



Copyright © 2018 by KAD International
All rights reserved.
Published in the Ghana

<http://kadint.net/our-journal.html>



ISSN 2410-4981

Development of a Critical Thinking Test Based on Higher-Order Thinking PISA Version: A Tool for Historical Learning in Senior High Schools

Alya Wulan Nur Fatimah ^{a, *}, Nunuk Suryani ^a, Sri Yamtinah ^a

^a Department of Teacher Training and Education, Sebelas Maret University, Surakarta, Indonesia

Paper Review Summary:

Received: 2017, December 12

Received in revised form: 2018, March 20

Acceptance: 2018, March 21

Novelty:

This paper addresses how PISA can be used to develop the critical thinking ability of historical learning among senior high school students in Indonesia.

Abstract

Critical thinking assessment is vital in historical learning among Senior High School students. The purpose of this research was to develop a critical thinking test to evaluate the level of critical thinking in historical learning among Senior High School students. The development process of this test followed the Context, Input, Process, Product (CIPP) evaluation model by Daniel Stufflebeam. Validation of this instrument was done by experts and senior teachers in the field (practitioners). Though the total number of items in the test was 25, validity and reliability tests yielded 20 items. In conclusion, an assessment based on the higher order thinking Programme for International Student Assessment (PISA) version was as an adequate measure of critical thinking in historical learning at Senior High Schools.

Keywords: assessment, critical thinking, higher-order thinking, historical learning, pisa, senior high schools.

Introduction

PISA is a student assessment program with international standard which is approved by Organization for Economic Co-operation & Development (OECD). PISA study, that is held by OECD and The United Nations Educational, Scientific and Cultural Organization's Institute for Statistics to measure student ability at the end stage of compulsory education. It is used for assessing students' readiness and the challenge of knowledge the society faces nowadays (Hopfenbeck et al., 2018). The assessment that is done in PISA is oriented to the future. Thus, it allows the young generation to be able to use their skill and knowledge to face the challenges of real life; not only to measure their ability in the school curriculum context (Pholphirul, 2017).

* Corresponding author

E-mail address: Alya_wulannurfatimah@yahoo.co.id (A.W.N. Fatimah)

Following the first cohort report on the use of PISA by OECD in 2001 had seen numerous applications (Goldstein, 2004). A systematic review on PISA by Hopfenbeck et al. (2018) pointed out that though “*studies based on the PISA dataset has led to progress in educational research while simultaneously pointing to the need for caution when using this research to inform educational policy*” (p. 333). Interestingly, other studies have linked PISA scores of countries to factors like fish consumption (Schmiedel, Vogt, & Walach, 2017), maternal milk content, national economy and effective teaching (Lassek, & Gaulin, 2015; Pholphirul, 2017). Notwithstanding these suggestions, little is known about the use of PISA in Indonesian schools.

Two decades ago, White’s (1997) analysis on social studies education showed that Indonesian culture has a peculiar positive effect to development and performance of students. However, history as a discipline in social sciences is often viewed as an unnecessary subject even in some schools of developed nations like the United States of America (De Oliveira, 2008). With this backdrop, the application of PISA to improve the critical thinking ability of history students is relevant in Indonesia.

Methods

The assessment tool used in this study was developed in accordance with the Context, Input, Process, Product (CIIP) evaluation model by Daniel Stufflebeam. Mainly, it adopted the Input, Process and Output model used by Aman (2012). The stages included in the development of this tool are as follows:

1. Introduction stage. This is the first step of collecting information related to the problem under review, that is, historical learning evaluation system at Senior High School. An introduction study was done through observation, document analysis and interviews with teachers and students.
2. Planning stage. At this stage, historical learning evaluation model for Senior High School, instrumented planning for the data collection as well as assessment model were developed. The design at this level was still hypothetical as its effectiveness could be known after testing.
3. Trial, evaluation and revision stage. Testing was done at this stage to guarantee the product quality. It also confirmed the instrument model based on Higher Order Thinking (HOT) PISA version.

Data for the study were collected from 31 class XI social science 1 and XI social science 2 students at SMA N 1 Sragen.

Results

Validity test analysis was done using the Aiken’s V formula:

$$V = \sum s / [n(c - 1)]$$

Explanation:

$$s = r - 1_0$$

1₀ = Validity Assessment number that is the lowest (in this case = 1).

c = Validity Assessment Number that is the highest (in this case= 5).

r = Number that is given by an estimator.

In the Aiken’s V formula, the value of V ranged between 0 to 1.00 indicates the content validity of the tool (Aiken, 1987; Azwar, 2014). Based on the count of expert validation, the Aiken’s V formula reported 25 items as valid. An operational trial was conducted as part of an implementation step of assessment model based on Soal Higher-Order Thinking (HOT). Results from the data collected on PISA version from SMA N 2 Sragen School Year in 2016/2017 are presented in Table 1. On the whole, average score of assessment instrument is 90% (category “A” / “Very Good”).

Table 1. Assessment Categories of instrument based on HOT PISA

Assessment Categories	Score (%)	Conversion	Criteria
Sentence arrangement	91.88	A	Very Good
Question Meaning	86.88	B	Good
The using Istilah	89.38	A	Very Good
Command to do soal	91.88	A	Very Good
Correct grammar, spelling and punctuation	90.00	A	Very Good
Average	90	A	Very Good

Source: Assessment Sheet in Operational Trial by Students

Table 2 shows that the whole average score of instrument's indicator is 94.55 %. Based on Tables 1 and 2, the whole average score of assessment tool vis-à-vis category and indicator quality is 92.275. Consequently, assessment based on soal HOT PISA version for historical learning fulfills the conditions for measuring critical thinking skills of Senior High School Students.

Table 2. Assessment Indicator of Instrument Based on HOT PISA Version

The assessment Indicator	Score (%)	Conversion	Criteria
Question is suitable with KD (the basic competency)	100	A	Very Good
Question is suitable for indicator	100	A	Very Good
Question can measure critical thinking skill	80	B	Good
Clarity of meaning of question	100	A	Very Good
Clear command to answer questions	100	A	Very Good
The clarity of term	80	B	Good
Good sentence rating	100	A	Very Good
Correct grammar, spelling and punctuation	80	B	Good
Correct answer key	100	A	Very Good
Objective scoring	100	A	Very Good
Adequate answer time for student	100	A	Very Good
Average score of indicators	94.55	A	Very Good

Source: Assessment sheet in the operational trial by teacher

Additionally, assessment of reliability of questions in shows a high reliability of 0.736. The output reliability based soal HOT PISA version shows a high category between the range 0.600 and 0.799.

Discussion

Critical thinking is one of the vital skills needed by students all over the world (Sedlak et al., 2003). Due to this, teachers work hard in various spheres to plan lessons to suit this need (Choy, Cheah, 2009). History is a science that learns about the past moments. History as a science discipline consists of chain moments that are rich in meaning. To understand the process and take values from the learning material, it needs critical thinking skills. Thus, this research is in line with the research that has been done before (Abrami et al., 2008). Therefore, it is important to develop the relevant instrument to measure the critical learning of students. The results show that learning

history as a subject can only be achieved when students develop their knowledge based on critical thinking skill. As a consequence, this assessment tool based on HOT provides a valid and reliable measure for evaluating students.

Conflicts of interest

The authors declare no conflicts of interest.

References

- Abrami, P. C., Bernard, R. M., Borokhovski, E., Wade, A., Surkes, M. A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research*, 78(4), 1102-1134.
- Aiken, L. R. (1987). Formulas for equating ratings on different scales. *Educational and Psychological Measurement*, 47(1), 51-54.
- Aman, A. (2013). Pengembangan model evaluasi program pembelajaran sejarah di sma. *Jurnal Penelitian dan Evaluasi Pendidikan*, 16(2), 437-456.
- Azwar, S. (2014). *Penyusunan Skala Psikologi*. Yogyakarta: Pustaka Pelajar.
- Choy, S. C., & Cheah, P. K. (2009). Teacher perceptions of critical thinking among students and its influence on higher education. *International Journal of Teaching and Learning in Higher Education*, 20(2), 198-206.
- De Oliveira, L. C. (2008). "History doesn't count": Challenges of teaching history in California schools. *The History Teacher*, 41(3), 363-378.
- Goldstein, H. (2004). International comparisons of student attainment: some issues arising from the PISA study. *Assessment in Education: Principles, Policy & Practice*, 11(3), 319-330.
- Hopfenbeck, T. N., Lenkeit, J., El Masri, Y., Cantrell, K., Ryan, J., & Baird, J. A. (2018). Lessons learned from PISA: A systematic review of peer-reviewed articles on the programme for international student assessment. *Scandinavian Journal of Educational Research*, 62(3), 333-353.
- Lassek, W. D., & Gaulin, S. J. (2015). Maternal milk DHA content predicts cognitive performance in a sample of 28 nations. *Maternal & Child Nutrition*, 11(4), 773-779.
- Pholphirul, P. (2017). Pre-primary education and long-term education performance: Evidence from Programme for International Student Assessment (PISA) Thailand. *Journal of Early Childhood Research*, 15(4), 410-432.
- Pholphirul, P. (2017). Pre-primary education and long-term education performance: Evidence from Programme for International Student Assessment (PISA) Thailand. *Journal of Early Childhood Research*, 15(4), 410-432.
- Schmiedel, V., Vogt, H., & Walach, H. (2017). Are pupils' 'Programme for International Student assessment (PISA)' scores associated with a nation's fish consumption? *Scandinavian Journal of Public Health*, doi.org/10.1177/1403494817717834.
- Sedlak, C. A., Doheny, M. O., Panthofer, N., & Anaya, E. (2003). Critical thinking in students' service-learning experiences. *College Teaching*, 51(3), 99-104.
- White, C. (1997). Indonesian social studies education: A critical analysis. *The Social Studies*, 88(2), 87-92.