



Profile of Critical Thinking Ability of High School Students on Animalia Material During Hybrid Learning in the Pandemic Era

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Abstract: The spread of the Covid-19 virus has brought changes in various sectors including education. Various policies have also been implemented in schools, such as distance learning to face-to-face learning on a limited basis. 21st century skills emphasize the creation of students who are able to apply technology in the digital era, think creatively and think critically. This study aims to determine the critical thinking skills needs of high school students in class X during the pandemic, especially on animalia material. The subjects of this study were high school students in class X in the province of Central Java, which was carried out using a random sampling technique. This research is quantitative research using a questionnaire sheet via google form consisting of 10 critical thinking questions. The instrument test was tested for validity and reliability using RASCH model with the Winsteps 3.73 application. The results of this study indicate that students' critical thinking skills are still low and further research is needed to improve students' critical thinking skills.

Keywords: Critical tinkng; Pandemic covid 19; E-Modul; Teknologi

Introduction

The spread of the Covid-19 virus has brought changes in various sectors including education. Various policies have also been implemented in schools, such as distance learning to face-to-face learning on a limited basis. Various limitations such as media, distance, and relatively short time make it difficult for teachers to ascertain whether students are really learning, and to build their own knowledge and thinking skills. Meanwhile, the Regulation of the Minister of Education and Culture of 2013 Number 65 explains that the learning process in educational units must be carried out interactively, inspiring, fun, challenging, motivating students to participate actively, and critically and provide sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students.

Critical thinking is a cognitive aspect that needs to be possessed by students as a provision to face

competition and also the challenges of the 21st century. Critical thinking skills are fundamental skills in learning, which are expected to be able to provide further explanations, carry out various decision-making analyzes that lead to rational action and logical (Ennis, 2011; Finita, 2015; King et al., 2012). Someone said to have critical skills can be seen from the characteristics during the learning process such as displaying intelligence to solve a problem, decide and assess a problem accurately (Dewi et al., 2019; Haryanti et al., 2016).

Critical thinking skills cannot emerge by themselves, especially in the current pandemic situation, learning is not optimal. This has made various countries affected by COVID-19 start looking for new solutions to overcome the learning difficulties of students while studying from home. In India, among 175 respondents, around 38.29% of students study classes via Zoom, almost 25% of students access learning materials through Google Classroom and 23.43% study via YouTube, and the rest prefer WhatsApp (10.29%), Mail

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(2.86%) each (Sathishkumar et al., 2020). Meanwhile in Indonesia, the ministry of education and culture states that schools should organize distance learning according to their respective conditions, and advises students and students to do learning from home with online learning both synchronously and asynchronously, through platforms: *Google Classroom/ Edmodo/ Schoology / Classdojo (for kids), to record video material via: Camtasia/ Screencast-O-Matic/ Seesaw/ Xrecorder, and for practice you can use Quizlet (flashcards and diagrams), Quizizz (homework) or Kahoot (Kemdikbud, 2020)*. This proves that technology plays a very important role in realizing effective learning, especially during the COVID-19 pandemic.

Information technology can be accepted as a medium in carrying out the educational process, including the teaching and learning process, which also involves searching for references and sources of information (Boru et al., 2021). One of the learning references that can be used online is the E-Modul. An electronic module or E-module is a form of presenting self-study materials that are systematically arranged in a learning unit to achieve a certain learning goal, which is presented in an electronic format and is practically used anywhere and anytime. E-Modules can help students in independent learning. In accordance with Razzaq (2018) which explains that electronic modules can be interpreted as a form of independent learning media that is systematically arranged in easy-to-understand language into learning units and displayed with electronic devices in the form of computers or smartphones. In line with that (Nurhidayati et al., 2018) revealed that E-modules can be used as learning media because they have various advantages, namely that they can be accessed anywhere and integrated content by video, audio, and images that help students understand the lesson. In addition, E-Modules are media that help students learn learning materials independently in their use so that E-modules are more efficient and effective for students to use (Wulansari et al., 2018; Hamzah et al, 2017).

The independence of students in learning can trigger students to think critically. Therefore, it is necessary to develop e-modules that can facilitate students to improve their critical thinking. One of the platforms that can be integrated with video, audio, and images is the *smart apps creator*. According to (Saputra et al., 2021) Previous research has proven that development products *Smart apps creator* can be used in online and offline learning so that the learning process can be more practical and effective. Previous research has also proven that the application of mobile learning models using *smart apps creator* effective for improving student learning outcomes (Khoirudin et al., 2021). Thus, this research was carried out with the aim of analyzing the need for e-modules based on *smart apps creators* in

terms of students' critical thinking skills in hybrid learning in the pandemic era.

Method

This research is a quantitative research using a survey method that focuses on students' critical thinking skills. The subjects used in this study were students of class X SMA in one of the districts in Central Java selected by *random sampling technique*. This study aims to determine the critical thinking skills of students on animalia material, and the research procedure includes the preparation of test instruments that have been validated with the *Winsteps 3.73*. The distribution of the test questionnaire through the link of the *google form* which consists of 10 *critical thinking* and 70 respondents obtained.

The instruments used were tested for validity and reliability using *Rasch Model* with the *Winstep 3.73* application. Measuring the reliability of the questions using *summary statistics* by looking at the results of *Cronbach's alpha*. The analysis of the *Rasch* can provide information as a whole, the quality of the instruments used, the quality of student responses as a whole and the interaction between respondents and item questions (Chan et al., 2014).

The reliability criteria are as follows: < 0.67 (weak); 0.67-0.80 (enough); 0.80-0.90 (good); 0.91-0.94 (very good); > 0.94 (special). Then for the analysis of item items based on the level of difficulty and differentiating power of the questions. The reliability test used *Cronbach's Alpha* with the following criteria 0.00-0.20 (very low); 0.21-0.40 (low); 0.41-0.70 (medium); 0.71-0.90 (high); 0.91-1.00 (very high).

The results of measuring the validity of the questions can be seen from the analysis of the level of suitability of the items (*item fit*). Measurement of instrument validity is based on the *Outfit Mean Square (MNSQ)*, *Outfit Z-Standard (ZSTD)*, and *Point Measure Correlation (Pt Mean Corr)* values. With the following criteria: b *Outfit Mean Square (MNSQ)* value received: $0.5 < \text{MNSQ} < 1.5$, Value of *Outfit Z-Standard (ZSTD)* accepted: $-2.0 < \text{ZSTD} < +2.0$, *Point Measure Correlation (Pt Mean Corr)* value: $0.4 < \text{Pt Mean Corr} < 0.85$. Items that are categorized as valid and feasible based on validity analysis using the *Rasch* are if they meet all the specified criteria, but if there are one or two tables which do not match the item questions can still be used or the same as valid. Analysis of the critical thinking skill level of the respondents themselves was measured through the distribution *Wright map* obtained from calculations using the *Rasch model*.

Result and Discussion

Based on the results of research conducted by analyzing critical thinking questions that have been disseminated using google form in January 2022 and have been filled in by 70 respondents of high school students in one of the districts in Central Java, the following results are obtained.

Table 1. The Results of the Reliability Test

	Value
Person Reliability	0.72
Item Reliability	0.84
Alpha Crombach	0.89

Table 2. The Results of the Validity Test

Question	MNSQ	ZSTD	CORR
S5	1.47	1.1	0.54
S3	0.65	-1.2	0.76
S4	0.68	-1.1	0.74
S7	1.91	2.7	0.44
S10	0.55	-1.9	0.83
S8	1.34	1.1	0.57
S6	1.36	1.0	0.61
S9	0.84	-0.2	0.63
S2	0.43	-1.3	0.69
S1	0.53	-0.7	0.57

Based on the results of the validity and reliability test of critical thinking items that have been analyzed through *Rasch* model, the person reliability value is 0.72 and item reliability is 0.84. Based on this value, it can be categorized as good so that the research instrument test is in accordance with the *Rasch* model requirements. So it can be said that critical thinking skills are feasible to use. value obtained *Cronbach Alpha* is 0.89, which means that the measuring instrument or questions used are included in very good criteria. Results of the item validity test using the *Rasch* modeling criteria *Rasch*. All of the test scores have met the criteria for the CORR because they did not pass 0.85. So it can be said that the ten questions used have been tested for feasibility.

In the *Rasch model*, the item difficulty level is basically a comparison between the number of correct answers and the number of questions being tested (*odds-ratio*). However, what makes the difference is the value of the opportunity. The probability value is scaled by entering a logarithmic function called logit. the level of item difficulty or *item difficulties* to explain the diversity of items. A good instrument must have a good variety of item difficulty levels. This is so that each level of student ability can be represented by these questions. According to Kurniawan & Andriyani, (2018) by using the average *logit* value combined with the standard deviation (SD) value, grouping the level of difficulty of the questions can be done. Information on the difficulty level of each item can be seen in table 3.

Table 3. The results of the E-module Needs Analysis Test

Entry Number	Total Score	Total Count	Measure	Items
3	24	70	1.75	s3
5	30	70	1.13	s5
4	31	70	1.02	s4
10	37	70	0.37	s10
7	37	70	0.37	s7
8	43	70	-0.29	s8
6	46	70	-0.61	s6
9	49	70	-0.94	s9
1	51	70	-1.16	s1
2	55	70	-1.62	s2
Mean	40.3	70.0	0.00	
S.D.	9.6	0.0	1.05	

The Table 3 shows the logit values of the items sorted from the largest to the smallest. Thus, researchers can map the level of difficulty of the items based on the standard deviation and mean values obtained from the output table 13. *Item: measure*. The number of groups can be calculated mathematically from the separation value. In addition, to see the level of difficulty of the distribution of questions and persons can be seen in the variable map in Table 4.

Based on the results of the data shown in Table 4, namely the map of the distribution of the variable map above, on the right is the distribution of student responses totaling 70 critical thinking skills. While on the left picture is the distribution of students' critical thinking questions with symbols S1-S10. Based on the results of the distribution of students' logit, it can be concluded that the higher the logit, the higher the level of critical thinking skills of students, and vice versa, the lower the logit value of students, the lower critical thinking skills of students. In the distribution of the data, by comparing the average logit value of 0.00 which is higher than the logit person of -0.04, this means that the average respondent is lower than the question.

Based on the data on Table 4 it can be concluded that students' critical thinking skills during the COVID-19 pandemic were still relatively low. Previous research also explained that critical thinking skills during the COVID-19 period were 60.8% with low criteria. This is due to the lack of learning materials that direct and train students during the pandemic to improve critical thinking skills (Yang et al., 2021). Students also experience difficulties while studying during the pandemic. In line with that according to research conducted (Santosa, 2020). Students experience difficulties in carrying out online learning, namely 50% of students stated it was difficult, 35% said moderate, 25% said very difficult, and 20% said it was easy. This difficulty is due to the fact that students have not been able to organize and control online learning from home

and students have not been able to provide initiatives for themselves (Utami et al., 2020).

Table 4. The Item Measure Test Results

Item - MAP - Person	
<rare> <more>	
3	+ 10L 13L 19L 28P 39P 44L 51P 62P 65P
	T
	S3
2	+ 06P 08P 14P 17P 35P 46P 49L 54P 66L 67P
	S
	S5
	S
	21L 38L 59P
1	+ S4
	S10
	23L 24P 45P 50L
	S7
0	M+ M 01P 03P 16P 25L 32P 37P 41P 55L
	S8 04L 20P 34L 36P 42P 52P 57P 63L 68L
-1	+ S6 02P 11L 12L 18P 22P 27P 33L 47L 53P 56L 58P 60P 69P 70L
	S
	S9
	S1
	S2
	S
-2	+ 05P 07L 09P 15P 26P 29P 30P 40L 43P
	T
	31P 48P 61P 64P
-3	+ <frequ> <less>

The low critical thinking skills of students will have an impact on the demands of 21st century learning. In the face of the current COVID-19 pandemic, the skills to analyze problems and decide on actions are very necessary. This really determines the steps a person takes in protecting themselves from the transmission of the dangerous disease COVID-19 through analyzing information and deciding on an action. Critical thinking becomes very important in dealing with difficulties facing the threat of the COVID-19 pandemic for personal safety (Sidabutar et al., 2020). Therefore, it is very important the role of education to improve these skills, one of which is through biology learning carried out in schools. According to Wulandari's research, it is one type of learning media that provides a lot of convenience for teachers and students. The use of e-modules can make learning take place effectively because in it there are features that can help students gain an understanding of the material, especially during this pandemic where learning cannot take place face-to-face. The use of interactive e-modules can increase learning motivation, scientific literacy, learning outcomes, independence and students' critical thinking skills (Wulandari et al., 2021).

Conclusion

Based on the results of the research that has been carried out and the discussion that has been presented, it can be concluded that the critical thinking skills of students during the Covid-19 pandemic are still relatively low. It can be concluded that the critical thinking skills of students during the COVID-19 pandemic are low. This can be seen from the analysis of the need for e-modules based on *smart apps creators* in hybrid learning, showing that e-modules based on *smart apps creators* are needed to facilitate students' critical thinking skills in the pandemic era.

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