Introducing a Model of Student Critical Thinking Skills in History Education

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Abstract

This study aims at presenting a model of student critical thinking skills in history education. Using Structural Equation Modeling techniques, this survey study was empirically tested on the basis of data from sample of 124 junior high school students in South Jakarta. The result of this study confirmed that student interpretations, inference, evaluation, explanation, and monitoring are positively associated with student critical thinking skills in history education. Results confirmed that determining and analyzing argument are positively related to student analysis of cognitive skills. Understanding and clarifying the meaning of data series and expressing significance of existing situation have positive association with student interpretation. Drawing correct conclusion is positively related to student inference of themselves. The three dimensions, namely, evaluating statement credibility, argument, and logical strength of inferential relations are positively correlated with student evaluation. The two dimensions, namely, making a proof and reporting the result have positive association with student explanation. Other two dimensions, namely, correcting opinion and having self-awareness are positively correlated with students monitoring. It can be concluded that based on the goodness of fit statistical analysis results, the model hypothesized should be modified in order to have a fit model.

Keywords: critical thinking skills; interpretation; inference; evaluation

1. Introduction

Most of junior high schools in Jakarta in Indonesia seldom measure Higher Order Thinking Skills (HOTS) including student critical thinking skills (Rapih and Sutaryadi, 2018). Junior high schools in Jakarta frequently focus on Lower Order Thinking Skills (LOTS) in social studies. This research offers a model of student critical thinking skills in history education to make this subject more interesting and encouraging for the student. Competences of elementary school graduates based on Regulation of Education and Culture Minister No. 21 in 2016 consist of attitude, cognitive, and skill aspects. One of skill dimensions of junior high school graduates is to have critical thinking skills through scientific approach suitable with learner development stage related to tasks given. Teaching and learning at elementary schools in 2013 curriculum based on Regulation of Education and Culture Minister No. 57 in 2014 should be designed in order that students can have critical thinking skills to solve the problems posed. In history education, junior high schools in Jakarta barely motivate the teachers to measure the critical thinking skills of the students. Most of test instruments used by junior high schools in Jakarta to evaluate the students in history education frequently measure
student LOTS. This research was conducted to present a model of critical thinking skills in history education.

Critical thinking consisting of cognitive and affective components, but mainly focuses on cognitive processes (Demir et al. 2011). Another study found that the student critical thinking levels were positively correlated with the student success (Ulas et al. 2012, Mckitrick, and Barnes, 2012). Through critical thinking skills, the students can make up their minds based on good and common sense approach (Sarigoz, 2012). Other study found that student social experience had a role in student thinking skills (Heyman, 2008). Student critical thinking skills can be enhanced by implementing suitable teaching method (Kitot et al. 2010). Critical thinking skills can be strengthened by strategy of visual thinking (Moeller et al. 2013). However, most studies didn’t focus on detail measurement of critical thinking skills.

2. Literature review

The dimensions of critical thinking skills consist of affective strategies involving thinking independently, achieving social insight, and using common sense; cognitive macro strategies including comparing similar condition, explaining issues, and results; and cognitive micro strategies relating to having reasonable differences and similarities, and evaluating premises (Demir et al. 2011). Critical thinking skill levels were determined by student analysis, evaluation, inference, interpretation, remarks and self-regulation skills (Ulas et al. 2012). The students should have critical thinking skills in order to give judgements appropriately and take action rationally (Sarigoz, 2012). Assessment strategy implementation of student critical thinking skills was conducted through three distinct stages of development, acceptance, and patience with an evolutionary approach (Mckitrick, and Barnes, 2012). Indicator of the student critical thinking skills is student ability in evaluating other people statement (Heyman, 2008). This study found that improvement of student critical thinking skills happened together with student maturational processes. Student social experiences can teach them to reason critically. Another study stated that the level of student critical thinking skills can be promoted by using the right teaching method encouraging student higher order thinking skills (Kitot et al. 2010). Student engagement in critical thinking can be enhanced through visual thinking strategies (Moeller et al. 2013). This study found that visual thinking strategies can improve effectiveness of reasoning inductively and deductively, analyzing parts interaction, problem solving, and making decisions consisting of proof examination, synthesizing, drawing conclusions, and reflecting critically. Improvement of student critical thinking skills can be done through adjusting curriculum, nurturing, and encouraging these skills (Pieterse et al. 2016). Student critical thinking skills may be estimated by student analysis of cognitive skills, interpretation, inference, evaluation, explanation, and monitoring (Martincova and Lukesova, 2015; Maksum, Safitri, Ibrahim, Marini, & Wahyudi, 2020). However, most studies didn’t give a more detail measurement of critical thinking skills.

Student analysis of cognitive skills, interpretation, inference, evaluation, explanation, and monitoring predict student critical thinking skills (Martincova and Lukesova, 2015). The summary of relationships hypothesized is described in a model shown in Figure 1.
3. Method

This research used survey method to 124 junior high school students in South Jakarta in Indonesia. Data collected were related to student critical thinking skills in history education. Content analysis was done to literature of student critical thinking skills involving analysis of cognitive skills, interpretation, inference, evaluation, explanation, and monitoring (Martincova and Lukesova, 2015). These aspects were converted into the questionnaire given to 124 students.

The three dimensions of analysis of cognitive skills consist of exploring, determining, and analyzing arguments. The dimensions determine interpretation are understanding the meaning of data series, clarifying the meaning of data series, and expressing significance of existing situation. Indicators of inference are asking something to validate, evaluating argument, and drawing correct conclusion. Evaluating statement credibility, evaluating argument, and logical strength of inferential relations predict evaluation. The indicators of explanation involve giving clear reason, making a proof, and reporting the results. The dimensions of monitoring consist of correcting opinion, conducting planned action, and having self-awareness.

In this research, data analysis used Structural Equation Modeling (SEM) with IBM SPSS Statistics 24 and SPSS AMOS 24 with 2017 Edition. This technique was used to determine the relationship of student analysis of cognitive skills, interpretation, inference, evaluation, explanation, and monitoring with student critical thinking skills in history education. Data collected from 124 junior high school students in South Jakarta were inputted in excel using responses with “strongly agree” scored 5, “agree” scored 4, “neutral” scored 3, “disagree” scored 2, “strongly disagree” scored 1 for positive questions, and “strongly agree” scored 1, “agree” scored 2, “neutral” scored 3, “disagree” scored 4, “strongly disagree” scored 5 for negative questions.

4. Results and Discussion

The result of the goodness of fit statistical analysis results is that the Chi-Square value reached 301.778 with Probability (P)= 0.000 meaning that the SEM model is not fit. The Root Mean Square Error of Approximation (RMSEA) reached 0.104 indicating that the model hypothesized is poor fit.
Expected Cross-Validation Index (ECVI) value reached 3.429 higher than saturated model value 3.073 but less than independence model 4.517 meaning that the model is poor fit. Akaike’s Information Criterion (AIC) value reached 421.778 higher than saturated model 378,000 but less than independence model 555,576 showing that the model proposed is poor fit. Normed Fit Index (NFI) value reached 0.000 indicating that the model is not fit. Comparative Fit Index (CFI) value reached 0.000 meaning that the model is not fit. Incremental Fit Index (IFI) value reached 0.000 showing that the model is not fit. Relative Fit Index (IFI) value reached 0.000 indicating that the model is not fit. Based on SEM measurement, the model hypothesized should be modified in order to have a fit model.

Based on observed variables measurement model test shown in Table 1 and 2, it can be seen that student interpretations, inference, evaluation, explanation, and monitoring have positive correlation with student critical thinking skills in history education of 0.427, 0.325, 1.301, 0.922, and 0.688, respectively. These values were significant at the 0.05 level of t statistics. This result was in line with the study indicating that student interpretations, inference, evaluation, explanation, and monitoring influenced the student critical thinking skills (Simpson, 2007, Facione, 2013, Martincova and Lukesova, 2015). However, the correlation coefficient of analysis of cognitive skills and student critical thinking skills in history education reaching 0.406 were not significant at the 0.05 level with t statistics. This finding was not similar to the study stating that student analysis of cognitive skills predicts the student critical thinking skills in history education (Simpson, 2007, Facione, 2013, Martincova and Lukesova, 2015).

In Table 1 and 2, determining and analyzing argument has significantly positive correlation with analysis of cognitive skills of 0.420 and 0.230 respectively. However, the correlation coefficient between exploring argument and analysis of cognitive skills of 0.934 is not significant at the 0.05 level of t statistics. It was also found that understanding, clarifying the meaning of data series, and expressing significance of existing situation have significantly positive correlation with interpretation of 0.840, 0.474, and 0.413 respectively. Drawing correct conclusion is significantly positive associated with inference of 1.048. However, relationship of asking something to validate and evaluating argument based on evidence with inference of -0.117 and 1.048 respectively is not significant at the 0.05 level at t statistics. This finding was the same as the study stating that determining and analyzing argument predicted analysis of cognitive skills, understanding, clarifying the meaning of data series, and expressing significance of existing situation affected interpretation, and drawing correct conclusion estimated the inference (Martincova and Lukesova, 2015, Boa et al. 2018). However, this result was different from the study showing that exploring argument influenced analysis of cognitive skills and asking something to validate and evaluating argument influenced the inference (Martincova and Lukesova, 2015, Florea and Hurjui, 2015).

Table 1. Measurement model test (Regression weights: Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Label</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS ← SCTSS</td>
<td>0.450</td>
<td>0.289</td>
<td>1.560</td>
<td>0.119</td>
<td>Not valid</td>
</tr>
<tr>
<td>IOC ← SCTSS</td>
<td>0.598</td>
<td>0.269</td>
<td>2.2225</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>IFOS ← SCTSS</td>
<td>1.092</td>
<td>0.388</td>
<td>2.812</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>EOS ← SCTSS</td>
<td>2.340</td>
<td>0.719</td>
<td>3.379</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>EPOS ← SCTSS</td>
<td>1.646</td>
<td>0.561</td>
<td>2.934</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>MOS ← SCTSS</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Measure</td>
<td>Estimate</td>
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<td>--------</td>
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<td></td>
</tr>
<tr>
<td>ACS ← SCTSS</td>
<td>0.406</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>IOC ← SCTSS</td>
<td>0.427</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IFOS ← SCTSS</td>
<td>0.325</td>
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</tr>
<tr>
<td>EOS ← SCTSS</td>
<td>1.301</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPOS ← SCTSS</td>
<td>0.922</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOS ← SCTSS</td>
<td>0.688</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT3 ← ACS</td>
<td>0.230</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CT2 ← ACS</td>
<td>0.420</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>CT1 ← ACS</td>
<td>0.934</td>
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</tr>
<tr>
<td>CT6 ← IOS</td>
<td>0.413</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT5 ← IOS</td>
<td>0.474</td>
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<tr>
<td>CT4 ← IOS</td>
<td>0.840</td>
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</tbody>
</table>

Source: AMOS Results 2019

Table 2. Measurement model test (Standardized regression weights: Group number 1 – Default model)
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CT9 ← IFOS</td>
<td>1.048</td>
</tr>
<tr>
<td>CT8 ← IFOS</td>
<td>-0.117</td>
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<td>CT7 ← IFOS</td>
<td>0.260</td>
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<td>CT12 ← EOS</td>
<td>0.481</td>
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<tr>
<td>CT11 ← EOS</td>
<td>0.449</td>
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<tr>
<td>CT10 ← EOS</td>
<td>0.455</td>
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<tr>
<td>CT15 ← EPOS</td>
<td>0.394</td>
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<tr>
<td>CT14 ← EPOS</td>
<td>0.365</td>
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<td>CT13 ← EPOS</td>
<td>0.146</td>
</tr>
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<td>CT18 ← MOS</td>
<td>0.602</td>
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<td>CT17 ← MOS</td>
<td>0.184</td>
</tr>
<tr>
<td>CT16 ← MOS</td>
<td>0.719</td>
</tr>
</tbody>
</table>

Source: AMOS Results 2019

Notes:
- SCTSS = Student critical thinking skills in history education
- ACS = Analysis of cognitive skills
- IOC = Interpretations
- IFOS = Inference
- EOS = Evaluation
- EPOS = Explanation
- MOS = Monitoring
- CT1 = Exploring argument
- CT2 = Determining argument
- CT3 = Analyzing argument
- CT4 = Understanding the meaning of data series
- CT5 = Clarifying the meaning of data series
- CT6 = Expressing significance of existing situation
- CT7 = Asking something to validate
- CT8 = Evaluating argument based on evidence
- CT9 = Drawing correct conclusion
- CT10 = Evaluating statement credibility
- CT11 = Evaluating argument
- CT12 = Logical strength of inferential relations
- CT13 = Giving clear reason
- CT14 = Making a proof
- CT15 = Reporting the result
- CT16 = Correcting opinion
- CT17 = Conducting planned action
- CT18 = Having self-awareness
Table 1 and 2 showed that evaluating statement credibility, evaluating argument, and logical strength of inferential relations have significantly positive association with evaluation of 0.455, 0, 449, and 0.481 respectively. Making a proof and reporting the result have significantly positive correlation with explanation of 0.365 and 0.394 respectively. However, relationship between giving clear reason and explanation of 0.146 is not significant at the 0.05 level at t statistics. In Table 1 and 2, it can also be seen that correcting opinion and having self-awareness has significantly positive relationship with monitoring of 0.719 and 0.602 respectively. However, association between conducting planned action and monitoring of 0.184 is not significant at the 0.05 level at t statistics.

In line with the study which claimed that evaluating statement credibility, evaluating argument, and logical strength of inferential relations promoted the evaluation, making a proof and reporting the result estimated the explanation, and correcting opinion and having self-awareness influenced the monitoring (Martincova and Lukesova, 2015, Vong and Kaewurai, 2017). Different from the study stating that giving clear reason affected the explanation and conducting planned action predicted the monitoring (Martincova and Lukesova, 2015). The structural model can be seen in Figure 2. Further research can be done with larger samples by involving junior high school students in other regions in Jakarta and modifying the model.

Figure 2. The structural model
5. Conclusion

Model of student critical thinking in history education offered by this research should be modified. Student interpretations, inference, evaluation, explanation, and monitoring predict student critical thinking skills in history education. Determining and analyzing argument determine analysis of history education. Understanding, clarifying the meaning of data series, and expressing significance of existing situation stimulate interpretation. Drawing correct conclusion encourages inference. Evaluating statement credibility, evaluating argument, and logical strength of inferential relations determine evaluation. Making a proof and reporting the result predict explanation. Correcting opinion and having self-awareness determine monitoring.

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References


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