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DEVELOPING CRITICAL THINKING SKILLS TEST IN INDONESIA

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ABSTRACT

The purpose of this research is to develop critical thinking skills of high school students in Indonesia. Instruments developed the model of the Watson-Glaser Critical Thinking Test which refers to the five sub-skills that argument, assumption, Deduction, Interpretation and Conclusions (A2DIK). Testing Critical Thinking Skill Test (CTST) involving 170 students in Indonesia to complete 32 test statement. The test results show CTST reliable internal consistency, the validity of each item CTST item through the Pearson correlation was significant, difficulty level at a high level and discrimination index are quite good. These results provide a decent conclusion that CTST used to measure critical thinking skills of high school students in Indonesia

INTRODUCTION

Critical thinking skills are skills that have been agreed as one of the main skills that bridge on the high-order thinking skills needed in education in the 21st century[27] . Critical thinking skills to be part of the 21st century competencies that support the so-called "pressing international concern" that need to be developed by the Asia-Pacific Economic Cooperation (APEC). Critical thinking skills are integrated in the education system of the 21st century will be able to support an education system that "lifelong learning, problem-solving, self-management and teamwork" (APEC, 2008).

Critical thinking skills are present as one of the skills required individuals to obtain precise and accurate information, including for students. In particular, critical thinking skills that will encourage students effectively living in society, make better judgments, and personal decisions, business or leadership[3]. Critical thinking skills to make students not only able to receive, possess and apply knowledge, yet be equipped to carry out the
analysis and evaluation of existing knowledge, and even create new knowledge that is beneficial to In turn[35] , critical thinking skills are an important part of the educational process to support student achievement[8] , It will also make the students as excellent generation produced. Students with critical thinking skills can be an important factor for Indonesia to face the MEA and the Industrial Revolution 4.0.

Fostering thinking skills into line with the vision of Indonesia on strengthening character education in Indonesia, especially curiosity. Indonesia has enacted the character of the private education superior of the young generation one is curiosity. Curiosity appears as a gift of a man's desire to learn and receive knowledge[13]. Therefore, the thinking skills needed to evaluate the truth of knowledge to be gained, and bring the desire and ambition to create a more advanced knowledge.

Furthermore, students in Indonesia need to have skills that can facilitate their curiosity and also interpret the knowledge and experience precisely in this digital era. Currently very easily disseminated information, presented, even copied, modified, manipulated and presented again[16] . These conditions will have an impact on the received knowledge which in turn can be internalized as a belief[1]. Thinking skills become essential in order to get proper knowledge and in accordance with the facts. In the end, concerns about the possibility of access and distribution of unwanted information, plagiarism, security threats[6] , At this point, the critical thinking skills to be important to bridge the curiosity of the younger generation of Indonesia.

The urgency to foster critical thinking skills students have been the basis for several studies. Variety current way has been pursued by parties various, especially in the field of education to cultivate and develop students' thinking skills. The research study using meditation and mindfulness strategies[17] , Learning literacy[34] , Problem solving learning models[5] and the Socratic method[2]. Before being given intervention to foster students' critical thinking skills, critical thinking skills measurement required of students by the conditions of student life. Several tests have been developed to a situation that is long enough as California Critical Thinking Skills Test in 1992, California Critical Thinking Disposition Inventory in 1992, Cornell Critical Thinking Test in 1985[23], In addition, some of the revalidation of the tests concluded that the tests in the category "inadequate" on the conditions of life today[9] .

Another test showed adequate results when retesting is Watson Glaser Critical Thinking Test (WGCTT) were tested on students in Lebanon[13]. WGCTT tests still need to be reviewed with regard to the measurement conditions of high school students in Indonesia[39] . This condition is also increasingly constrained by the necessity of character education variable assessment curiosity in the

instruments developed. In turn, there is a need for their critical thinking skills measurement tool that helped bridge the character curiosity of students.

The ideas that have been underlying submitted conceptually urgency the need for a measuring tool of students' critical thinking skills. WGCTT measurement techniques using instruments, as deemed most appropriate test to be developed further in the living conditions of students in Indonesia. Thus, this study has the objective to obtain the product of measuring instruments Indonesian students' critical thinking skills that are based on WGCTT instrument.

The measuring tool product is a product that is ready for use in Indonesia, based on the reliability and proof of validity measuring instruments.

METHOD

Measures

Critical Thinking Skill Test (CTST)
CTST is a measure of the critical thinking skills of WGCTT adopt. CTST developed to measure students' critical thinking skills based on 5 dimensions of argumentation skills, assumptions, deduction, interpretation, and conclusions[2]. As with WGCTT, then CTST exposes a major statement followed by a statement of response. Statements in CTST developed in the context tailored to the student's understanding, in the school environment, learning, friends, and career experienced by high school students in Indonesia.
CTST further develop an alternative answer in the form of a response statement on the shape categorization arguments, assumptions, deduction, interpretation, and the conclusion is right or not. In more detail, the statement needs to be assessed by the student's response as a response to a major statement. Is the response statement has become a proper response or not. By the dimensions, and then students will assess the arguments related to the appropriate and based on the assumption of the right, the right of deduction, the appropriate interpretation and thorough conclusion. In the charging process, the students provide an assessment according to the following dance with the categorization of arguments, assumptions, deduction, interpretation, and the conclusion is right.

Categorizing statements prepared response by determining the response statement on the category of answers. At every major statement provided statements adequate response is not appropriate. Each key statements are not always followed by a statement proper response, but there are some key statements followed several statements right, and vice versa.

Administration of the test procedure

Critical Thinking Skills test high school students this can be done individually, in small groups or large groups, both offline and online mentoring. Overall there were 10 major statement followed 32 statement response. Overall the statement is divided into five sections of the test.

Scoring Test Results.

Scoring against the workmanship of students is done in parts and whole. Division results by mapping the thinking skills of students in the stages of each part of critical thinking skills. While the overall judgment becomes a conclusion to map the students' critical thinking skills. A final assessment can also be done in groups of either each part or in whole. The results of such assessments can be designed follow-up, either individually or in groups to the students. Scoring is done by looking at the accuracy of categorization of the statement by the students as respondents. Categorizing statement proper response will get a score of 1, while the incorrect categorization will get a score of 0. The overall result of the response statement is 32, the maximum score is 32 students.

Specifically, the calculation of the score also performed in the categorical assessment. Total statement in section A: Arguments, section B: Assumptions, Part C: Deduction and section D: Interpretations have each 6 statement, resulting in a maximum score of 6 in each section. Section E: Conclusion There is 8 statement with a maximum score of 8.

Participants

Critical Thinking Skill Test is intended to measure the level of critical thinking skills of students in high school education. The test can be used on the condition of students in general. These tests as a form of self-understanding related students' critical thinking skills, which is one part of a High Order Thinking Skill. The process of testing a test involving 170 students. Students who are involved as
respondents were high school students who
are in the age range of 15-17 years. Selection is done using random sampling of students in some schools in Indonesia.

FINDINGS AND DISCUSSION

Descriptive Statistics

Results of descriptive statistical analysis to test critical thinking skills test high school students in Indonesia can be seen in Table 1. Descriptive analysis was conducted in 2 groups of analysis, which analyzes per sub-variables and the overall analysis of the test instrument. Analysis per variable is done by comparing the mean and total scores between sub-variables in the test instrument high school students' critical thinking skills. The results of this analysis are no differences in levels of student achievement at each variable critical thinking skills. These differences indicate a trend of decreasing achievement in student numbers in sequence on the argument, assumption, deduction, interpretation, and conclusion.
The overall analysis of students 'critical thinking skills tests described how students' critical thinking level overview of all respondents overall

Table 1. Descriptive Data Measurement

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Part of CTST	Mean	Total Score
Argumentationtasi	0412	421
Assumption	0381	389
deduction	0350	357
Interpretation	0349	356
Conclusion	0359	367

RESULTS

Reliability

Measurement of reliability tests of critical thinking skills is done through two methods of analysis that is by Kuder Richardson 20 as the internal consistency. The results of internal analysis consistency presented in Table 2. The overall test instrument analyzed with the data reliability KR-20 in point 0.708. These results indicate the condition of the reliability of KR-20 included in the category of unreliable as a form of internal consistency.

Table 2. Data Reliability Instruments

Cronbach's Alpha	N of Items
708	32

Validity

Testing the validity of the test instruments CTST performed using analytical methods grain items, difficulty level and discrimination index.

Analysis of grain items

Item analysis was conducted to see the validity of the items in the form of contributions to the overall value of the test. Item analysis based on the items carried by Pearson bivariate correlation. Pearson correlation analysis is presented in Table 3. Significance Pearson correlation for each item is below the 0.05 figure. These results indicate a significant contribution of each item statement on the outcome of critical thinking skills test high school students.

Table 3. Item Analysis Item

	Pearson Correlation	Sig. (2-tailed)	N
A2A	.221 **	.004	170
a2b	.290 **	.000	170
A2C	.284 **	.000	170
a3a	.251 **	.001	170
A3b	.163 *	.033	170
a3c	.283 **	.000	170

B3a	.461 **	.000	170
b3b	.357 **	.000	170
b3c	.248 **	.001	170
b4a	.277 **	.000	170
b4b	.216 **	.005	170
B4C	.344 **	.000	170
C2A	.446 **	.000	170
C2B	.262 **	.001	170
c2c	.471 **	.000	170
C3A	.436 **	.000	170
C3b	.240 **	.002	170
c3c	.308 **	.000	170
d1a	.205 **	.007	170
d1b	.282 **	.000	170
d1c	.311 **	.000	170
D3A	.435 **	.000	170
d3b	.291 **	.000	170
d3c	.336 **	.000	170
e1a	.435 **	.000	170
E1B	.401 **	.000	170
E1C	.408 **	.000	170
E1D	.366 **	.000	170
E2A	.430 **	.000	170
E2b	.360 **	.000	170
e2c	.274 **	.000	170
E2d	.154 *	.045	170

*. **Correlation** is significant at the 0:05 level (2-tailed).

Difficulty level analysis is used to see the level of difficulty presented in this CTST test. The instrument was developed has been modified and adapted to the context of situations that are often experienced by high school students. Difficulty level analysis was done by looking at the range of the highest and lowest scores thus obtained coefficient of the level of difficulty of each item in the test instrument CTST. Results of the analysis indicate the

level of difficulty of each item in the test high school students' critical thinking skills that are in the overall 0347 average. The range of difficulty levels showed that overall, that the test has a level of difficulty that tends to be higher. Analysis per sub-variables can also be done to get the level of difficulty of each sub-variables. The level of difficulty for each variable argument, Assumptions, deduction, interpretation, and the conclusion is at 0:41, 0:38, 0:35, 0:35, and 0:27. Exposure to a more detailed analysis of the level of difficulty results presented in Table 4.

Table 4. Difficulty Level

	difficulty Level	**Mean of Part Test**
Argumentation 1 (a)	0229	0413
Argumentation 1 (b)	0218	
Argumentation 1 (c)	0441	
Argumentation 2 (a)	0235	
Argumentation 2 (b)	0471	
Argumentation 1 (c)	0882	
Assumption 1 (a)	0465	0381
Assumption 1 (b)	0500	
Assumption 1 (c)	0318	
Assumption 2 (a)	0518	
Assumption 2 (b)	0271	
Assumption 2 (c)	0218	
Deduction 1 (a)	0371	
Deduction 1 (b)	0218	
Deduction 1 (c)	0300	0350
Deduction 2 (a)	0241	
Deduction 2 (b)	0535	
Deduction 2 (c)	0435	
Interpretation 1 (a)	0759	
Interpretation 1 (b)	0329	
Interpretation 1 (c)	0306	0349
Interpretation 2 (a)	0229	
Interpretation 2 (b)	0271	
Interpretation 2 (c)	0200	
Conclusion 1 (a)	0206	
Conclusion 1 (b)	0294	
Conclusion 1 (c)	0159	0270
Conclusion 1 (d)	0194	
Conclusion 2 (a)	0306	
Conclusion 2 (b)	0224	
Conclusion 2 (c)	0359	
Conclusion 2 (d)	0418	

* **Correlation** is significant at the 0:01 level (2-tailed)

Discrimination Index

Different

t power analysis done to see how the item may indicate differences in the knowledge possessed by the upper and lower group. Results of the analysis showed overall different power those items have different power mean for 0404 with a range of 0306-0556 is presented in Table 5. Analysis of different power are also performed every sub-variables with the results for each variable

argument sub-variables, assumptions, deduction, interpretation and Conclusions had a mean 0:33, 0:40, 0:40,
0:41, 0:44. Overall, the different power each item in the instrument of critical thinking skills of high school students is above 0.3, which indicates acceptance of items.

Table 5. Discrimination Index

	Discrimination Index	**Mean of Part Test**
Argumentation 1 (a)	0.305555556	0.337962963
Argumentation 1 (b)	0.333333333	
Argumentation 1 (c)	0.388888889	
Argumentation 2 (a)	0.305555556	
Argumentation 2 (b)	0.305555556	
Argumentation 1 (c)	0.388888889	
Assumption 1 (a)	0.527777778	0.402777778
Assumption 1 (b)	0.472222222	
Assumption 1 (c)	0.305555556	
Assumption 2 (a)	0.388888889	
Assumption 2 (b)	0.305555556	
Assumption 2 (c)	0.416666667	
Deduction 1 (a)	0.5	0.407407407
Deduction 1 (b)	0.361111111	
Deduction 1 (c)	0.444444444	
Deduction 2 (a)	0.472222222	
Deduction 2 (b)	0.305555556	
Deduction 2 (c)	0.361111111	
Interpretation 1 (a)	0.527777778	0.412037037
Interpretation 1 (b)	0.333333333	
Interpretation 1 (c)	0.388888889	
Interpretation 2 (a)	0.333333333	
Interpretation 2 (b)	0.472222222	
Interpretation 2 (c)	0.416666667	
Conclusion 1 (a)	0.444444444	0.447916667
Conclusion 1 (b)	0.5	
Conclusion 1 (c)	0.444444444	
Conclusion 1 (d)	0.5	
Conclusion 2 (a)	0.5	
Conclusion 2 (b)	0.388888889	
Conclusion 2 (c)	0.416666667	
Conclusion 2 (d)	0.388888889	

CONCLUSION

The results of the research reviewed to achieve the goal of research to develop the critical thinking skills of instruments of high school students that can be used as a measuring tool that is valid and reliable. CTST test instrument developed based on domain critical thinking skills of high school students. This

test instrument adopts this type of instrument critical thinking skills developed by Watson-Glaser with adjustments to the existing condition of high school students in Indonesia.

The test results CTST tests have shown that the reliability of the test high school students' critical thinking skills. Results of instrument reliability describing the consistency of each item to the whole item[11]. The reliability of evidence supporting their constancy construct each item as an instrument of accession intact.

Validity testing through Pearson correlation analysis showed that 32 rounds of statements in the test of critical thinking skills of high school students are at a valid category. Results are visible from the whole item which shows the significance of his contribution to the final score obtained. Thus, each item in the test CTST owns contribution and worth to describe the critical thinking skills of high school students.

The results of the analysis of the level of difficulty and different power problems indicate the difficulty level tests that tend to be high with different power problems are in good enough category. About the difficulty level tends to be high indicates that not all students can find the answers on each item correctly. Different power enough good about supporting the involvement of the students' knowledge in finding the right answers to the upper group and lower group[36] .

Critical thinking skills test high school students organized in the form of multiple choice. This form sets one answer as the main answer and did not give a score to the answers. The charging process ultimately requires thinking skills for students to find the right answer based on a statement that is raised. This position is the development of a model of the test instrument Watson Glaser Critical Thinking Test intended to measure individual skills in understanding their issues and receive a variety of facts in support of knowledge and facts are valid[22].

Model instrument in the form of multiple-choice to support high levels of thinking process[21]. These conditions have the same characteristics with the critical thinking that requires a high level of cognitive development[26] . The existence of multiple-choice is a manifestation of various forms of directional information, knowledge and even solutions. This is consistent with the purpose of critical thinking skills to receive and open to the possibilities and solutions[4] . In the process of choosing an answer on this instrument, a process of inspection and checking of information using different ways of thinking of each individual[15] . This condition is indirectly supporting the curiosity and motivation to examine each possibility in-depth, not just repeating existing knowledge[14] . In the end, individuals can use critical thinking skills to bridge the curiosity with information management, the situation and the knowledge gained[7] . Although capable of bridging the character of curiosity, CTST test has not been able to describe the critical thinking skills of students in the form of problem-solving. Assessment of the relationship between the statement as a form of in-depth analysis of the information, the situation, the knowledge and the problem is a provision to start searching for alternative solutions to

problems[30] . The process of critical thinking skills will continue to seek the best solution on the basis of the knowledge that has been held. Thus, further intervention is necessary critical thinking skills related to problem-solving students. Various interventions focused problem-solving can be a good alternative in the form of learning strategies as well as guidance and counselling services. Learning strategies to engage students in solving problems specific to areas of learning critical thinking skills they have. Guidance and counselling services can focus more widely on various aspects of student life, in the form of personal, social, academic, and career. Thus, all educators are necessary to provide intervention to students' critical thinking skills,

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