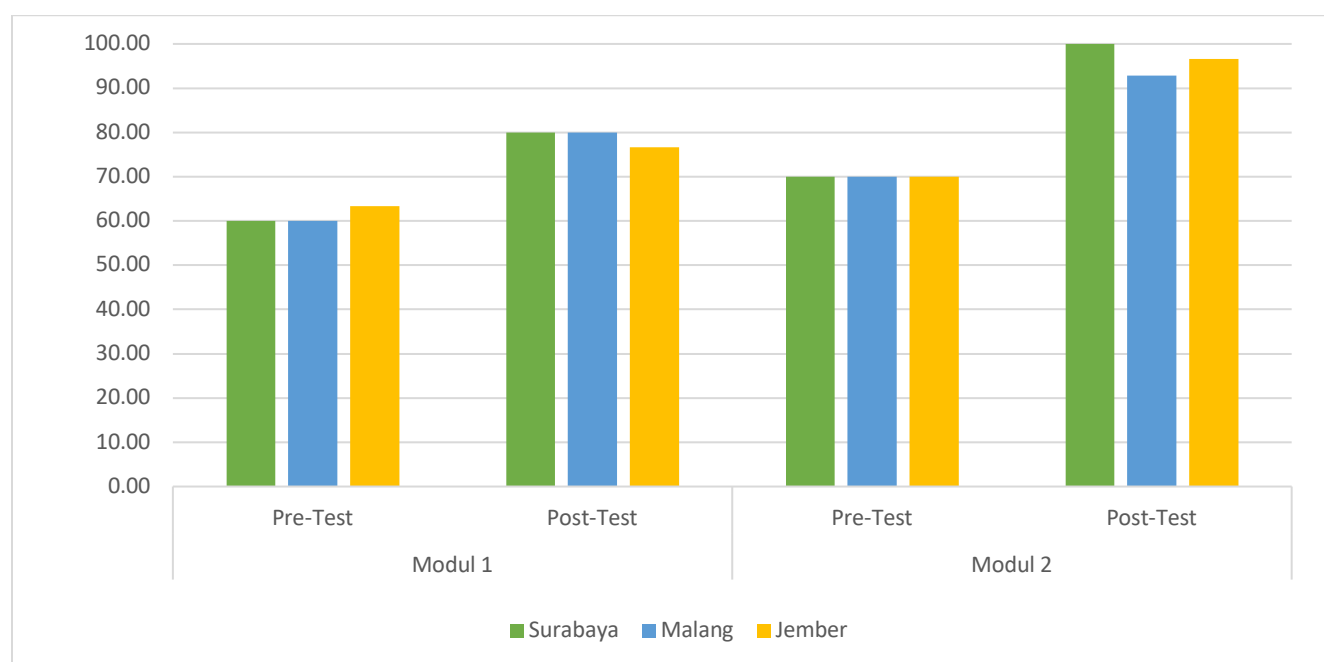


Figure 1. The average pre-test and post-test results on the learning sources

Based on Figure 1, it appears that there has been an increase in student learning outcomes in both Surabaya, Malang, and Jember after the implementation of lectures using Blended Learning teaching materials. A more significant increase in learning outcomes occurred in learning module 2, where students' post-test scores almost reached a perfect score.

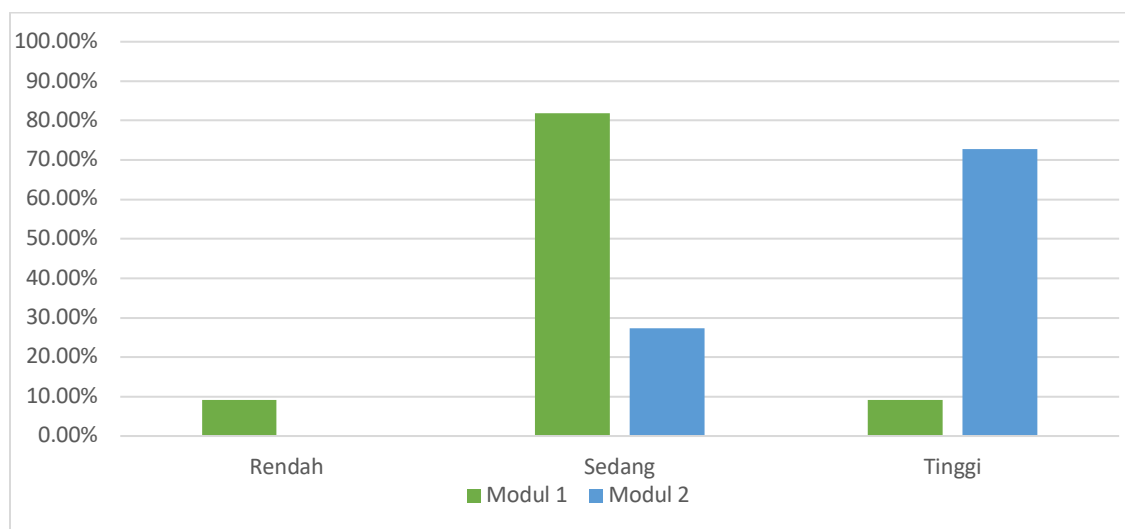
N-gain**Figure 2. N-gain on blended learning sources**

Figure 2 shows the N-gain of learning outcomes. It appears that the majority of students get an increase in learning outcomes in the medium and high categories. In the first module, most students experienced an increase in learning outcomes in the medium type. While in the second module, students experienced an increase in learning outcomes in a high category.

This blended learning can be done during the face-to-face learning process, and wherever students are as long as there is internet access (Dobrzański & Brom, 2008). The learning process using blended learning can provide additional time for students to understand the material. Blended learning allows students to repeat learning material independently. Students can improve their mastery of knowledge by repeating some learning materials, practicing solving learning problems independently and in groups. Besides, blended learning also simplifies and accelerates the non-stop communication process between teachers and students (Passwords, 2012). With this approach, the material is delivered online. Even though the tutor is in the room providing on-site support as needed, learning is essentially self-guided, as students independently learn and practice new concepts in a digital environment.

Students' Cognitive Styles

By looking at the combination of feelings, imagination, thinking, and acting, different cognitive styles arise, including (1) students are enthusiastic, active and work based on their emotions, (2) students are imaginative, rely on intuition, but also enjoy observing before acting, (3) students are practical as thinkers and actively solve problems, and (4) students are logical, careful, careful, think logically, it is easier to connect ideas. The cognitive style of the respondent students is shown in table 2.

Table 2. Student Cognitive Styles in Solid State Physics Subjects

UPBJJ	Nama	Modul 1					Modul 2				
		GK1	GK2	GK3	GK4	GK5	GK1	GK2	GK3	GK4	GK5
Surabaya	A	3	3	3	3	3	3	3	3	3	3
Malang	B	3	3	3	3	2	3	3	3	2	2
Malang	C	3	3	2	2	2	3	3	2	2	3
Malang	D	3	3	3	3	3	3	3	3	3	3
Malang	E	2	2	2	2	2	2	2	3	3	2
Malang	F	3	2	2	2	2	3	3	2	2	2
Malang	G	3	3	3	3	3	3	3	3	3	3
Malang	H	3	3	3	2	2	3	3	3	3	2
Jember	I	3	3	2	2	2	3	3	3	3	3
Jember	J	2	2	2	2	2	3	2	2	2	2
Jember	K	3	3	3	3	3	3	3	3	3	3

Based on table 2, student A from UPBJJ Surabaya has a cognitive style that is consistent in every aspect of each module. In the elements of knowledge, understanding, perception, imagination, and problem solving, students get a score of 3 points, namely that students are practical as thinkers and actively solve problems. Meanwhile, for the cognitive styles of students from UPBJJ Malang, it can be seen that students B, D, and G have a practical cognitive style as thinkers and are active in solving problems in both modules. Student C has an average mental sort imaginative, relies on intuition, and likes to observe before acting in module 1. Realistic cognitive style as a thinker and actively solves problems in module 2. Students E and F have an average cognitive sort imaginative relies on intuition and enjoys observing before acting in both modules.

Then for the mental type of students from UPBJJ Jember, based on table 2, I, on average, have an imaginative cognitive style, rely on intuition, and enjoy observing before acting in module 1 and practical learning styles as thinkers and actively solve problems in module 2. Student K has a consistent, helpful cognitive manner as a thinker and actively solves problems in every module and aspect. While student J has an average cognitive style imaginative, it relies on intuition and likes to observe before acting in both modules.

Students Responses

After receiving solid-state learning with blended learning teaching materials, students are given a questionnaire regarding their response to the learning activities carried out. Some of the things that become the assessment are about student interest in the learning that has been done, the level of ease of students receiving and understanding the material being taught, and the level of difficulty experienced by students in working on the pretest and posttest. The results of student responses are shown in Figure 2.

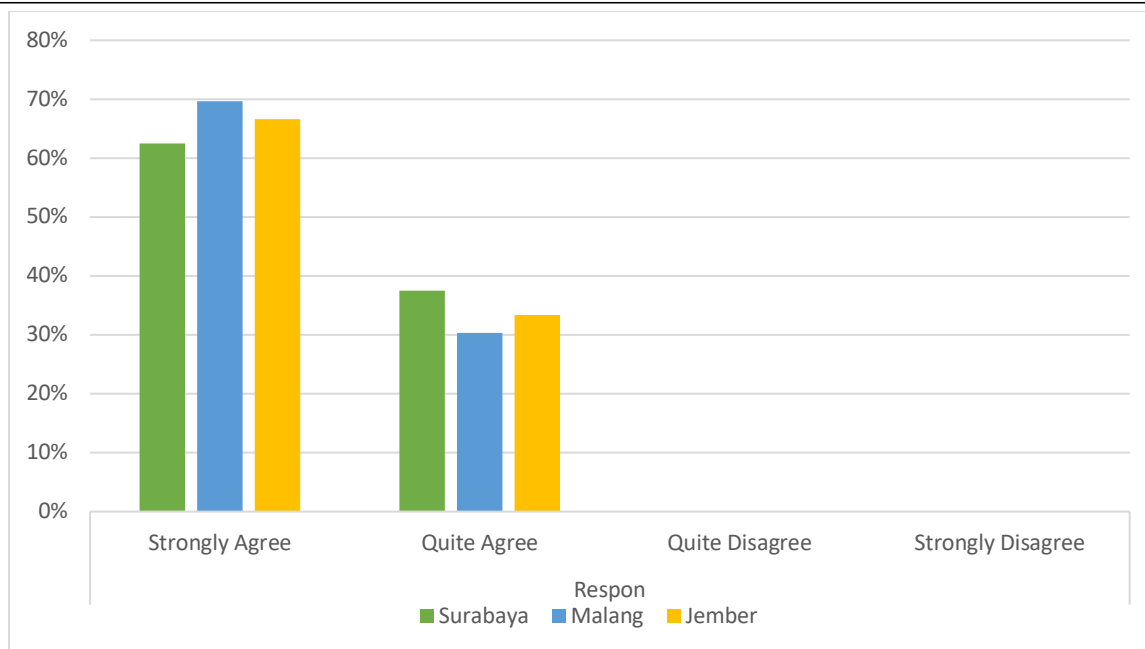


Figure 2. Students' Responses to The Blended Learning Resources

Figure 2 shows that more than 60% of UPBJJ Surabaya students agree with the Blended Learning teaching materials. In comparison, nearly 40% of students entirely agree, and there are no students who disagree or disagree. Meanwhile, for UPBJJ Malang students, 70% of students strongly agree, 30% quite agree, and 0% of students disagree or disagree. Then for UPBJJ Jember students, around 65% of students strongly agree, and 35% quite agree. This shows that the majority of UPBJJ Surabaya students are interested in Blended Learning teaching materials and feel that there are many new components in this Blended Learning teaching material. Blended Learning teaching materials are easy to understand and learn. The majority of students are also interested if Blended Learning teaching materials are applied to other subjects.

Readability of Teaching Materials

Teaching materials provided to students are in the form of video and print. The average score of the readability of student teaching materials is shown in Figure 3.

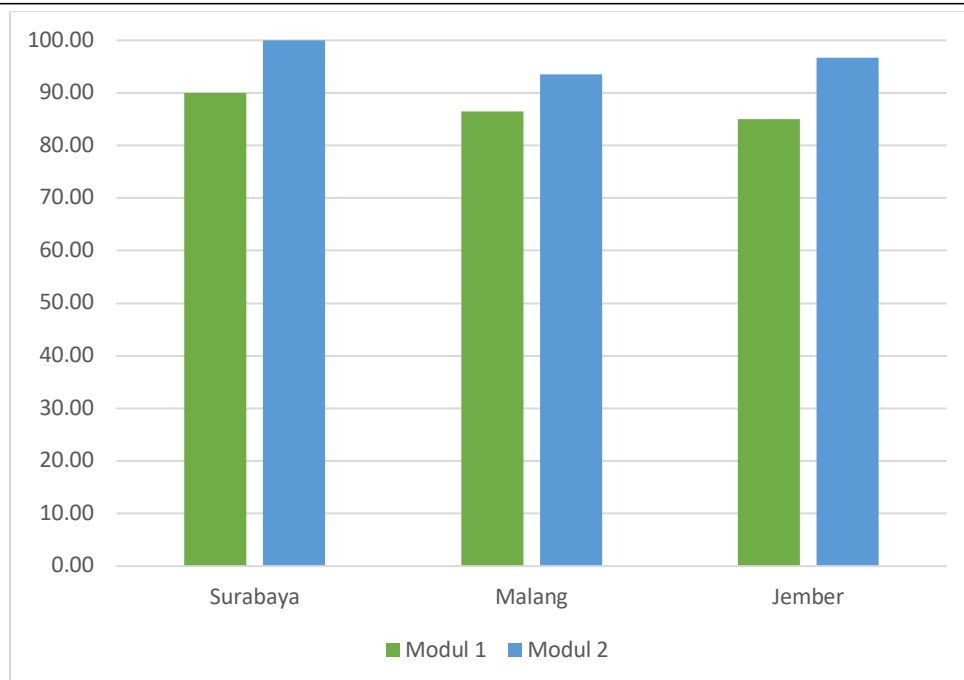


Figure 3. Readability of Blended Learning Teaching Materials

Based on Figure 3, students from UPBJJ Surabaya got very high points in both modules, but in module 2, the readability score of student A was higher than in module 1. Likewise, UPBJJ Jember students got a readability score of more than 80 in module 1, and the score is more than 90 in module 2. For poor UPBJJ students, in module 1, the readability score ranges from 80 to 90, while the readability score of module 2 teaching materials ranges from 90 to 100.

The Implementation of Blended Learning

Table 3 shows blended learning in solid substances courses conducted in Surabaya, Malang, and Jember. The learning implementation includes face-to-face education, video learning, and print media learning.

Table 3. The Implementation of Blended Learning

UPBJJ	Face to face	Video	Printed
Surabaya	S	S	C
Malang	S	S	S
Jember	S	S	S

It appears that almost all UPBJJ students, both from Surabaya, Malang, or Jember responded that blended learning in solids subjects had been carried out very well.

Students Activities

In addition to learning outcomes, cognitive styles, and learning feasibility, other things observed in this study were student activities during learning with blended learning. The activities observed were conducting the pre-test, observing the tutor explaining the introduction, observing the PowerPoint, observing the learning video, recording important issues, asking questions, completing

student worksheets, presenting student work, paying attention to the tutor's explanation delivering the answer sheet student work, as well as doing a post-test.



Figure 4. Students Activities in Blended Learning

Students from UPBJJ Surabaya can be said to be very active in participating in learning activities; it can be seen from Figure 4 that students from UPBJJ Surabaya participate in 90% of learning activities. This means that only 1 in 10 activities that student A does not do, namely watching the learning videos. Then, UPBJJ Malang students are also very active in participating in this Blended Learning learning activity. Almost all student respondents participate in all learning activities. Meanwhile, students from UPBJJ Jember also seemed very busy participating in this Blended Learning learning activity. Of the three student respondents, two students participated in all learning activities, while one student participated in 8 out of 10 movements.

Comments and Suggestions

Then students are also allowed to submit their comments and suggestions regarding learning activities using blended learning. Here are some comments and suggestions from student respondents:

1. Face-to-face tutorial activities like this need to be done frequently.
2. The delivery of material in the video needs to be slowed down.
3. Subsequent learning should use blended learning because modules only guided it during the previous tutorial. It was challenging to answer evaluation questions; examples of questions and discussion were not many, and answer keys were sometimes wrong / not suitable.
4. This learning is quite good, and I can follow this lesson because it is easy to do.
5. The material is easy to understand
6. Learning is not monotonous, so it increases motivation to learn

CONCLUSION

Based on the research data analysis results, it can be concluded that blended learning resources found on cognitive style can significantly improve students' learning outcomes. The implementation of composite learning resources based on cognitive techniques shows that most students got an

average N-gain at a high and moderate level. This study also raises information that blended learning resource based on cognitive styles effectively increases students' learning outcomes. Blended learning allows teachers/tutors to provide a more comprehensive learning experience for students.

Recommendation

This research implies that blended learning resources based on cognitive styles can be an innovative solution to improve student learning outcomes, especially in distance education systems. The implementation of blended learning is, of course, inseparable from the main components that synergize to produce the expected learning outcomes.

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