High School Students Engagement in Malang Raya: What Can the Rasch Model Explain?

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Abstract*: Students' engagement is aimed at understanding the students' willingness to participate in developing a learning environment and school environment. The students' willingness is shown routinely and strategically. The students' attitude toward school can be known from the quantity of their engagement. The purpose of this study is to describe the measurement result of the Student Engagement in School Questionnaire (SES-Q). This study uses a quantitative approach by applying Rasch analysis to 33 items. The subjects are 421 high school students in Malang Raya. The result showed that there were three domains on the SES-Q, including affective, behavior, and cognitive, with alpha reliability of 0.92, which means this instrument has good reliability. In general, the implications of this study can provide suggestions for educators to use effective learning strategies from each domain.*

Keywords: student engagement, Rasch model, affective, behavior, cognitive

Introduction

Students at school take several activities to support their academic and non-academic aspects. The quality of the activity greatly depends on the students' considerations. Student engagement is considered as important by educators in addition to supporting students' success in school and increasing students' ability to learn new things (Gilbert, 2010; Gunuc, 2014). Teachers or educators can also observe how the involved students' performance during activities at school, for example, how bored students are at school and why students are not motivated (Appleton, Christenson, & Furlong, 2008).

Student engagement consists of cognitive, affective, and behavioral engagement (Hart, Stewart, & Jimerson, 2011). Cognitive engagement includes belies related to self, school, teachers, and peers (e.g. self-efficacy, motivation, aspirations, expectations, and perceptions about the teachers' or peers' care). Affective involvement includes interest in learning as well as students' feelings and perceptions about school, teachers, and peers. Behavioral involvement includes goals, student efforts, and student participation in non-academic activities such as extracurricular activities (Jimerson, Campos, & Greif, 2003).

Research on student engagement has been linked to several factors, such as the increase of teacher's support so that the students can be actively involved (Reeve, Jang, Carrell, Jeon, & Barch, 2004), optimism (Medlin & Faulk, 2011), students' life satisfaction (Upadyaya & Salmela-Aro, 2017), and the role of parental support (Fan & Williams, 2010). Other research also states that student engagement also has a negative relationship with academic stress (Young, 2017) and burnout (Schaufeli, Martínez, Pinto, Salanova, & Barker, 2002). The more students have good engagement in school, and then the students have lower stress levels compared to students who have less engagement.

Currently, the constructs of student engagement have been examined by involving other variables such as descriptive studies, correlations, and comparisons. Other studies examine the problem of definition, measurement, and methodology regarding student involvement, which aims to investigate the context of broad student involvement (Fredricks, Filsecker, & Lawson, 2016). Yet from these studies, there is no specific research in discussing the effectiveness of the measurement of the scale used.

Previous studies, in general, used the classical test theory approach, which in this study only showed information about the level of item reliability on the measurement scale of student engagement. Other important components such as dimensionality, item difficulty, effective use of Likert rankings, missing data, data intervals, detection of measurement bias, and detection of individual bias (Sumintono & Widhiarso, 2014) were not revealed in previous studies. So this study aims to provide clarity about these important components in the construct of student engagement.

The Rasch model has been applied in various ways in the fields of education, psychology, and other fields. The Rasch model is used to (a) develop, evaluate, and

improve surveys and tests, and (b) facilitate the calculation of the "measurement" which leads to more reliable data analysis and interpretation because ordinal data that has been converted into interval data gives the same range (level). The Rasch model in detail can inform the research and practice of educational and school psychology with its contribution to the quality of instrumentation functions. Researchers can analyze more deeply before parametric statistics and communicate the performance of more objects from a test or survey (Boone & Noltemeyer, 2017).

Some tests and surveys in the field of educational and school of psychology were not developed based on a strong theoretical basis for measurement. Until now, there are still many measurements that do not use a score measurement with a linear scale. However, it is now increasingly recognized that measurements with categorical data can be converted into interval data with the same range so that they can produce data that can be interpreted and produce more reliable information.

Method

The research subjects were obtained using a convenience sampling technique. The subjects were high school students in Malang Raya, consisted of 148 (35.24%) men and 272 (64.76%) women. The participants aged between 14 and 18 years. Demographic types of classes consist of 271 natural sciences, 113 social sciences, and 36 language classes. All subjects responded to the research instrument after filling in their personal data.

Student engagement in school activities was measured by The Student Engagement in Schools Questionnaire (SESQ; Hart et al., 2011) using a Likert scale of four choices that strongly disagree (1) to strongly agree (4). SESQ consists of 33 items consisting of five factors, that is affective engagement: interest in learning, interest in schools, behavioral engagement: effort and perseverance, behavioral engagement: extracurricular activity, and cognitive engagement. Statement example: "I take an active role in extracurricular activities in my school."

Scoring is done on each item unfavorable and favorable. One reason for using the Rasch model measurement technique is that the raw score is not linear, and the difference between two consecutive raw scores cannot be considered to have the same distance. Data can be converted into interval scales with the Rasch model. This research uses Winstep 3.73 data processing software to do the Rasch model (Boone, Yale, & Staver, 2014). The analysis was carried out on each dimension. The dimensionality assumption uses principal component analysis on the measurement of Rasch and residue. Effectiveness on the 4-point response scale used was assessed in each dimension.

The dimensionality parameter in the Rasch model is indicated by the magnitude of the raw variance percentage (at least 20 percent) and the first residual component of the variance that is not explained more than two eigenvalues (Linacre, 2006). DIF is conducted on the analysis of gender differences and class differences. According to Sumintono and Widhiarso (2014), the bias in the gender category or other demographics can be known as the probability value if it shows a value of less than 5%.

Results

Data analysis was performed on each of the behavioral dimensions in the Rasch model which showed that the five dimensions meet the assumption of unidimensionality and variance that could not be explained in no more than a 2.0 eigenvalue (Fisher, 2007). The standard variance explained by each dimension has a predetermined percentage of (<20%) (Sumintono & Widhiarso, 2014). The effectiveness of the 4-point rating scale used is examined in each dimension. All categories have an outfit mean square of less than 2.0 at each level. Distance scores at each level are in the range 1.4-5.0 (Van Zile-Tamsen, 2017). The overall range of categories moves up along with the rating scale (rating), so it is concluded that the research subjects have understood the difference in the range on the rating scale provided.

The reliability of the instrument is indicated by the reliability of the person and the reliability of the item. The results of person reliability are mapped at
0.72 in Affective: Liking for Learning,
0.69 in Affective: Liking for School,
0.68 in Behavior: Effort and Persistence,
0.49 in Behavior: Extracurricular,
0.80 in Cognitive, while item reliability has 0.99 in Affective: Liking for Learning,
1.00 in Affective: Liking for School,
0.98 in Behavior: Effort & Persistence,
0.99 in Behavior: Extracurricular,
0.94 in Cognitive. The reliability of raw scores using the Cronbach Alpha on the whole scale is in the range of 0.52–0.85.

The item (group) separation index for the whole scale above 3 which explains that the sample used in the category is sufficient to confirm the difficulty of the grading level in the instrument. Person separation index on all scale dimensions between 2 and 3 that is not appropriate, quite appropriate, and very appropriate. However, this does not affect the quality of the measurement. The research subjects were in the high category in each dimension of behavior with a positive logit measurement score. It was found that the subject had the lowest average (Mean = 1.03) in the behavioral dimension (extracurricular). The highest average was in the affective liking for school dimension (M = 2.43) compared to the affective liking for learning (M = 1.88).

Table 1. Summary Statistics of Student Engagement (N = 420)

Construct	Affective: Liking for Learning	Affective: Liking for School	Behavior: Effort & Persistence	Behavior: Extracurricular	Cognitive
Person Measure					
Mean	1.88	2.43	1.24	1.03	2.39
SD	2.53	2.73	1.31	2.27	2.12
SE	0.12	0.13	0.06	0.11	0.10
Item Outfit MNSQ					
Mean	0.95	0.99	0.99	0.98	0.94
SD	0.35	0.33	0.27	0.17	0.18
SE	0.65	1.06	0.28	0.23	0.16
Item reliability	0.99	1.00	0.98	0.90	0.94
Person reliability	0.72	0.69	0.68	0.61	0.83
Item separation	10.13	14.47	8.04	1.98	4.09
Person Separation	2.45	2.30	2.28	1.62	3.32
Cronbach Alpha	0.77	0.73	0.72	0.61	0.89
χ^2/df	1.28*	1.40*	1.73*	2.11*	1.18*
Raw variance	57.60%	63.20%	37.20%	49.60%	41.90%
Category Step					
1 (SD)	NONE	NONE	NONE	NONE	NONE
2 (D)	-4.57	-4.71	-2.55	-4.16	-3.16
3 (A)	-0.95	-0.71	-0.64	0.05	-0.67
4 (SA)	5.52	5.42	3.19	4.11	3.83

Note *p<0.05

Summary statistics of the five dimensions of the SES-Q scale are presented in Table 1.

Figure 1 displays the Wright Map, which is a depiction of the location of the respondent and items along with the range of student engagement dimensions. The items that are the most difficult to agree with include point A5, point A8, point B9, point B3 and point C12. The easiest items to agree with include items A4, item A7, item B2, item B4 and item C1. The average person and item (M) of 1SD (S) and 2 SD (T) are placed on the left side (for person) and the right side (for items). In general, the difficulty of items in each dimension is lower than the affective level (liking for learning and liking for school), behavior (effort - persistence and extracurricular), and cognitive.

DIF gender analysis found three items (B2, C6, C12) with a probability value of less than 5%. Item B2 states, "I volunteer to help with school activities such as sports day and parent day," which are more agreed by male students than female students. C6 states, "When learning things for school, I try to see how they fit together with other things I already know," which are more agreed by male students than female students. C12 states, "When studying, I try to combine different pieces of information from course material in new ways," which more agreed by female students than male students. DIF analysis based on class found two items (C12 and B8). Item C12 showed that students majoring in language class were easier to agree than students majoring in natural sciences and social science, and item B8 showed that students majoring in social science were easier to agree than students majoring in natural sciences and language class.

Discussion

The component of student engagement in school activities is characterized by affective, behavioral, and cognitive engagement. The analysis showed that student engagement was highest in the affective dimension, followed by cognitive and behavioral engagement. Affective engagement is shown by the liking for learning and the liking for school. The using of the Rasch model analysis can be used up to the item level. The findings of this study indicate that affective engagement in students is shown by enjoying learning activities in new things and the pride of being students in their schools. In accordance with Furrer & Skinner(2003), students who have a good relationship with teachers and peers show high engagement. Parental engagement also contributes to student engagement and also academic performance (S. F. Lam et al., 2012). Lam et al. (2014) state that the sense of belonging to school is not only on academic achievement but also on the various results of student adjustment at school.

Affective engagement was also shown in a survey conducted by Yazzie-Mintz (2007) through the High School Survey of Student Engagement which revealed that 72% of students agreed that they felt involved in school, 70.5% of students felt concerned about their school, and 55% of students answered agree or strongly agree the statements that students are an important part of the school community. The results of a survey on the question of why students come to school show that 68% because of friends and 34% because they feel happy at school

The survey also showed that 27% of students considered participating in school activities to be very important, and 30% of students considered participating in sports activities to be very important. Following the results of this study, the students tend to easily agree on statements about efforts to do the best at school. Based on the statement, it shows that the engagement of behavior is an important factor for the development of student studies and achievement of academic (Archambault, Vandenbossche-Makombo, & Fraser, 2017; Olivier, Archambault, & Dupéré, 2018).

Students more easily agree on cognitive involvement by trying to understand the material better by linking it to things that are already known and trying hard to do the best at school. Most students agree that information that has been learned can be useful in the reality of their lives, this was also demonstrated by (Yazzie-Mintz, 2007) through a survey that 73% of students want to graduate and continue their studies to college, and 47% feel they want to have skills in the workplace. Although cognitive engagement is less observable because it originates from the internal self, it has the content of self-regulation, thinking about the relevance of schoolwork for future efforts, the value of learning, and personal goals and autonomy (Appleton, Christenson, Kim, & Reschly, 2006).

Other findings in this study also show that students tend to disagree with statements about "learning is boring," "In school, I do just enough to get by," participate in camping activities and assist in school activities such as guardian student meetings with the school. It should be noted that cultural bias is one of the weaknesses of this study; there are items that may be less relevant if tested in several different cultures including in Indonesia. By understanding student involvement in several dimensions, instructors can take strategic steps for positive development for students and teachers. So that at some stage, the school can achieve the expected goals.

Conclusion

The measurement by Rasch analysis shows that the affective component of student engagement shows the highest level, followed by the cognitive and behavioral components. Feeling proud of the school, helping school activities, enjoy learning activities with new materials, connecting with things that are already known, and useful (applicable) in real life, are important things that are chosen and are more agreed upon by students.

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