Measuring Student Interest in the Industrial Revolution 4.0 Through Rasch Analysis

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Abstract
Interest in learning can help students in learning activities and get satisfying results. The phenomenon that occurs is the low student learning outcomes because of a lack of interest in learning possessed by students. This study measures student interest in the vocational high school (SMK) learning. This study involved 154 students. The instrument in the study was in the form of a learning interest questionnaire with a Likert model scale. Data were analyzed using the Rasch Model approach. The results showed that the learning interest of some students was in the medium category. In addition, there were 30 students who provided answers or showed outliers. As for the quality of the learning interest instrument used, it is good to be used to identify student interest in learning, we can see this from the reliability value of 0.97. The findings show that overall student interest in learning is in the medium category.

Keywords: Students, Interest in Learning, Rasch Model


Introduction
The era of the Industrial Revolution 4.0 is an era in which humans race in developing abilities. They can obtain the intended ability through the learning process, followed by students (Yuliarti et al., 2016). However, according to the results of the Program for International Student Assessment report (Excellence and Equity in Education, 2018) revealed that students in Indonesia have a decreased ability and the student achievement outcomes are still low. Decreased ability and low learning achievement by students is caused by several factors (Molstad & Karseth, 2016; Nurhasanah & Sobandi, 2016). One factor is because of students own the interest in learning that (Putrayasa et al., 2014).

Interest in learning is the tendency or high interest of someone towards something that aims to change, where it happens through an activity (learning) (Lin & Huang, 2016; Muldayanti, 2013; Wang & Adesope, 2016). In line with this, Ainley, Hillman, & Hillman (2002); Arnone, Small, Chauncey, & Mckenna (2011) revealed that interest in learning as a psychic statement shows concentration of subject matter because the object is attractive to him. Hong & Lin-siegler, (2011); Rotgans & Schmidt (2014) states that interest in learning is one of the important factors students must possess that so that the learning process can run effectively. The factors that influence learning interest are student enjoyment in learning, student attention in learning, student curiosity, student determination in learning and student goals in learning (Hidi, 2006; Muller & Louw, 2004; Palfrey & Gasser, 2008). Edelson & Joseph (2001) mentioned 5 (five) aspects of learning interest, namely (1) students’ enjoyment in learning, (2) students’ attention in learning, (3) students’ curiosity with subject, (4) student self–confirmation in learning, and (4) students’ goals in learning.

The symptom that arises from the low learning interest students own that students are not interested in taking part in learning activities (Firman, 2015). Students who are not focused on learning (Budiwibowo, 2016). And students obtains the low achievement of learning outcomes (Sakti et al., 2012), Aritonang (2008) mentioning the low student interest in learning can also interfere with the purpose of learning activities. Interest in learning is one important factor, so students can follow the learning process well and effectively (Rotgans & Schmidt, 2014).

This study measures the interest in learning that is owned by students, so students who have a high interest in learning obtain satisfying learning outcomes.
Method

This research uses a quantitative approach with a descriptive design (Yusuf, 2014). The population in this study amounted to 250 students. The sampling technique in the study used proportional random sampling (Sugiyono, 2012). So that the sample in this study amounted to 154 students comprising class X, XI, and class XII students. The research instrument in the form of a questionnaire that contains statements about students’ interest in learning. The instrument in research uses a Likert scale model which has five alternative answers namely; very suitable, appropriate, appropriate, not suitable very inappropriate. Research data were analyzed using Rasch Model fit statistics (Alagumalai et al., 2005; Bond & Fox, 2007). Fit statistical analysis using MNSQ outfit parameters with the ideal range (+0.5> MNSQ <+1.50) (Suminto & Widhiarso, 2015). The Rasch Model is used to measure the quality of instruments of interest in learning and to describe the interest in learning possessed by students.

Results and Discussion

To achieve the research objectives, there are two stages carried out; (1) assessing the property and quality of instruments of interest in learning, and (2) assessing the ability of students to respond to instruments of interest in learning.

Instrument Quality Test

The aspects used to test the quality of learning interest instruments are; (1) reliability and separation index, (2) dimension test, (3) item fit and misfit, and (4) instrument information function (Smith et al., 1995).

<table>
<thead>
<tr>
<th>Estimation</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item Reliabilities</td>
<td>0.97</td>
</tr>
<tr>
<td>Separation Index of Item</td>
<td>5.58</td>
</tr>
<tr>
<td>Mean Item</td>
<td>0.00</td>
</tr>
<tr>
<td>Mean OUTFIT MNSQ</td>
<td>1.00</td>
</tr>
<tr>
<td>Raw Variance Explained by Measures</td>
<td>29.9%</td>
</tr>
<tr>
<td>Raw Variance Unexplained by Measures</td>
<td>70.1%</td>
</tr>
</tbody>
</table>

The table results from the instrument of interest in learning, the reliability of the instrument is at 0.97. This shows that the reliability of the instrument of learning interest is at a very good level, even close to the perfect score. This value is also supported by the value of the separation index of items that can set the item to 5 (five), this can be interpreted that the instrument of interest in learning can measure up to 5 (five) groups from the highest to the lowest. This shows that the distribution of instrument items can measure almost all aspects. To identify the value of the variance, an analysis of the main components (PCA) is obtained to obtain a result of 29.9%, this can be interpreted that the instrument undimension conditions have been met (> 20%) (Linacre, 2006), or 46 items in the instrument of interest in learning can measure learning interest in students.

Gambar 1. Instrument information function (TIF)  Gambar 2. Probability of student answers on each choice answer
Based on Figure 1, we obtain information that the output of information collected through learning interest instruments is in the high, medium and low categories. This shows that each student has different learning interests in taking part in learning. This explanation is supported by the opinion of Feriady, Harnanik, & Sunarto (2012); Laginder & Stenøien (2011) which states that each student has a different learning interest, sometimes it can go up and it can go down. The findings are also supported by Figure 2, where the probability of the choice of answers is very appropriate, appropriate, not appropriate and not very appropriate. In figure 2 it also appears that students have no difficulty answering instruments of interest in learning. However, from Figure 2 it can be seen that students ‘answers are stable and or students’ interest in learning is in the moderate category (+0.23 logit). This explanation is also supported by the opinion of Terrell (2012) which states that many things affect the interest in learning, including teaching methods of teachers, psychological conditions and learning environment.

To find out the items categorized as fit and misfit on the instrument of interest in learning, it can be shown by comparing the average MNSQ Outfit value of + 1.00 logit, this means that 46 items of interest in learning instruments have no misfit, or that 46 items learning interest is appropriate to measure the learning interest possessed by students.

**Realization of Student Performance in Learning Interest Instruments Based on Fit Statistics**

To determine the ability of students to work on instruments of interest in learning, it carries an evaluation out through individual measurements and individual compatibility. It uses both as a basis for determining students who have high learning interest and who have low learning interest, and students who are not suitable to give answers.

**Tabel 2. Summary of person (adolescents) Measured Based on Rasch Fit Statistics (N person = 154)**

<table>
<thead>
<tr>
<th>Estimation</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Reliabilities</td>
<td>0.87</td>
</tr>
<tr>
<td>Separation Index of Person</td>
<td>2.62</td>
</tr>
<tr>
<td>Mean Pearson</td>
<td>0.23</td>
</tr>
<tr>
<td>Mean Outfit MNSQ</td>
<td>1.00</td>
</tr>
<tr>
<td>Cronbach alpha (KR-20) Person Raw Score “Instrument” Reliability</td>
<td>89.0%</td>
</tr>
</tbody>
</table>

Based on the table above it is known that there are students who have an interest in learning while taking part in the learning process, this is stated with Mean Person 0.23 (> 0.00 logit). From the table above it is also known that the stability of students in providing answers to instruments of interest in learning is in the good category (0.87), this can be interpreted as a good interaction between students and instrument items.

We also explored students who gave answers that did not match the instrument (Misfit), out of 154 students there were 30 students who had +0.50 logit <OUTFIT MNSQ> +1.48 logit. It displays student data in the following table.

**Tabel 3. Misfit Order of Respondents**

<table>
<thead>
<tr>
<th>#Res.</th>
<th>OUTFIT MNSQ</th>
<th>#Res.</th>
<th>OUTFIT MNSQ</th>
<th>#Res.</th>
<th>OUTFIT MNSQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>0.316</td>
<td>87</td>
<td>0.090972</td>
<td>146</td>
<td>0.046</td>
</tr>
<tr>
<td>152</td>
<td>0.250</td>
<td>70</td>
<td>0.088194</td>
<td>122</td>
<td>0.045</td>
</tr>
<tr>
<td>21</td>
<td>0.228</td>
<td>46</td>
<td>0.085417</td>
<td>138</td>
<td>0.041</td>
</tr>
<tr>
<td>92</td>
<td>0.218</td>
<td>47</td>
<td>0.155</td>
<td>1</td>
<td>0.039</td>
</tr>
<tr>
<td>28</td>
<td>0.216</td>
<td>75</td>
<td>0.153</td>
<td>137</td>
<td>0.042</td>
</tr>
<tr>
<td>19</td>
<td>0.214</td>
<td>11</td>
<td>0.156</td>
<td>104</td>
<td>0.040</td>
</tr>
<tr>
<td>9</td>
<td>0.107639</td>
<td>18</td>
<td>0.156</td>
<td>100</td>
<td>0.039</td>
</tr>
<tr>
<td>57</td>
<td>0.104167</td>
<td>27</td>
<td>0.149</td>
<td>68</td>
<td>0.035</td>
</tr>
<tr>
<td>40</td>
<td>0.096528</td>
<td>88</td>
<td>0.047</td>
<td>85</td>
<td>0.031</td>
</tr>
<tr>
<td>136</td>
<td>0.09375</td>
<td>33</td>
<td>0.047</td>
<td>81</td>
<td>0.026</td>
</tr>
</tbody>
</table>

(Measuring Student Interest in the Industrial Revolution 4.0 Through Rasch Analysis)
Based on the above table, students with code 105 (3.16 logit) are students who have the highest ability in answering instruments of learning interest among 154 other students. And students with code 081 (0.26 logit) are students who have the low ability in answering instruments of learning interest. This means that students with code 105 have the highest level of interest in learning related to 5 (five) aspects, namely (1) students' enjoyment in learning, (2) students' attention in learning, (3) students' curiosity with subject, (4) students' self-confirmation in learning, and (4) students' goals in learning. This explanation is supported by the opinion of Abrantes, Seabra, & Lages (2007); Ainley & Ainley (2011); Rotgans & Schmidt (2011) which states in the learning process needed interest from students, and interest arises from students' interest and curiosity about a lesson.

The above analysis shows that the quality of the learning interest instruments given to students is very satisfying. It can be seen in the item's reliability and person, the index of separation and the unidimensional instruments are very adequate. But to measure the ability of students to fill the instrument of interest in learning, there were 30 students among 154 students who answered incorrectly or outliers, ie students who presented responses were not in accordance with the instruments filled out. Students who answer are not appropriate or outliers, because there is cheating and or origin in giving responses to the instrument of interest in learning.

Conclusion

Overall, it can be concluded that the instrument of interest in learning in this study is very good to be used to measure student interest in learning, be it high, moderate learning interest or low learning interest. This study also revealed the level of interest in learning of all students. This is supported by the interaction of students in responding to items, which are in the good category. Although there are still 30 students who are not suitable for giving answers or misfit, there are indications of cheating or answering instruments by guessing. From the analysis of the above data it can also be concluded that overall the learning interest possessed by students is in the medium category. This means that many factors influence learning interest, such as teacher teaching methods, students' psychological conditions and environmental conditions.

References


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