Measuring biology educations students' critical thinking skill using online System

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Measuring biology educations students' critical thinking skill using online systems

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Abstract. The times always had implications for the education, not least the trend of the industrial revolution 4.0. Therefore, students must be able to compete and use technology intelligently and appropriately. It is the obligation of educators to be able to equip and develop skills for students, so that they have high competitiveness. These skills can be in the form of critical and creative thinking skills. The aims of this study is to Measuring students' critical thinking skill Using online systems. These skills can be measured quickly and precisely through online test, which is currently in line with the era of the industrial revolution 4.0 which emphasizes the internet of things. This measurement is carried out for biology education students in the first semester. The measurement results show that the critical thinking skills of biology students in grade one are still low. The categories of critical thinking skills that most high is the ability to Ask and answer questions the scores achieved by 63.3%. While the lowest category is create and determine the results of consideration with a score of 51.6%.

1. Introduction

Time changes continuously, as it has now switched to the industrial revolution 4.0. Industry 4.0 is an era where manufacturing technology has entered the trend of automation and data exchange. This trend has changed many areas of human life, including the world of education. Industrial revolution 4.0 embed intelligent technologies that can be connected to various areas of human life. This change also requires major changes in our education system. The conveniences offered by technological advances must be welcomed by change.

Every trend of the times has always had implications for the field of education, including the trend of the industrial revolution 4.0. Many scholars and studies have also discussed the importance of critical thinking skills in the context of 21st century education and workforces [1]. Barrington also discussed critical thinking education in the context of students' abilities to enter a modern, 21st century workforce [2]. Students must be able to compete and use technology intelligently and appropriately. It is the obligation of educators to be able to equip and develop skills for students, so that they have high competitiveness. These skills can be in the form of critical and creative thinking skills. These skills can be measured quickly and precisely through online, which is currently in line with the era of the industrial revolution 4.0 which emphasizes the internet of things. The purpose of education itself is nothing but a provider of infrastructure to develop students' talents and abilities optimally. Talents that need to be developed to deal with the development of knowledge and technology in a country not only by using cognitive intelligence but also critical and student creativity. Education is the main part for the nation to develop and advance, so that the nation can harmonize with the times that are always developing and advancing.

The demands of 21st century education, which are currently in the era of the industrial revolution 4.0, demand the emergence of a superior generation capable of critical and creative thinking. Many contemporary studies have discussed the importance of critical thinking in a 21st Century workforce and in a knowledge-based economy [3 - 6].

Indonesia's national qualification framework (KKNI) curriculum emphasizes that Biology learning is giving direct experience to students to be able to develop, explore the surrounding environment in a scientific manner. The emphasis is expected to improve their abilities in the learning process, that is, be able to foster critical and creative thinking skills. The 2013 curriculum has a pattern in which it wants to create critical and creative Indonesians. So from this it can be interpreted that the ability to think critically and creatively is important to be owned by students. So the ability to think critically and creatively must be possessed by all students at every level of education.

Critical thinking is an attempt to create new ideas from previous experiences or discoveries. According to Ennis [7]. Critical thinking is thinking that makes sense, reflective thinking that is focused on deciding what to believe or do aspects of competence at the level of critical thinking which includes; elementary clarification, basic support, inference, advanced clarification, manage strategy and tactics. Teacher' capacities are particularly pivotal commitment to pupil learning. Teachers need to realize how to make the strides important to accumulate data that will enable them to make better bases judgment about what is happening and what techniques might be useful. The educators ought to comprehend and have the option to incorporate information on the substance into exercises on educational plan, instructing, learning, and students [8].

Students' ability to think critically can be done by conducting an assessment. Learning evaluation is needed to measure the learning success of students indirectly by using quantitative measures with fixed units. Based on the survey results obtained information that there are still many teachers who have not assessed critical thinking skills.

2. Method

This study is a quantitative descriptive research which is a pre-research of development research conducted by providing tests to obtain data on students' initial ability to think critically. The subjects of this study were the first semester of biology education students, as many as 80 students. Test results were analysed based on the Ennis indicator [9, 10] as in Table 1.

Table 1. The critical thinking skill based on Ennis indicator.

Aspect of Critical Thinking	Indicator
Basic Clarification	1) Focus on a question
	2) Analyzing Argumen
	3) Asking and answering questions of clarfication
Basic Support	4) Judging the credibility of a source
	5) Observing and judging observations reports
Inference	6) Deducing and judging deductions
	7) Inducing and judging inductions
	8) Making and judging value judgments
Advanced clarifications	9) Define terms and judge definitions
	10) Identifying assumptions
Strategy and tactics	11) Deciding on action
	12) Interacting with others

3. Result and Discussion

3.1. The Category of Student's Critical Thinking Skill

This research was carried out in the Biology education study program, Sriwijaya University, namely the first semester students taking general biology courses, as many as 80 students. Students are given a test of 12 multiple-choice reasons. The analysis showed that the ability to think critically mostly included in

the low category. The results of the analysis of these critical thinking skills tests are presented in Figure 1.

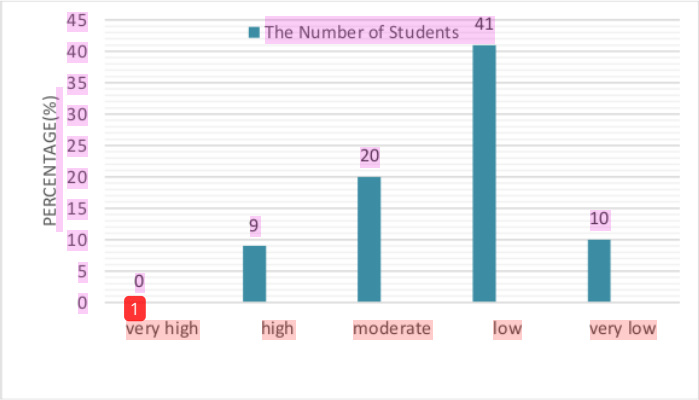

Figure 1. The category of students' critical thinking Skill.

Critical thinking test results can be easily assessed using online tests. The assessment becomes more effective and efficient because we do not spend the paper and we can immediately assess the value immediately, we can get accurate student achievement. According to Elliott [11], it is now necessary to put a greater role on e-learning and advance towards personalized learning and assessment. Since life-long learning is of increasing importance, e-learning cannot be neglected. Based on Figure 1, it can be seen that the critical thinking skills obtained by students are vary, according to the range of students' critical thinking abilities, namely very high, high, medium, low and very low. Based on the data obtained there were no students included in the very high category. And as many as 8 students included in the category of very low with a percentage of 10%.

The ability to think critically is still relatively low, this is because students are not accustomed to solving questions that stimulate students to think critically. The factors that cause the low ability of critical thinking of participants are students not trained to involve critical thinking processes in answering questions because the questions commonly used do not have indicators of critical thinking. Besides the commonly used questions have a low cognitive level so that students can only answer questions in the form of memorization. Through the practical advantages of e-assessment we should now use it not only to assess results but also to improve the learning process.

3.2. The Indicator of Critical Thinking Skill

Table 2 shows that the ability of students to answer questions based on indicators of critical thinking skills. It can be seen that the indicator ask and answer the question greater percentage than the other indicator that is 63.3%. And indicators make and determine the results of consideration has a lower percentage than other indicators that is 51.6%. The indicators in making and determining the results of student considerations are still relatively low, one of the reasons is because they are not accustomed to being faced with a problem. They are not accustomed to considering certain solutions in solving a problem. Solving problem enabling students to think about things, they need to utilize conceptualizing in critical thinking forms, gain practicability in speaking, understanding and participation. Thinking on the outcomes and causing races to give that students gain sympathy, bargain and they share the duty of the choice. In end students can be autonomous evaluator in their employments by assessing their blunders and decisions [12]. Breaking down contentions including the second least, students are not talented in examining contention scores got just 52.1%. It's is brought about by students not straightforwardly associated with passing on and investigating contentions in exchanges, dialog exercises are frequently just a single course.

Teachers need to structure exercises that offer students the chance to figure out how to deliver clarifications from information, distinguish and survey the pertinence or effectiveness of proof, lucid

and bolster clarifications in contentions, react to questions or counter contentions, and modify claims dependent on criticism they get or dependent on new proof so as to accomplish these objectives. Educators additionally need to discover approaches to enable students to learn, adjust, and utilize similar criteria utilized for scholars to figure out what includes as logical information in the field of science ensured certain. Talking about and assessing dubious issues that happen in regular day to day existence make the science proficiency of students increasingly created [13].

Table 2. Indicator of critical thinking skill.

No.	Indicator of Critical Thinking Skill	Amount	Percentage
1	Analyse arguments	250	52.1
2	Ask and answer questions	304	63.3
3	Induce and consider the results of induction	268	59.4
4	Create and determine the results of consideration	248	51.6
5	Determine an action	270	56.3

Another factor that causes the ability of students to think critically is low, students' lack of training to answer questions that give rise to natural phenomena. The ability to think critically can be developed by always asking and questioning phenomena that are happening. The ability to think critically is positively related to learning outcomes. Students with low critical thinking skills will be followed by low cognitive learning outcomes as well [14]. Therefore, related factors that are determinants in improving students 'critical thinking skills must be considered by teachers and students so that with the increase in students' critical thinking skills, the cognitive learning outcomes obtained will also increase.

Students' critical thinking skills are still relatively low indicating that an evaluation is needed in the learning process. Critical thinking skills are skills that can be empowered in many ways such as through learning models, teaching materials, open ended questions, conceptual questions, assignments, use of stories, and literature [15].

4. Conclusion

Students' critical thinking skills are still relatively low indicating that an evaluation is needed in the learning process. Critical thinking skills are skills that can be empowered in many ways, through the practical advantages of online tests (e-assessment) we should now use it not only to assess results but also to improve the learning process. Online tests are continuously used as a formative assessment can be used as a tool to improve students' critical thinking skills online tests definitely offer a comparative advantage to empowered the students' critical thinking skills.

5. Acknowledgments

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