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School connectedness instrument's testing with the Rasch model for high school students during the COVID-19 pandemic

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Abstract

This study aims to produce a school connectedness instrument for high school students in Yogyakarta. This research is quantitative and descriptive. The sample in this study was 526 high school students in Yogyakarta who had implemented online learning. The sampling technique used is simple random sampling. The data collection of this research was carried out using a questionnaire technique. The data analysis in this study used quantitative analysis techniques using the Rasch model. The results showed that the instrument had good reliability with a coefficient value of 0.86 and various item separations with a value of 2.46. The analysis results show that the subject has a reliability of 0.99 in the excellent category and a person separation value of 11.03, which indicates that the subject's character varies significantly to detect the items developed. Overall, all items are declared fit and can be used to measure school connectedness in students.

Keywords: School connectedness, senior high school, students.

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1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has swept across the world for more than a year since its emergence. One of the Indonesian government's policies related to COVID-19 that impacts education is the learning from home policy (Herwin et al., 2020). This changes the learning process for both teachers and students at the elementary, junior high and high school levels. Some findings show that online learning during the pandemic still raises various problems and challenges for both teachers and students, such as difficulties in organising for teachers and difficulties in following for students (Harjudanti, 2021; Herwin et al., 2021; Mahyoob, 2020). Teachers are less than optimal in providing learning material, and the material delivered is incomplete. The conditions cause students to feel very bored and get bored quickly with giving assignments every day. Students are not ready to face changes in online learning during the COVID-19 pandemic, causing several problems, including the lack of interaction between students and lecturers in online learning compared to face-to-face learning (Coman et al., 2020). A total of 69% of the students are dissatisfied with online learning because of the lack of interaction between students and teachers and interaction with peers (Cole et al., 2014). These conditions indicate that the implementation of online learning often experiences various obstacles for teachers, students and parents.

In general, the learning process is an interaction between teachers, students and learning resources (Senen et al., 2021; Wuryandani & Herwin, 2021). The learning process is carried out through various digital platforms, including WhatsApp, Zoom meeting, Google Meet, Google Classroom and various other platforms that allow teachers and students to carry out learning activities (Hamid, 2020). This is very important to understand because of the current trend that requires technology to be integrated in educational programmes (Saptono et al., 2021).

The inability of teachers, students and parents to use these various technological devices and platforms is also a significant obstacle to participating in online learning (Efriana, 2021). In addition, the conditions and backgrounds of students are very diverse in terms of economy, culture and family education. The inclusion of technology variables is a problem for teachers in carrying out their learning. Some parents and students have difficulty with computers or android devices so that it becomes a challenge for teachers in carrying out learning activities (Wahab & Iskandar, 2020). Teachers and students can access these various platforms to carry out learning from their own homes. These conditions indicate that online learning poses various problems and challenges for students and teachers.

These various problems need to be facilitated by guidance and counselling teachers in schools. Guidance and counselling services during the COVID-19 pandemic are urgently needed to help students face various challenges in changing learning patterns (Ahmed & Firdous, 2020). The critical role of homeroom teachers is the same task as guidance and counselling teachers in building school connectedness in Japan through various services. A school connectedness-based programme is one alternative for guidance and counselling services that can be used to improve the quality of learning during the COVID-19 pandemic. School connectedness is a complete construction that includes a sense of belonging, integration, attachment and students' satisfaction with their relationships with institutions/schools formed through interactions with friends, teachers and other school personnel (Farrell et al., 2018). School connectedness is the belief that the school cares about the learning process and students' conditions, where student interactions with teachers and peers influence the learning success achieved by these students. The interaction between students and teachers is one indicator of

school connectedness. Learning conditions that are carried out online make it difficult for students to interact and reduce school connectedness during the COVID-19 pandemic.

Students who do not have a sense of attachment to teachers and friends at school will tend to have deviant behaviours, such as experience anxiety and depression, have poor academic performance and abuse narcotics and illegal drugs (Bond et al., 2007). This sense of attachment is formed through student interactions with friends, teachers and other school personnel (Farrell et al., 2018). School connectedness will occur when students feel part of their school and have bonds and closeness with friends and school components such as teachers and other school staff. The attachment between students and school components has been considered as one factor that influences student learning success in school (Lohmeier & Lee, 2011).

Guidance and counselling teachers need to develop school connectedness to support student's academic and non-academic success (Lapan et al., 2014). School connectedness-based guidance and counselling can be implemented by actively involving parents, teachers and peers in the process of providing systematic and comprehensive guidance and counselling services during the COVID-19 pandemic. Families, schools and communities must work together to create a learning environment that supports optimal student development. The component of support and attention from parents is an essential factor that can help students undergo online learning. Collaboration between parents and teachers can optimally support the implementation of learning and increase students' sense of attachment to school (Garbe et al., 2020). The development of guidance and counselling programmes based on school connectedness can also improve students' social and emotional aspects. Implementation of online learning makes students less cooperative and less tolerant, experiencing emotional problems, such as boredom and sadness, because they are far from friends and teachers, and often experience verbal violence when studying with parents (Kusuma & Sutapa, 2020).

In developing guidance and counselling services based on school connectedness, guidance and counselling, teachers need to conduct an assessment to find out the description of the condition of school connectedness owned by students. Assessment is an integral part of guidance and counselling (Hays, 2017). In line with this, Oluwatosin and Popoola (2018) stated that the primary requirement that a counsellor must have to be able to assist clients in the counselling process is a thorough understanding of the client. This understanding is based on information obtained from and about the client using objective and systematic testing and assessment procedures. Guidance and counselling teachers need a school connectedness assessment instrument to measure the condition of school connectedness in students. Assessment is also helpful for providing information that can be used as a basis for making a diagnosis, developing a case conceptualisation, making recommendations for management and designing an intervention plan that will be given (Edwards & Young, 2013).

Several previous studies have examined the development of school connectedness assessment instruments, including research (Farrell et al., 2018) that tried to develop a school connectedness scale for college students. The scale contains 5 aspects with 27 question items, but the scale was developed for college students, while the characteristics of students in this study were at the high school level. Lohmeier and Lee (2011) tried to develop a school connectedness scale for adolescents. The scale contains 7 components of school connectedness and 51 question items, but the study has not discussed the school connectedness instrument for high school students during the COVID-19 pandemic. Instrument testing that specifically discusses school connectedness during a pandemic for high school students is needed to suit the characteristics and needs of students during online learning.

In this study, measurements were carried out using the Rasch model. The selection of the Rasch model is based on considerations of its advantages. This model is suitable for measuring a good attitude scale, interpreting it meaningfully. In addition, this model allows researchers to produce a good participant profile as well (Zamora-Araya et al., 2018). This study aims to test the school connectedness instrument explicitly used for online learning during the COVID-19 pandemic by guidance and counselling teachers.

2. Method

2.1. Research model

This research is a type of quantitative descriptive research. Researchers adapted the school connectedness scale developed by Lohmeier and Lee (2011). The scale, which initially contained 54 items, was shortened to 18 items. The 18 items tested in this study were based on responses from respondents and the Rasch model.

2.2. Participants

The participants in this study were 526 high school students in Yogyakarta who had implemented online learning. The sampling technique used is simple random sampling. Even though it was carried out randomly, the sample selection also considered the representation of each location in Yogyakarta. This is intended to obtain more comprehensive data even though it is carried out in a sample area.

2.3. Data collection tools

The data collection of this research was carried out using a questionnaire technique. The questionnaire used measures 6 components spread over 18 statement items. This research instrument is set in an online form.

2.4. Data collection process

This research data was collected through the help of an online form. This is based on the situation at the time the research was still under activity restrictions due to the pandemic. Therefore, data collection was carried out remotely. Data collection techniques were carried out online using Google Forms to prevent the spread of COVID-19.

2.5. Data analysis technique

Data analysis in this study used quantitative analysis techniques using the Rasch model. The data analysis technique used in this research is qualitative. The data obtained from the fields are then continued in the process of data condensation and data verification to obtain conclusions. In addition, to ensure the validity of the data obtained, data triangulation was carried out. The type of triangulation carried out was source triangulation. In addition, time triangulation was also carried out through an extension of time to strengthen the accuracy of the data obtained for the purpose of drawing conclusions.

3. Results and discussion

This study aims to produce a school connectedness instrument for high school students in Yogyakarta. The research results are described based on several things that have become the focus of

this research. There are four things to focus on, including instrumental aspects of school connectedness, reliability and distribution of items in the instrument, the distribution of the ability of subjects with the same level of difficulty and item fit. The results of the four focuses are described in detail below.

3.1. Instrumental aspects of school connectedness

The school connectedness scale refers to aspects developed by Lohmeier and Lee (2011), then modified to suit the character of high school teenagers. The grid for the school connectedness scale instrument is presented in Table 1.

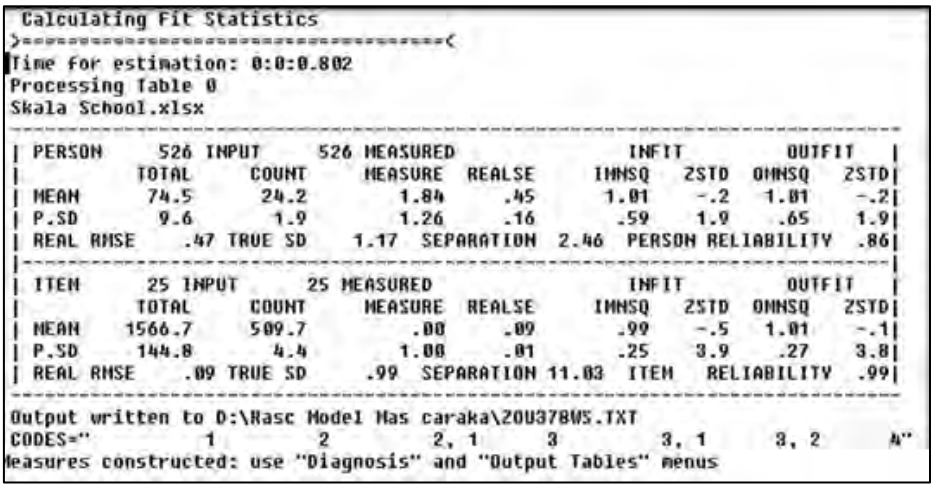
Table 1. School connectedness instruments

No.	Component	Item
1.	Connection with adults in school	1. The teachers at my school care about their students. 2. Teachers at my school pay attention to student progress. 3. The teachers at my school are friendly to students.
2.	Connected with peers (peer connections)	4. I am actively involved in activities at my school, such as a club or team. 5. I encourage other students to be involved in school activities. 6. I do many things to support my school.
3.	Connected with school (school involvement)	7. I am actively involved in activities at my school, such as a club or team. 8. I encourage other students to be involved in school activities. 9. I do many things to support my school.
4.	emotional connection	10. When I have a problem, I ask my friends at school for help. 11. I talk to my friends at school about how I feel. 12. I help friends who have problems at school.
5.	Instilling values in schools (school values)	13. I think school is important. 14. I care about my teacher's opinion of me. 15. I try to do my best in school.
6.	Comfort in this school	16. I feel this school is the right place for me. 17. I think my school is a safe place. 18. I would get annoyed if someone said bad things about my school.

The school connectedness scale consists of 18 items that reveal students' connectedness with school, connectedness with peers, connectedness with teachers, emotional connectedness, inculcation of values in school and comfort in school. These aspects can show the extent to which students feel they have an attachment to their school during the COVID-19 pandemic.

3.2. Reliability and distribution of items in the instrument

The second thing that becomes the focus of the results of this study is the results of the reliability analysis. This information is very important to consider the quality of the instrument that has been developed. The results of the analysis related to reliability are shown in Figure 1.



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 Calculating Fit Statistics
>==============================<
Time for estimation: 0:0:0.802
Processing Table 0
Skala School.xlsx
-------------------------------------------------------------------------------
| PERSON     526 INPUT     526 MEASURED              INFIT        OUTFIT    |
|          TOTAL     COUNT     MEASURE  REALSE     IMNSQ   ZSTD  OMNSQ   ZSTD|
| MEAN      74.5      24.2        1.84     .45      1.01    -.2   1.01    -.2|
| P.SD       9.6       1.9        1.26     .16       .59    1.9    .65    1.9|
| REAL RMSE    .47 TRUE SD    1.17  SEPARATION  2.46  PERSON RELIABILITY  .86|
|-----------------------------------------------------------------------------|
| ITEM      25 INPUT      25 MEASURED              INFIT        OUTFIT    |
|          TOTAL     COUNT     MEASURE  REALSE     IMNSQ   ZSTD  OMNSQ   ZSTD|
| MEAN    1566.7     509.7         .00     .09       .99    -.5   1.01    -.1|
| P.SD     144.8       4.4        1.00     .01       .25    3.9    .27    3.8|
| REAL RMSE    .09 TRUE SD     .99  SEPARATION 11.03  ITEM   RELIABILITY  .99|
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Output written to D:\Rasc Model Mas caraka\ZOU378W5.TXT
CODES="        1         2         2, 1      3         3, 1      3, 2      A"
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Figure 1. Reliability analysis with Rasch model

The instrument reliability test was carried out using the Rasch model. Item person has a reliability of 0.86, which is included in the excellent category, and has an item separation of 2.46. The school connectedness scale has various item difficulty levels and can measure school connectedness in high school students. The analysis results also show that the subject only has a reliability of 0.99 in the excellent category and person separation value of 11.03, which indicates that the subject's character varies significantly to detect the items developed.

A reliability value that exceeds 0.90 indicates a high reliability coefficient (Hinton et al., 2014). This means that all items in the instrument can be relied on to measure the right construct (Herwin & Nurhayati, 2021). It can be interpreted that although the items are different from each other, they measure the same construct (Huck, 2007). Another thing that can be explained is that this reliability also shows consistency. This means that this instrument will still give relatively the same results even though the measurements are carried out several times (Herwin & Mardapi, 2017; Otaya et al., 2020). Therefore, it can be described that the school connectedness instrument for high school students in Yogyakarta can be used to carry out measurements consistently.

3.3. Distribution of the ability of subjects with the same level of difficulty

One of the features of Rasch analysis with the Winstep application is a Wright Map that describes the distribution of subject abilities and the distribution of item difficulty levels with the same scale. Based on the analysis results, it can be seen that the area on the left is the distribution of the subject's abilities, while the area on the right is the distribution of items. The map shows that, in general, the questions in the test are parallel compared to the subject's ability.

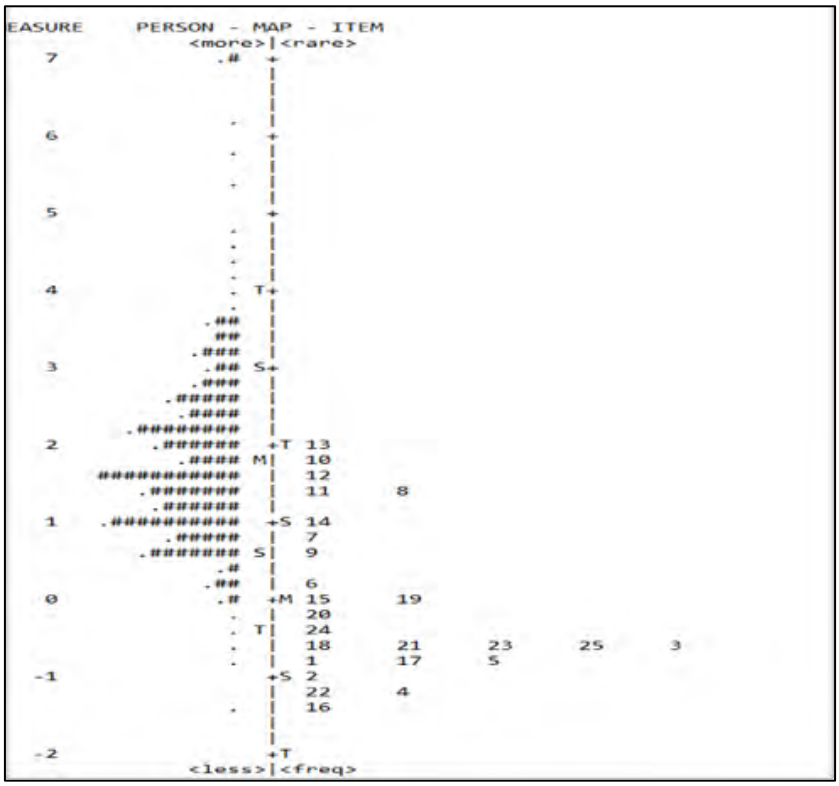
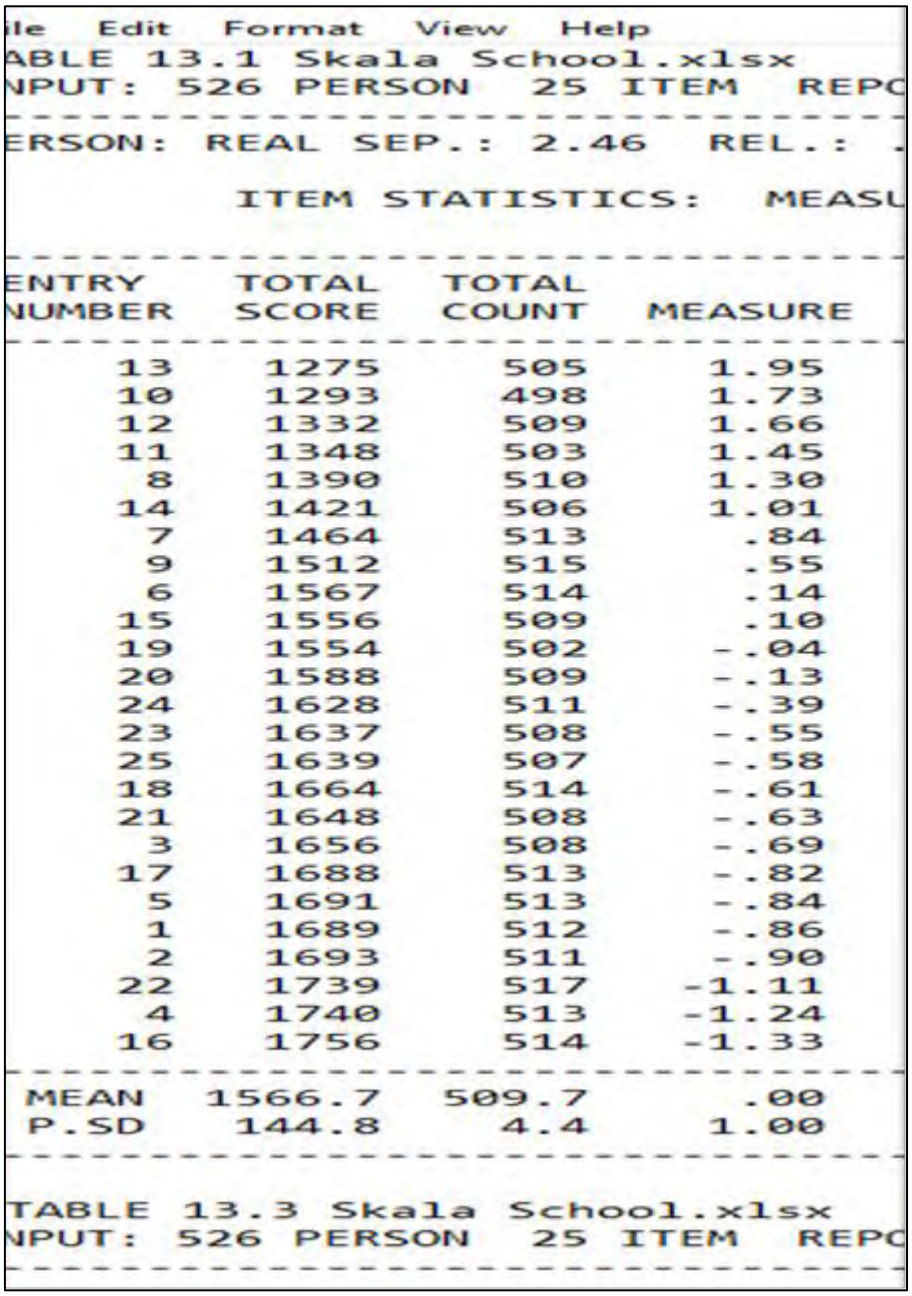


Figure 2. Person-item map distribution

The analysis results on the map show that items numbered 13 and 10 are the most difficult items for respondents to answer. On the contrary, item 16 is the most accessible item for respondents to answer. The Rasch model is a very suitable alternative to prove the validity of an item (Bond & Fox, 2013). Measurements with the Rasch Model produce an instrument that is more accurate, efficient and reliable (Ariffin et al., 2010; Herwin et al., 2019; Mohamed et al., 2008; Yasin et al., 2015). The details of the difficulty level of the item can be seen in Figure 3.



ile Edit Format View Help
ABLE 13.1 Skala School.xlsx
NPUT: 526 PERSON 25 ITEM REPC

ERSON: REAL SEP.: 2.46 REL.: .

ITEM STATISTICS: MEASU

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE
13	1275	505	1.95
10	1293	498	1.73
12	1332	509	1.66
11	1348	503	1.45
8	1390	510	1.30
14	1421	506	1.01
7	1464	513	.84
9	1512	515	.55
6	1567	514	.14
15	1556	509	.10
19	1554	502	-.04
20	1588	509	-.13
24	1628	511	-.39
23	1637	508	-.55
25	1639	507	-.58
18	1664	514	-.61
21	1648	508	-.63
3	1656	508	-.69
17	1688	513	-.82
5	1691	513	-.84
1	1689	512	-.86
2	1693	511	-.90
22	1739	517	-1.11
4	1740	513	-1.24
16	1756	514	-1.33
MEAN	1566.7	509.7	.00
P.SD	144.8	4.4	1.00

TABLE 13.3 Skala School.xlsx
NPUT: 526 PERSON 25 ITEM REPC

Figure 3. Items difficulties distributions

Items with the highest difficulty level are at the top, while the easiest items are at the bottom. Figure 3 shows that item 13 is an item that is difficult to answer by respondents with a measured value of 1.95. Item 16 is an item that is easy to answer with a measured value of −1.33. The calculation of the value of this measure refers to the categorisation written by Sumintono and Widhiarso (2015), which states that measure value < -1 is very easy item. Measure value −1 to d.0 is easy item. Measure value 0 to d.1 is difficult item. Measure value >1 is very difficult item. This result is also supported by various findings which state that the ideal difficulty level is around the range of −2 to 2 (Ayala, 2008; Herwin et al., 2019;

Tjabolo & Otaya, 2019). Based on the analysis results, it can be seen that the items developed have various categorisations, ranging from items in the very easy, difficult and very difficult categories.

3.4. Item fit

The level of item fit is used to determine the accuracy of the item with the model (item fit). Item fit can explain whether the items in the instrument function normally in measuring or not. If items do not fit, this indicates a subject's misconception in answering the question.

OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.		PTMEASUR-AL EXP.
1.04	2.00	A	.48	.53
1.46	1.64	B	.43	.49
1.40	1.01	C	.45	.47
1.23	1.05	D	.47	.47
1.23	1.34	E	.52	.52
1.22	1.83	F	.44	.44
1.21	1.74	G	.49	.49
1.18	1.45	H	.41	.47
1.14	1.02	I	.51	.51
1.11	1.60	J	.49	.51
1.09	1.20	K	.41	.46
1.04	.56	L	.48	.51
1.03	.43	M	.48	.54
1.03	.49	1	.50	.54
1.00	.04	k	.57	.53
.89	-1.59	j	.46	.44
.80	-1.91	i	.49	.46
.81	-1.83	h	.49	.46
.77	-1.36	g	.48	.49
.77	-1.52	f	.51	.45
.75	-1.87	e	.57	.47
.67	-1.12	d	.51	.49
.68	-1.03	c	.56	.47
.62	-1.19	b	.60	.47
.60	-1.61	a	.59	.48
1.01	-.1			
.27	3.8			

Figure 4. Item fit

According to Boone et al (2013), the outfit mean square, outfit Z-standard and point measure correlation are the criteria used to see the level of item fit. If the item does not meet the criteria, then the item can be repaired or replaced. Guidelines for assessing item fit criteria, namely outfit mean square (MNSQ) value received 0.5 < MNSQ < 1.5. Accepted Z-standard (ZSTD) outfit value was -2.0 < ZSTD < +2.0. The accepted point measure correlation value was 0.4 < pt. measure correlations < 0.85 (Boone et al., 2013). In Figure 4, we can see that the items displayed have varying point measure correlation, MNSQ and ZSTD values but meet the specified criteria limits. Overall, 18 items on the school connectedness scale are declared fit and can be used to measure the condition of school connectedness in high school students.

These results indicate that there is a match between the empirical model and the theoretical model that was previously thought (Tungkunanan, 2020). In addition, this means that the measurements carried out have been able to show the similarity of the correlations that were derived from the theoretical one with the correlations that were derived empirically (Herwin & Nurhayati, 2021; Furr & Bacharach, 2013). Thus, this measurement has met the theoretical expectations.

4. Conclusion

The school connectedness instrument developed consists of 6 aspects with 18 items. The analysis results using the Rasch model show that the instrument has a good reliability with a coefficient value of 0.86 and various item separations with a value of 2.46. The analysis results show that the subject has a reliability of 0.99 in the excellent category and a person separation value of 11.03, which indicates that the subject's character varies greatly to detect the items developed. Item 13 is an item that is difficult to answer by respondents with a measured value of 1.95. Item 16 is an item that is easy to answer with a measured value of -1.33. Overall, 18 items in the instrument have met the specified MNSQ, ZSTD and point measure correlation criteria. All items are declared fit and can be used to measure school connectedness in students. The results of this study contributed to the development of instruments using the Rasch model in the field of guidance and counselling, primarily to support student development during the COVID-19 pandemic. Future research is expected to develop instruments on other variables to help students achieve their development tasks optimally.

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