

Research Article

Relationship Between Learning Style and Critical Thinking Skill Through Hybrid Learning on the Topic of Work and Energy

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Abstract.

Critical thinking skill is one of the abilities that must be possessed by students in the 21st century. Students are currently not trained to always think critically, which could be caused by the learning styles of the students themselves. The learning style here is a combination of a person's state of being able to absorb, be able to organize, and be able to process information. This study aims to analyze the implementation and relationship of learning styles with critical thinking skills after the hybrid learning model is applied to the work and energy materials. The method used correlation analysis with product-moment correlation. The sample of this research was the students of class X MIPA, totaling 16 students who were selected by using the saturated sampling technique. The instruments used were a learning style questionnaire (an authentic assessment based on teaching and learning trajectory) with student activity sheet (AABTLT with SAS), and critical thinking skills test questions. The results showed that the average percentage of learning implementation using the hybrid learning model was 91% with a very effective category. The results of the hypothesis test using the product-moment correlation test, then count $(0.110) < \text{table } (0.497)$ or count less than stable, so H_a is rejected and H_0 is accepted. The results of this study can conclude that there is no significant relationship between learning styles and critical thinking skills of students of class X MIPA on the matter of work and energy.

Keywords: learning style, critical thinking skill, hybrid learning

1. INTRODUCTION

Hybrid Learning or commonly called Blended learning is a learning process that unites various learning methods by combining virtual resources and physical contact. M.Finn defines blended learning is integrating or hybrid learning on the programs in different formats to achieve a common goal [1]. Heinze A in his research states that blended learning or hybrid learning is a mixed model of various learning strategies and methods of delivering the learning process which strategy is based on offline and online, especially online learning based on web/blog, without leaving face-to-face activities [2]. The

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hybrid learning model is a combination of face-to-face learning with online learning or e-learning. Thus, the combined purpose of this hybrid learning is to combine the nature of the learning model [3].

The use of the learning model can be applied by looking at the characteristics of students. This can be seen from the students' learning styles. De Porter explains that learning style is a combination of how a person can absorb, organize and process information [4, 5]. An appropriate learning style is a key to student success in learning [5]. Hamzah in his research stated that "There are several categories/types of a person's learning style that we can know and observe that we might follow if we feel that we are suitable for such a learning style, including visual learning styles, auditory learning styles and kinesthetic learning styles" [6]. Visual learners are different from auditory learners who rely on the ability to hear. Meanwhile, kinesthetic students prefer to learn by being directly involved [7]. Recognizing one's own learning style does not necessarily make someone smarter, but knowing one's learning style will be able to determine a more effective way of learning [8].

Ennis' statement that critical thinking is a process in which one of the aims is to make a decision about what to believe and what to do in a learning process [9]. The term Focus is related to identifying the main focus or concern, Reason relating to identifying and assessing the acceptability of the reason, Inference relating to assessing the quality of conclusions with the assumption of reasons to be accepted, Situation relating to the situation carefully, Clarity relating to clarity then check to make sure the language is accurate and clear and Overview relating to double check or step back and see everything in its entirety [10]. Several critical thinking indicators, Ennis identified 12 critical thinking indicators, which is 1) Formulate questions; 2) Analyze arguments or questions, 3) Answering questions about an explanation or question, 4) Consider the credibility of a source; 5) Observing and considering an observation report; 6) Deduce and consider the results of the deduction; 7) Make and consider value decisions; 8) Induce and consider the results of induction; 9) Define terms and consider a definition; 10) Identify assumptions; 11) Define action; and 12) Interact with other people.

Nurbaeti's research states that students' learning styles have a close relationship with the achievement of the average value of students' critical thinking skills [11]. This makes it difficult to achieve educational goals, one of which is an indicator of critical thinking ability [12]. This is based on the theory that has been put forward by experts (especially Piaget), that critical thinking skills can already be applied to students at the junior high school level, because the age of students in junior high school (+ 12-15 years) is included in the category of the formal operation stage [13].

Critical thinking skills can be trained through practice and patience in thinking process activities, so that students more easily understand concepts and materials that have a broad scope and affect higher student learning outcomes [14]. Nurbaeti in her research states the learning process goes well, the learning objectives will also be achieved [15]. Thus, when students are able to think critically, on the other hand, it can also improve student learning outcomes [16]. With the ability to think critically allows students to find the truth in the midst of events and information that occurs every day [17]. The roots of this hybrid learning research can be traced to information systems researchers, while information systems researchers have a very important role in drawing attention to the impact of technology to develop this education [18].

2. METHOD

The method used is the method of correlation analysis with research design based on the situation and conditions in the field [19]. The sample of this study was the students of class X MIPA in one of Madrasah Aliyah in Subang, totaling 16 students from 31 students who were selected with saturated sampling technique, because the situation of COVID-19.

Data instrument in this research using using instrument worksheet with AABTLT with SAS, learning style questionnaire using Likert Scale, and critical thinking ability test. There are 3 stages in this research, namely the planning stage, the implementation stage and the final stage, the following data analysis techniques: implementation of learning analysis, learning style questionnaire sheet analysis, and critical thinking ability test analysis. The relation between learning style and critical thinking ability using hypothesis test with Normality Test (Chi Square) and Hypothesis Testing with Product Moment Correlation).

3. RESULT AND DISCUSSION

3.1. Implementation of hybrid learning

For the implementation of the Hybrid Learning model in online learning, using the WhatsApp Group application, Google Classroom, Google Form. Documentation of activities is presented from Figure 1 to Figure 2.

Figure 3 shows offline learning activities for learning calligraphy activities. In the implementation of learning the number of questions is 8, for the stages of each question

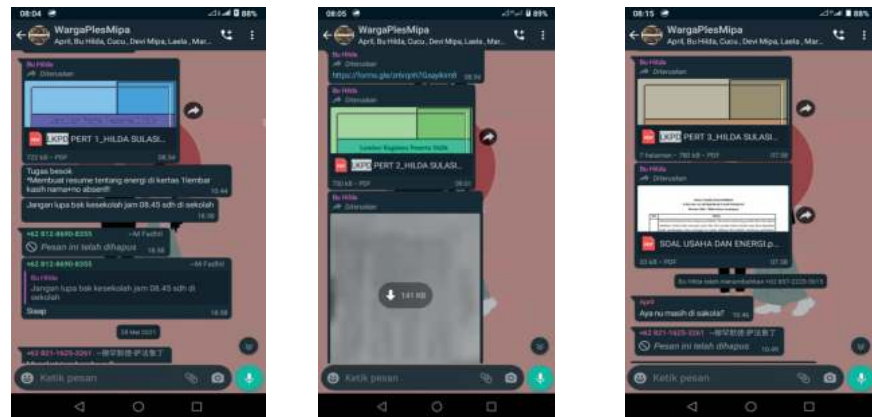


Figure 1: Distribution of worksheet and posttest.

	Tidak ada ... POSTTES 1 dari 100	Tidak ada ... LKPD PERT 3 dari 100	Tidak ada ... LKPD PERT 2 dari 100	Tidak ada ... LKPD PERT 1 dari 100
Angi Sundari	90 Draf	100 Draf	90 Draf	100 Draf
Eka Juliani Sadiyah	80 Draf	98 Draf	90 Draf	90 Draf
Fitri Yanti	70 Draf	90 Draf	90 Draf	98 Draf
FN RANDOM	90 Draf	96 Draf	98 Draf	94 Draf
Gita Yuliani	95 Draf	97 Draf	96 Draf	92 Draf
Iaila al Jannah	98 Draf	90 Draf	95 Draf	78 Draf
Mega Raisya Octaura	98 Draf	95 Draf	100 Draf	89 Draf

Figure 2: Assessment for worksheet and posttest.

consist of 4, namely apperception, motivation, problems and asking, conclusions. All that stages was doing when online and offline learning.



Figure 3: Offline learning.

3.2. Grouping of learning styles and critical thinking skills

Student learning style test results are presented in the Figure 4.

Grouping of Learners' Learning Styles

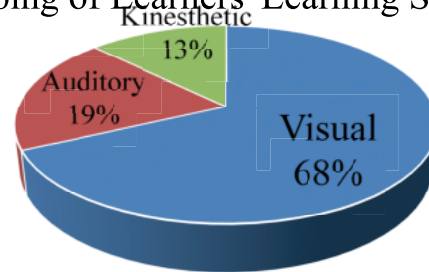


Figure 4: Diagram of the grouping of students' learning styles.

Figure 4 shows that 68% of students tend to have a visual learning style, 19% of students tend to have an auditory learning style and 13% of students tend to have a kinesthetic learning style. After classifying students' learning styles, researchers will classify critical thinking scores based on learning styles.

Critical Thinking skills Based on Learner's Learning Style

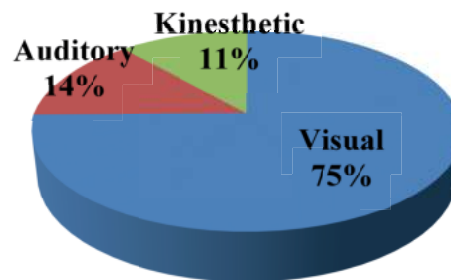


Figure 5: Diagram of critical thinking skills based on student learning styles.

Figure 5 shows the percentage of students' critical thinking skills grouping based on learning styles. It shows that students' critical thinking skills as a whole can be categorized into 3 categories of learning styles with the following influence or percentage: visual learning style has the highest percentage in the implementation of critical thinking ability tests. students who get a percentage of 75% with a total of 11 students, for auditory learning style has a percentage of 14% with 3 students, and for kinesthetic learning style has a percentage of 11% with 2 participants. Overall, it can be concluded that most students have visual learning style categories so that the learning style in the classroom is more dominant in what they see or see than what they hear and do. Thus, the percentage value of the critical thinking ability test of students in the visual learning category is higher than the auditory and kinesthetic learning style category. Because basically every student has a different category of learning styles, but not

all of them develop in a balanced way, but some dominate with their learning style category. This causes students to like learning that varies according to the category of learning styles they have. The diversity of categories of student learning styles requires a selection of suitable teaching strategies or teaching styles so that the strengths of students' learning styles develop properly. By involving visual, auditory, and kinesthetic aspects, it is expected to be able to increase students' learning activities [8].

Meanwhile, the percentage of critical thinking skills based on each indicator is presented in Figure 6.

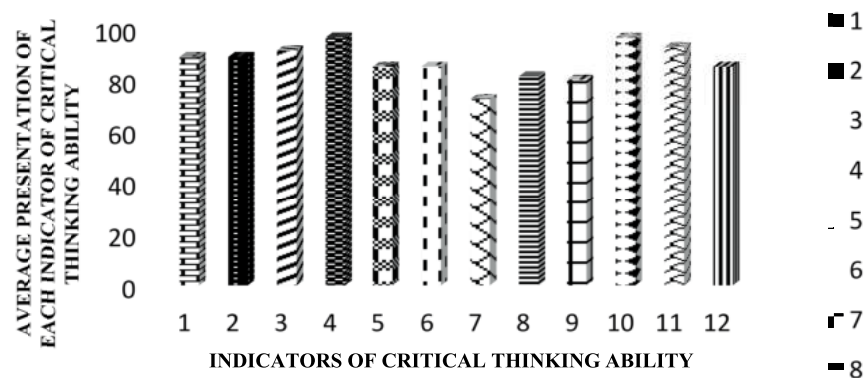


Figure 6: Average percentage of each indicator about critical thinking skills.

Figure 6 shows that the average percentage of each indicator about students' critical thinking skills is very high, from 73-100%. The indicator about the critical thinking ability of students who have the highest score is the question indicator 4 considering the credibility of a source and indicator 10 identifying assumptions with a value of 96%. While the lowest is indicator 7 induces and considers the results of induction by 73%. The factors that have the greatest influence on the process of achieving student learning outcomes with critical thinking ability tests are intelligence and talent, critical thinking skills must be possessed by a student, because based on existing theory it can be concluded that critical thinking skills play an important role in regulating and controlling one's cognitive processes in learning and thinking, so that one's learning and thinking becomes more effective and efficient [20].

3.3. The relationship between learning styles and critical thinking skills

Analysis for relationship between learning style and critical thinking skills are show in the Table 1 and 2.

TABLE 1: Critical thinking skills data normality test.

Criterion	Critical Thinking Skills
Number of Students	16
Maximum Value	98
X Average	87
Chi-Square (Xcount)	11
Degrees of Freedom	5
Chi-Square (Xtable)	11.0705
Information	normal distribution

Table 1 shows that the critical thinking skills can be categorized as data that is normally distributed if the calculated chi-square value (Xcount) is smaller than the table chi-square value (Xtable). For critical thinking skills shows that the value of Xcount (11) < Xtable (11.0705), thus the critical thinking skills test data of students is normally distributed.

TABLE 2: Hypothesis testing data recapitulation.

Criterion	Value
r_{count}	0.110
r_{table}	0.497
Criteria	H_a is rejected, H_0 is accepted
Information	There is no significant relationship between learning styles and students' critical thinking skills

The data in Table 2 shows the results of hypothesis testing conducted using Product Moment Correlation. Based on the results of data processing above, it can be concluded that H_a is rejected and H_0 is accepted, meaning that there is no significant relationship between learning styles and students' critical thinking skills through a hybrid learning model on work and energy materials. The factors causing the absence of a significant relationship include the learning styles of the students themselves, because in order to provide the best way of learning for each individual, the learning style must be determined/known in advance by considering differences such as personality, perception, ability and intelligence [21]. Then another factor is the lack of development of students' critical thinking skills, because according to Lambertus the development of students' critical thinking skills can be strengthened through the application of student-centered learning, because students are given the freedom to build their own knowledge, discuss

with friends, are free to express opinions, can accept or reject the opinion of friends and can formulate conclusions [22]. Another factor that causes the absence of a significant relationship between learning styles and students' critical thinking skills is because the results of processing critical thinking skills tests show various averages. The factors that have the greatest influence on the process of achieving student learning outcomes with critical thinking ability tests are intelligence and talent [23].

Competence in the achievement of critical thinking skills by students may therefore be influenced by the learning style preferences of each individual [24]. Critical thinking skills and learning styles of students are a major concern for educators because they affect the teaching methods used in their development in teaching in a learning classroom. In this study, lack of information about the learning styles of students resulted in no significant relationship with students' critical thinking skills, so that further research should dig deeper into the categories of students' learning styles themselves in more detail in order to get maximum results, namely In addition to being seen and considered in terms of the personality of the students, it is also seen from the side of the perception of each student based on learning styles or experiences in learning to gain knowledge, then it should also be seen in terms of intelligence and children's ability to manage knowledge information better in order to get results. maximum and knowing and considering the more detailed categories of learning styles of students. And then the teaching of critical thinking must therefore focus on explicitly teaching its guiding principles, as well as putting the skill into practice through exercises that promote its use [23]. Because 21st schools and universities as well should prepare students for a different social life, a different economic world and a more demanding and skills-oriented workplace. It is the century of digital literacy, technological advances, multicultural societies, human mobility, global communication, social networking, innovations and creativity and inclusiveness. In other words, 21st century students need to develop the necessary 21st century skills [24].

4. CONCLUSION

The results of the study show that the learning process using the hybrid learning model, very effective category. Based on the calculation results from the learning style questionnaire, it shows that the category of learning styles is visual learning style. There is no significant relationship between learning styles and students' critical thinking skills through a hybrid learning model on work and energy materials. The factors causing the absence of a significant relationship include the learning styles of the students

themselves, because in order to provide the best way of learning for each individual. But, based on the results of the calculation of the value of students' critical thinking abilities, it shows that students' critical thinking skills have a very good category and the percentage of each indicator about students' critical thinking skills has various values, but is still in the very high category, meaning that the value obtained by students in The critical thinking ability test of students is very good.

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