

Application of Rasch Measurement Model to Analyze Instrument of Quality of Early Childhood Care and Education in Malaysia

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Received: October 14, 2021

Accepted: December 04, 2021

Online Published: March 17, 2022

doi:10.5430/wjel.v12n2p282

URL: <https://doi.org/10.5430/wjel.v12n2p282>

Abstract

This study aims to identify the validity and reliability between constructs from peer-to-peer perspective regarding the quality of early childhood care and education in Malaysia. Following the process of modification and fining, this questionnaire consists of four constructs with 60 items. The findings evidently showed that this study is significant in exploring children's early development which influences human behaviors and practices as they reach adulthood. Therefore, the findings of this study aspire to help the stakeholders involved in early childhood education to investigate the appropriate methods, approaches or techniques to elevate the early childhood education in Malaysia. It is hoped that the moral values vastly shared on social media are put into practice and fathomed by the society to be able to curb and control the social problems among Malaysian societies.

Keywords: rasch analysis, validity, reliability, child care quality, early childhood education, children development

1. Introduction

By 2050, early childhood education is among the critical concerns seeking for improvement. Early childhood education is the core of children's growth and development. Hence, quality fundamental education is essential for the children to excel in education towards a higher level. The key agencies playing an important role in the development of early childhood education are the Ministry of Education (MOE) Malaysia, KEMAS under the Ministry of Rural and Regional Development as well as the Department of National Unity and Integration (JPNIN) under the Prime Minister Department, along with the private sectors. Statistically, to date, 7,511 preschool classes were provided by MOE, 8,525 by KEMAS, 1,643 by JPNIN and 6,378 registered private preschools were established. This demonstrated an approximate increase of 2.9 percent (69.9%) from the previous enrolment of 67% in 2009. However, more preschool establishment is required from time to time to provide the best fundamental education to develop the quality of childhood education in Malaysia.

1.1 Early Childhood Education

Early childhood education was initially highlighted when a financial provision was given by the Asian Foundation to the Worker Society of Malaysia to develop kindergarten such as the Head Start project in the United States of America. The kindergarten operated in Selangor, particularly in Kampung Muniady, Kg. Manggis and Kg. Sentosa in which were mostly occupied by underprivileged children of Malay, Chinese and Indian ethnicities. A study was taken in the USA showing how the children involved in this project achieving commendable performance academically and behaviorally compared to the children who were not (Bernard Van Lee 2009). Subsequently, in 1970, the Ministry of Rural and Regional Development (KEMAS) had opened 10 sample preschools in rural areas known as Tabika to help poor local citizen. Following this is the constitution of preschools by FELDA, Risda (1980) and Community Relations Council (1976).

Hence, the Ministry of Education (MOE) legislated a specific act in 1970 for Early Childhood Education called the

Education Act 1961 P.U (A), *Kaedah-kaedah Pelajaran (Kindergarten/ Sekolah Asuhan)(Pendaftaran)*. Based on a report from The Dropout Study 1973 by Ee Ah Meng in 1988, there was positive impact among the children who received early education at preschool level. 90 percent of these children were placed in the leading class when they enrolled into primary schools (Ee Ah Meng 1998). This report had evidently shown how early childhood education needed critical attention. It was supported by Jemimah et al. (2018), Muhammad Jufri dan Hillman Wirawan (2018), Shulamit (2016), and Vladimir (2017) who believed that early childhood education required more attention as well as the children needed to be nurtured with courage and aesthetic values from an early age. Consequently, this study is relevant to construct the best model framework for early childhood education learning among the children in Malaysia.

2. Problem Statement

At present, highly developing countries indicate higher rate of social issues. Hence, more stakeholders are taking this matter seriously while investigating the roots of this social problem. Some of the efforts made were exploring the quality of early childhood care and education in Malaysia. The development of early childhood education is a reflection of the adults today. This coincided with the views of Azilah, Rafikul dan Nur Anisah (2018) who said that the impact of early childhood education influenced the behavior and practices once they became adults. Moreover, this study is practically relevant to identify the positive and negative criteria which influence and affect the development of children as they grow older. Peer perspective was chosen as the respondent of this study for the fact that besides parents, guardians and employers, friends are considered the closest companions for idea sharing, group work, as well as story and opinion sharing, hence the respondent's peers were also chosen to evaluate and give opinions on their friends who had attended kindergarten.

Furthermore, early childhood education is highly important in nurturing exemplary criteria and model for a credible leadership in the future. This study on early childhood development is hoped to nurture the values of a dedicated leader. Nonetheless, the focus on early childhood education is also specific on the construction of a virtuous and excellent generation in terms of academics, moral and personality, in line with Malaysian cultures which are known to be highly courteous, well-mannered and honorable. Likewise, early exposure for the children towards problem-solving skills may reduce the risk of mental health issues like extreme stress and depression later on. Hence, this study aspires to encourage more positive endeavor and views in order to improve and develop early childhood education for a prosperous and healthy forthcoming society.

3. Objectives of Study

- a) To explore the impacts of ECCE programs towards the development of adults.
- b) To identify the positive factors of ECCE towards the development of adults.
- c) To identify the negative factors of ECCE towards the development of adults.

4. Research Questions

- a) To what extent does the ECCE program affect the development of adults?
- b) How does the ECCE program give impact on the development of adults?
- c) What are the positive factors that contribute to the development of adults?
- d) What are the negative factors that contribute to the development of adults?

5. Methodology

The researchers had developed a questionnaire on Quality Early Childhood Care and Education in Malaysia to explore peer-to-peer perception towards the impacts of the quality of early childhood care and education of their peers who had received early education such as the kindergarten. This questionnaire consists of 60 items to measure and validate each construct to obtain the validity and reliability of each of item and construct. It was divided into the constructs of individual characteristics, learning experience, personal skills and good citizenship, and distributed to 87 respondents across Malaysia. The data was analyzed using the software Winsteps Version 3.74.

6. Research Findings

The data analysis through Rasch measurement model had acquired (i) the reliability and item segregation among respondents; (ii) the polarity item which measured the constructs based on PTMEA CORR; (iii) the item correspondence in measuring constructs and (iv) item measurement for constructs. Based on Rasch measurement model, the Alpha Cronbach reliability value (α) is between 0.71 – 0.99 where the best level is (71% - 99%). The findings from the preliminary study is at an excellent level of 0.78 between constructs although the reliability

between respondents has the reliability value of 0.96. The obtained value showed that the questionnaire was commendable with high consistency value and correspondence between items.

Other analysis required besides reliability was segregation of each item among the respondents. Table 1 demonstrated the overall reliability value and item segregation of 0.78 and 1.90. The reliability value obtained indicated the good and acceptable value (Born & Fox, 2007). Conversely, the segregation value of 1.90 displays a good value and should be segregated into two parts at the measurement levels. According to Linacre (2003), the segregation index value is excellent as it approaches the segregation value of 2.0.

Table 1. Reliability of 5 item constructs

No	Construct	Num. of item	Item Reliability		INFIT MNSQ		OUTFIT MNSQ	
			Item	Segregation	Max	Min	Max	Min
1.	Individual Character	12	0.77	1.83	1.76	0.75	2.17	0.70
2.	Learning Experience	9	0.86	2.43	1.73	0.19	1.77	0.19
3.	Personal Skills	15	0.71	1.58	1.74	0.66	1.51	0.54
4.	Good Citizenship	24	0.60	1.23	2.10	0.40	2.07	0.33
Total		60	0.78	1.90	2.85	0.41	2.86	0.34

However, the reliability value of each respondent is 0.96 and the segregation value is 4.74. This indicated that the data acquired were very good and highly acceptable. On the other hand, the segregation value showed a good segregation value since it surpassed the value of 2.0 of Linacre (2005).

Table 2. Reliability of 34 respondents

No	Construct	Num. of item	Respondent Reliability		INFIT MNSQ		OUTFIT MNSQ	
			Respondent	Segregation	Max	Min	Max	Min
1.	Individual Character	12	0.83	2.25	3.53	0.16	3.95	0.15
2.	Learning Experience	9	0.65	1.35	3.79	0.27	3.85	0.32
3.	Personal Skills	15	0.91	3.19	5.01	0.14	5.50	0.13
4.	Good Citizenship	24	0.93	3.60	2.39	0.14	2.33	0.13
Total		60	0.96	4.74	2.29	0.25	2.92	0.24

6.1 Item Polarity Based on the Value of PTMEA CORR

The value of PTMEA CORR is used to determine the polarity of item to test the relationship between constructs in order to attain good correspondence. If the value of PTMEA CORR is positive, the value of the construct has been measured. Contrarily, if the value is negative, the item being constructed was not measured (Bond & Fox, 2007). Therefore, the negative value should be mended or omitted since it is insignificant to the items in the questionnaire. Based on Table 3, there is no negative item, hence the items overall have acquired a good correspondence level. The highest positive PTMEA CORR value is 0.43 for the learning experience construct. This means that the overall PTMEA CORR value was high and each item had high relationship between items.

Table 3. Item Polarity: Preliminary

No	Construct	PTMEA CORR			Total of Item
		Min	Item	Max	
1.	Individual Character	.67	SB_KI_12	.90	12
2.	Learning Experience	.43	SC_PB_8	.88	9
3.	Personal Skills	.74	V56_A	.88	15
4.	Good Citizenship	.67	SE_WB_22	.87	24
Total		0.47	SC_PB_4	0.76	60

6.2 Measurement of Item Difficulty towards Constructs

Item correspondence could also be measured from the values of Infit dan Outfit Mean Square (MNSQ). As stated by Bond dan Fox (2007), the values of Infit dan Outfit MNSQ should have values between 0.6 and 1.4 to ensure that each measured item fits its construct. Nevertheless, the values of Outfit MNSQ should be taken into account first compared to the values of Infit MNSQ to measure the items between constructs (Kashfi, 2011). Based on Table 4, the first item, courageous spirit, is the hardest item while the least relevant is the ninth item which was social ability. Meanwhile, the 14th respondent had the most difficulty to answer the questionnaire.

Table 4. Item difficulty and respondent ability for 5 constructs: Preliminary

No	Construct	Item measurement	Item	Respondent measurement	Respondent
1.	Individual Character	+1.22/-1.48	SB_KI_1/SB_KI_9	+6.40/-2.77	14/19
2.	Learning Experience	+1.34/-1.48	SC_PB_4/SC_PB_8	+6.77/.20	14/12
3.	Personal Skills	+1.22/-1.49	V52_A/ V49_A	+8.30/ -0.61	14/12
4.	Good Citizenship	+1.76/-1.45	SE_WB_22/SE_WB_8	+8.16/-1.30	29/12
Total		+2.27/-1.44	SB_KI_1/ SE_WB_24	+9.51/-0.46	25/12

6.3 Measurement of Item Correspondence towards Constructs

Unidimensionality regarded the items in the instruments as measuring single ability (Conrad et al., 2012). Three features taken into account to study unidimensionality were the principal component analysis (PCA) which were the value of variance as depicted by measurements, item dissonance level in each contrast and Eigen values. The findings of the overall item values fulfilled the first condition which was more than 20 percent (Conrad et al., 2012) with PCA value of 27.1 percent, exceeding the recommended 20 percent. However, the construct of good citizenship has a low contrast value of only 9.8 percent.

Table 5. Unidimensionality: Standardized Residual Variance for 5 subconstructs: Preliminary

No	Construct	Varian Explained by Measures (%)	Unexplained Variance Explained by 1 st Contrast (Size)
1.	Individual Character	49.1	5.9 (25.0%)
2.	Learning Experience	41.4	4.2 (27.1%)
3.	Personal Skills	54.5	7.8 (23.8%)
4.	Good Citizenship	53.5	5.0 (9.8%)
Total		49.1	11.7 (9.9%)

6.4 Overall Analysis

The findings displayed the validity and reliability of the questionnaire based on the analysis of Rasch measurement. The modification process of each item was conducted based on the acquired values. This process was done by taking the opinions and evaluation of experts into consideration. As seen in Table 6, no item is omitted. All items from all four constructs were retained as 60 items.

Table 6. Summary of item of preliminary study

No	Construct	Item	Num. of item	Omit- ted Item	Rasch measurement model analysis				
					Num. of omitted items	Improv- e d items	Num. of improved items	Retained items	Num. of retained items
1.	Individual Character	SB_KI_1-SB_KI_12	12	-	-	-	-	All retained	12
2.	Learning Experience	SC_PB_1- SC_PB_9	9	-	-	-	-	All retained	9
3.	Personal Skills	SD_KI_B1- V59_A	15	-	-	-	-	All retained	15
4.	Good Citizenship	SE_WB_1 - SE_WB_24	24	-	-	-	-	All retained	24
TOTAL			60						60

Based on the item and respondent reliability, the questionnaire had good validity and reliability to measure peer-to-peer perception with their peer’s experience in attending kindergarten. Bond dan Fox (2007) firmly stated that Rasch analysis technique was able to identify the level of difficulty for each item as well as respondent’s ability.

7. Recommendation for Future Research

In future, it is recommended that the techniques of studies in questionnaire development uses techniques such as focused group and Delphi technique. These are suggested to ensure that the attained items are more intensive and concentrated towards the particular conducted studies.

8. Conclusion

This research paper discussed the outcome of Rasch analysis in investigating peer perspective towards the quality of early childhood care and education in Malaysia for their friends who had attended kindergarten as a child. Likewise, it sought to validate the constructs for this model framework statistically and have good validity and reliability between items. Overall, the reliability value for item is 0.78 while the value of reliability for respondent is 0.96. A number of 60 items were retained in this study for the conduct of further surveys. The application of Rasch statistical analysis is highly recommended for a quality item and construct analysis, especially to gain reliable data during the conduct of survey.

Acknowledgement

This research study is supported by the Ministry of Finance (MOF) through the Ministry of Education (MOE) Malaysia. We thank the National Child Development Research Centre (NCDRC), Universiti Pendidikan Sultan Idris (UPSI) as the leading university in this study in collaboration with SEGi University. The title of this study is "Development of a Comprehensive and Integrated Model of Quality Malaysian Early Childhood Care and Education (2015-0024-106-04) with the sub-project Project 4/LTI: The Impact of ECCE on Human Capital Development" (2015-0024-106-04-4). It is funded by the Ministry of Finance through the Ministry of Education Malaysia. We thank all members of the research team who had contributed to this research. We also thank the steering committee, critical informants, teachers, parents and other stakeholders who participated in the study.

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