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### Historical Thinking Model in Achieving Cognitive Dimension of Indonesian History Learning

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#### **Abstract**

Historical thinking instruments have been phenomenally implemented in developed countries making history education experts in Indonesia encouraged to conduct research to achieve learning objectives in the form of valid and reliable historical thinking instruments. However, research on historical thinking instruments is not without challenges and failures because it is not considered to be able to bring students to be able to think critically so that there is no standard instrument. The aim of the study is to produce a historical thinking instrument using the cognitive dimension criteria in history learning in tertiary institutions. The research was conducted using the stages of the method; needs analysis based on competencies in the curriculum, designing historical thinking assessment instruments, and testing the resulting instruments. The results showed the need for instruments according to cognitive dimensions using categorized instrument models, namely multiple choice models to measure factual dimensions, free response question models with short answer types to measure conceptual dimensions, document-based free response question models to measure procedural dimensions, and models, and free response question essay type to measure metacognitive dimensions. Testing of the instruments arranged shows that the resulting instrument meets the validity and reliability aspects or  $r_{11} > r_t$  so that it can be concluded that the instrument developed can be used in the test.

Meanwhile, the result of the factor analysis shows that the dominant factor in the developed instrument is the factual dimension which determines the achievement of the cognitive dimension.

## INTRODUCTION

History educators based on constructivism agree that students and teachers are provided with knowledge of the historical method known as historical thinking (Seixas, 2017). Historical thinking as interpreted by many experts from outside and inside the country is related to linking two opposing views of intellectual skills and habitual skills (Laksana, 2020).

The process of learning history in high schools, teachers still teach conventionally and do not develop intellectual skills (Sarbaini et al., 2019). The tendency of history teachers in teaching that is more focused on emphasizing the side of memorization is concerned with a series of names of figures, dates and years of a monumental event that may not mean anything to students. Students also easily forget the date, year and even the names of historical figures they have studied. This condition makes students far from the process of awareness and only becomes an imitation of the teacher which will only produce *necrophilia* (a feeling of love that does not have a life spirit) not *biophily* (love for everything that has a soul of meaningful life) (Fatimah et al., 2020).

Research of Seixas (2017), attempts to apply historical thinking on a large scale in North America. The article contains narrative investigations on historical education reform through a development class-based assessment. The search for data in the research was obtained through participant observation, and as a result, the author experienced obstacles could not be overcome. Triana & Rajiani (2019) tested the effectiveness of the oral approach in relation to students' competences. A total of 35 ninth graders were randomly assigned to one of four conditions: direct, video, text, or a control group by *pretest*, *posttest designs*, and *follow-up*. Comparing the three intervention groups with the control group, the intervention group scored better on four of the five achievement tests. Comparing the live group with the video and text group, the students in the living condition were more confident about their learning progress at the two measurement points. However, they scored lower than the video / text group on the two achievement measures and higher on the one on the *post-test*.

Studies on the development of historical thinking models with various evaluation models used have developed starting with dissatisfaction with the concept and assessment of conservative learning to solutions about historical thinking, including its assessment and evaluation (Subiyakto et al., 2020). Studies with this theme have been well responded to by historians and history educators. Recent studies see historical thinking with its various evaluations as a factor for

the progress of education because it provides a great possibility in the learning process to be democratic and critical and to make education more open (Abbas et al.,2018). The specification of history learning is to train students to be able to think about history, so a special evaluation model is needed to find out how the achievement of students' abilities in thinking history. Learning evaluation has a function as a measure of success, so the evaluation model used must be in accordance with the learning objectives. Historical thinking as a learning goal requires an assessment that is able to translate goals and indicators of competency achievement in the form of a valid and reliable evaluation instrument so that it is able to give judgment on the specified learning outcomes (Bal et al.,2020).

Based on the above arguments, this research was conducted to develop an evaluation model of historical thinking in college level students. Thus, the outcome of this study is expected to become an evaluation instrument for historical thinking that is tested by fulfilling pedagogical scientific elements.

### **LITERATURE REVIEW**

Existing studies have shown that growing students' interest in learning history should be motivated by investigating the problems they face through historical thinking which is interpreted with a variety of perspectives (Nguyen, 2020). Historical thinking skills are oriented like historians in researching history, designing historical learning including making its evaluation (Maulana et al.,2020). On the other hand, historical thinking emphasizes being critical of facts, synthesizing, interpreting, reflecting on and relating current events to the past (Ginting et al.,2020).

Various studies on the theme of historical thinking show different results from one another. On the one hand, students are still considered unable to solve problems and the effectiveness of getting obstacles (Bartelds et al.,, 2020), The other side of the validity study of the history assessment of thinking (HATS) which is used to test the thinking of HAT turns out to be better than those who were tested using multiple choice questions (Smith et al.,, 2019). At least three topics of discussion can be found from previous studies, namely fulfilling the need to develop models in historical thinking, looking for an evaluation model of his thinking. theory and testing it in order to find the standard and evaluation model of historical thinking is believed to be a way to teach a critical-analytical history so that learning objectives can be achieved.

The existing writings explain that learning success in universities requires innovation in learning activities, personal experience, observation and self-reflection (Rajiani &Norain, 2018). This tendency implies that learning and understanding history requires students to have the opportunity to create historical narratives and arguments, so that they develop a high sense of empathy (Arsawan et al.,2020). Existing studies tend to be objective by analyzing the results of the

answers to questions in the form of multiple choices. This evaluation model is a multilevel and multidimensional knowledge evaluation model to measure historical thinking skills which not only memorize facts and past events but understand and analyze them (Rajiani et al.,2019). Definition, purpose and the direction of the assessment as narrated above is used by the researcher to build an assessment. Bringing subjects to think historically requires a creative teaching approach and evaluation system so that the learning process runs effectively and efficiently. With this particular consideration in mind, we develop a model.

## **METHODS**

Research was carried out in three stages, namely the needs analysis stage, the preparation of the historical thinking assessment instrument, and finally the assessment instrument testing. This research is a continuation of development research on historical thinking models. There are deficiencies in the evaluation aspect to determine the success of the historical thinking learning model encouraging this research to be carried out to complement the previously produced learning model. This development research begins with identifying needs, and developing learning evaluation models that can stimulate students to solve problems, so that a tentative model is proposed the Historical Thinking Evaluation Model (HTEM) (Thorp & Persson, 2020).

Instrument trials are carried out on all participants of the Indonesian History course, the Era of Colonialism and Imperialism in accordance with a load of test material compiled by as many as 128 people. The data analysis used includes testing the validity and reliability of the instrument to determine the feasibility of the instrument used in the evaluation process. In addition, factor analysis was also carried out on the instruments that were arranged to determine which variables were dominant in achieving the cognitive dimension.

## **RESEARCH RESULTS AND DISCUSSION**

The results of the study were divided into two parts, namely the results of the needs analysis and the results of the historical thinking instrument test.

### **Needs Analysis Needs**

Analysis is carried out on the aspects of the curriculum needs of the study program to find out what competencies should be measured in the preparation of the historical thinking assessment instrument, referring to the cognitive dimensions developed by Anderson and Krathwohl (2010). The results of the curriculum needs analysis can be seen in the table.

Table 1. Results of Needs Analysis Based Competency

Dimension	Competency	Aspects of Cognitive and Encoding
Factual	Linking national and world history chronology, as well as selecting the main approaches for studying the history	Apply (C31), analyzing (C41)
	Formulating the text and the description is based on the latest historical information that can be used, for example; journalism products, museums and local institutions	Evaluate (C51), create (C61)
	Reconstructing social, economic, political and cultural developments in various cultural areas in Indonesia and the world	Creating (C62)
Conceptual	Interpreting the political and cultural context in which historical events occur	Analyze (C42), evaluate (C52)
	Describing historiographical trends in the last decades and their relationship with the ideas of modernity, postmodernism, globalization	Analyze (C43), evaluate (C53) Compare
	Underlying various national and world historical events	Analyze (C44)
Procedural	Criticizing Controversial events in national and world history	Evaluating (C54)
Metacognitive	Reconstructing the relationship between present-day phenomena and past events	Creating (C63)

Based on the results of needs analysis based on the competency of the study program curriculum, it is known that the dimensions with the broadest coverage are factual and conceptual dimensions 1, with the lowest cognitive aspects at the C3 level and the highest C6 levels. Thus, the need for an assessment instrument should mostly cover both factual and conceptual dimensions. Referring to the taxonomy proposed by Anderson and Krathwohl (2010) the coverage of the factual dimensions is: knowledge of terminology; knowledge of specific details and elements (in this case events). Furthermore, the conceptual dimensions include: knowledge of classifications and categories; knowledge of principles and generalizations; knowledge of theories, models, and structures.

The scope of the procedural dimensions are: knowledge of skills in certain areas and procedures / steps; knowledge of techniques and methods; knowledge of the criteria for using the procedure. The metacognitive dimension includes: strategic knowledge; knowledge of cognitive tasks (contextual and conditional); self-knowledge.

The results of the needs analysis based on these competencies will be an indicator that determines the instrument model to be used. Thus there are 4 cognitive dimensions that represent all competencies in the study program curriculum. The cognitive dimension is then translated into an instrument model according to the category of each cognitive dimension.

### Design of a Historical Thinking Assessment Model Based on the Achievement of Cognitive Dimensions

Before determining the assessment techniques and instruments to be designed, a study of various historical assessments was conducted. Assessments that are considered standardized and tested in the field of history include those used in the Advance Placement of the United States History (APUSH). In general, the test material in APUSH is in accordance with the results of the needs analysis in this study because the main components of the test material are *historical thinking skills and reasoning processes*. Meanwhile, if viewed from the type of instrument, the APUSH assessment uses a variety of instruments according to the desired cognitive ability achievement. The assessment in the APUSH includes multiple choice tests, and *free response questions (FRQs)*. Multiple choice is used to measure the achievement of factual aspects while FRQs is used to measure the ability to build arguments and evaluative reasoning.

In addition to the above studies, a study was also conducted on the validation results of the History Assessment of Thinking Skill (HATS) which were used to test the thinking of HAT using the essay test technique, it turned out that the results were better than those tested using multiple choice questions (Smith et al., 2019). At least three topics of discussion can be found from previous studies, namely fulfilling the need to develop a model in historical thinking, looking for an evaluation model of historical thinking and testing it so that it can be found standard and evaluation models of historical thinking are believed to be a way to teach critical-analytical history so that learning objectives can be achieved.

Historical thinking assessment planning is based on the results of needs analysis. Based on the needs analysis, the instruments compiled include 4 cognitive dimensions; factual, conceptual, procedural, and metacognitive (Anderson & Krathwohl, 2010). The assessment model matrix developed can be seen in the following table. Meanwhile, the determination of the instrument model made is based on a study of standardized instrument models, namely APUSH and HATS by using the strict application of cognitive dimensions as an indicator of achievement.

Table 2. Matrix Model Achievement of Cognitive Dimensions in Historical Thinking Assessment

Dimensions	Category	Code	Model Instruments & Scoring
Factual	Knowledge of terminology	C31	Multiple Choice Analysis; 20 items, 5 answer choices, 1 score for each correct item
	Knowledge of details and elements of events	C41 C51	

Conceptual	Knowledge of classifications and categories	C42 C52	Free Response Questions (FRQs), types of short answers; 6 items with a maximum score of 5 per item
	Knowledge of principles and generalizations	C43 C53	
	Knowledge of theory, models and structures	C44	
Procedural	Knowledge of skills in certain areas and procedures / steps	C54	Free Response Questions (FRQs), document-based types of questions; 2 items using 4 assessment criteria with a maximum score of 10per item
	Knowledge of techniques and methods	C61	
	Knowledge of criteria for using procedures	C62	
Metacognitive	Strategic Knowledge of cognitive tasks (contextual and conditional) Self-knowledge	C63	Free Response Questions (FRQs), essay type ; 1 item using 6 assessment criteria with a maximum score of 30.

Based on the table, there are 4 instrument models developed based on the cognitive dimensions used. This test instrument is a multi-aspect complex test that asks test takers to give different responses to each part of the test.

**Instrument Testing Results Testing**

The results of the validity test can be seen in the following table.

Table 3. Validity Test

**Multiple Choice**

Item01	Item02	Item03	Item04	Item05	Item06	Item07	Item08	Item09	Item10
.670**	.415.546*	*	.477**	.418.5*	*	.388**	.381*	.591**	.579**
Valid	valid	valid	valid	valid	valid	valid	valid	valid	valid

Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20
.477.566*	*	.418**	.418*	.572**	.429*	157	-.390*	.418*	.493**
Valid	Valid	Valid	Valid	Valid	Valid	-	Valid	Valid	Valid

**Free Response Questions (FRQs) Short Answer**

Item1a	Item1a2	Item1a	Item1b	Item1b	Item1b	Item1c	Item1c	Item1c	Item2a
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1		3	1	2	3	1	2	3	1
.452*	.657**	.414*	.633**	.686**	.415*	.736**	.419*	.651**	.610**
Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

Item2a 2	Item2a3	Item2b 1	Item2b 2	Item2b 3	Item2c 1	Item2c 2	Item2c 3
.559**	.554**	.406*	.539**	.620**	.476*	.503**	.484**
Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

### Free Response Questions (FRQs) Base Document Test

Item1. 1	Item1.2	Item1. 3	Item1. 4	Item2. 1	Item2. 2	Item2. 3	Item2. 4
.505**	.605**	.525**	.858**	.636**	.631**	.446*	.537**
Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid

### Free Response Questions (FRQs) Base Document Test

Item01	Item02	Item03	Item04	Item05	Item06
.646**	.740**	.557**	.754**	.515**	.744**
Valid	Valid	Valid	Valid	Valid	Valid

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Based on the results of the validity test, it can be seen that the validation results for the 4 instrument models developed in this study. The test results showed that there was only one item of the instrument that was invalid, namely item 17 for the multiple choice question model. Data from invalid items were not used in the analysis of research results, and because the representation of each indicator had been fulfilled, it did not affect the data analysis process. Thus the need for instruments for each cognitive dimension has been met. Reliability test results show that for all types of instruments score Cronbach's Alpha greater than the value critical of 0.361 with  $n = 28$ , or  $r_{11} > r_t$  then all test instruments are reliable. Based on the results of the validity and reliability test, it can be concluded that the historical thinking assessment instrument made is valid and reliable so it is feasible to be used in the test.

### Achievement of the Cognitive Dimensions

To determine the achievement of the cognitive dimensions, factor analysis is used. Factor analysis aims to filter out which variable is the most superior or the most dominant of the 4 variables in the cognitive dimensions, namely the factual, conceptual, procedural, and metacognitive dimensions. The results of the factor analysis for the historical thinking assessment instrument are presented as follows.



The first test is the KMO and Bartlett's Test to determine the feasibility of the variables for use in further analysis. The test results show that the KMO MSA (Measure of Sampling Adequacy) value is greater than 0.50 or  $0.542 > 0.50$  so that the results of the factor analysis can be continued. As another requirement, the significance value indicates  $0.000 < 0.50$ . Both indicators confirm that the variable can be used for further analysis.

The next test is the anti-image matrices test to find out which variables can be used in factor analysis. The test results are shown as follows.

Table 4. Anti-image Matrices

		Factual	Conceptual	Procedural	Metacognitive
Anti-image Covariance	Factual	.889	-.143	.032	-.101
	Conceptual	-.143	.570	-.228	.133
	Procedural	.032	-.228	.273	-.240
	Metacognitive	-.101	.133	-.240	.372
Anti-image Correlation	Factual	<b>.728<sup>a</sup></b>	-.202	.064	-.175
	Conceptual	-.202	<b>.541<sup>a</sup></b>	-.579	.289
	Procedural	.064	-.579	<b>.527<sup>a</sup></b>	-.753
	Metacognitive	-.175	.289	-.753	<b>.529<sup>a</sup></b>

a. Measures of Sampling Adequacy (MSA)

Based on the results of the Anti-image Matrices test, it can be seen that the MSA value on each variable is more than 0.50, thus the four variables can be used in factor analysis. Furthermore, to see the results of each variable in the factor analysis, it can be seen that the Eigenvalues achievement score.

A variable can be said to achieve / meet Eigenvalue if the total score is more than 1. Only variable 1 (factual) reaches a score of more than 1, thus of the 4 variables contained in the historical thinking assessment instrument, only the factual knowledge variable determines the overall cognitive aspect achievement. In other words, if the factual variables have been met, then other variables, namely conceptual knowledge, procedural knowledge, and metacognitive knowledge have the opportunity to be achieved. Conversely, if factual knowledge has not been achieved, other knowledge is difficult to achieve. Meanwhile, if seen from the percentage, the total score of 2.301 can explain the variant of the test participants of 57.514% or there are 57.514% of test participants who have a linear pattern with the achievement of the cognitive dimensions.

If it is compared with the taxonomic principles, the results of the testing of the instrument as a whole fulfill the principle of achieving the cognitive dimension, namely cascading from the simplest dimension in terms of cognitive activity,

namely starting from factual knowledge, then conceptual, procedural and finally metacognitive knowledge. Thus, because metacognitive is the highest dimension, not all test participants reach that dimension. Meanwhile, when viewed from the category of each dimension, the category with the highest achievement is knowledge of terminology, and knowledge of the details and elements of the category.

Knowledge of terminology in history is knowledge of terminology in history, for example the terms colonialism, imperialism, while knowledge of details and elements, for example knowledge of details of events including the time of the incident, the scene, the characters involved, and the chronology of events. The result of the factor analysis shows that this knowledge is the key to achieving the cognitive dimension. Studies on the development of historical thinking models with various evaluation models used have developed starting with dissatisfaction with the concept and assessment of conservative learning to solutions about historical thinking including its assessment and evaluation (Laksana, 2020). Studies with this theme have been well responded to by historians and history educators, even in Canada that has a Center for Historical Consciousness which produces studies and recommendations used in the United States for historical evaluation (Seixas, 2017). Recent studies see historical thinking with its various evaluations as a factor for the progress of education because it provides a great possibility in the learning process to be democratic and critical and to make education more open (Thorp & Persson, 2020). However, they admitted that Historical Thinking Evaluation Model (HTEM) development research with all its shortcomings and strengths was still being issued because there were still no standard ones to be found. From the three trends of the study, it appears that the search for and research and development of HTEM in accordance with the character of students is positioned as an objective force that provides space to force education experts to work. Subjective perspectives in adapting and difficulties in applying historical thinking evaluation models resulting from development have not been well mapped.

The paper is based on the argument that the HTEM model has not been standardized even though it is considered important in the progress of historical education so that it can create new problems that must be faced. HTEM as a factor of the process requires the search for new evaluation models in accordance with the spirit of the times and the character of students to be used optimally. On the same side the evaluation model of historical thinking has the power to force a new system in the learning process. Learning based on the historical thinking evaluation model developed changes the educational tradition from conventional (teacher-centered) to student-centered.

## CONCLUSION

It turns out that historical thinking instruments that are considered important are still not standardized, making educators attempt to research the instruments needed for historical learning. The instrument developed in this study is a historical thinking assessment instrument that refers to the achievement of the cognitive dimensions, namely factual, conceptual, procedural, and metacognitive. To ensure the suitability of the designed instrument, the development of this instrument begins with a needs analysis followed by a study of the types of standardized instruments that have been used in the historical field assessment.

The concept of the instrument allows finding space for explanations of the criteria for achieving cognitive dimensions with a multiple choice instrument model and Free Response Questions with 3 variants, namely Short Answers, Document-Based Tests, and Essays. The test results of the 4 types of instruments indicated that all instruments developed were valid and reliable so that they met the requirements for use in the test. Furthermore, based on the results of the factor analysis, it is known that the attainment of the cognitive dimension with the greatest score is on the dimension of factual knowledge.

This study is limited to the achievement of the cognitive dimension in the class of Indonesian History in the Era of Colonialism and Imperialism as many as 128 people have not integrated the perspectives of other students, lecturers, teachers and high school students. Integrating the perspectives will enable a comprehensive understanding of the cognitive dimensions. This method allows finding solutions for a more solute cognitive dimension. In line with that, further research is needed involving other students, lecturers, teachers and high school students to accommodate their experiences and problems. In this way comprehensive problem solving is possible.

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