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EXPLORING PRESERVICE TEACHERS' BEHAVIOURAL AFFECTION FOR INCLUSIVE EDUCATION IN MALAYSIA: A VALIDITY AND RELIABILITY STUDY OF THE PTBAIES

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ABSTRACT

To learn more about teachers' perceptions of including students with disabilities in regular classrooms, the Multidimensional Attitudes towards Inclusive Education Scale (MATIES) was first created. For the purposes of the current study, MATIES (Mahat, 2008) was being cross-culturally modified. In order to better support the learning outcomes for preservice teachers who pursued the inclusive education course during the relevant semester, the current study is focusing on the two dimensions namely, affection and behaviour. A cross-validation and reliability study on the behavioural affection of 254 preservice teachers was undertaken using the Rasch Measurement Model (RMM) Item Analysis and Exploratory Factor Analysis (EFA). The Preservice Teachers' Behavioural Affection towards Inclusive Education Scale (PTBAIES), according to the findings, is a dual-dimensional scale with two components (affection and behaviour). The reliability coefficient for Cronbach's alpha was .802 at the time. Results indicated that the 10-item-PTBAIES can be used as a valid and reliable tool for preservice teachers to examine their demeanour towards inclusive education in Malaysia.

Keywords: Attitudes, Affection, Behaviour, Inclusive Education, Rasch Measurement Model, Exploratory Factor Analysis

INTRODUCTION

Inclusive education, which aims to provide equal opportunities for all students, regardless of their abilities or backgrounds, has gained significant attention in educational research and practice (UNESCO, 2020). The successful implementation of inclusive education relies heavily on teachers' attitudes, beliefs, and behaviors toward inclusive practices (Forlin, 2018). Preservice teachers, as future educators, play a crucial role in shaping the inclusive education landscape (Çekici & Erdem, 2019). Therefore, understanding their behavioral affection toward inclusive education is essential for promoting inclusive practices in Malaysian schools. This article examines the development and utilisation of the Preservice Teachers' Behavioral Affection toward Inclusive Education Scale (PTBAIES) within the Malaysian context.

The PTBAIES is a research instrument adapted from the initial scale, Multidimensional Attitudes toward Inclusive Education Scale (MATIES) (Mahat, 2008) to measure preservice teachers' behavioral affection toward inclusive education. It offers valuable insights into the attitudes, intentions, and behaviors of preservice teachers, which can inform teacher education programmes, policy-making, and professional development initiatives (Sadeh & Shonfeld, 2019). The scale provides a comprehensive framework for assessing preservice teachers' readiness and commitment to inclusive education, allowing for targeted interventions to address potential gaps and challenges.

The Malaysian context poses unique cultural, linguistic, and educational challenges that influence preservice teachers' perceptions and behaviors toward inclusive education. Adapting the PTBAIES is crucial for capturing the specific nuances and cultural factors that may impact preservice teachers' responses. The adaptation process involves rigorous translation, cultural validation, and piloting to ensure the scale's reliability and validity within the Malaysian educational landscape (Kaur et al., 2021). The PTBAIES can provide valuable insights into the strengths and areas for improvement in preservice teachers' behavioral affection toward inclusive education. Findings from this scale can inform the development of evidence-based teacher education programs that address the specific needs and challenges faced by preservice teachers in Malaysia. Additionally, policymakers can utilize the scale's results to develop targeted policies and guidelines that promote inclusive practices in schools.

LITERATURE REVIEW

The development of Multidimensional Attitudes toward Inclusive Education Scale (MATIES) by Mahat (2008) has significantly contributed to the measurement of teachers' attitudes toward inclusive education. This psychometrically-sound instrument was designed to capture the multidimensional nature of teachers' attitudes, including their cognitive, affective and behavioural regarding inclusive practices. It aimed to provide comprehensive insights into teachers' acceptance, readiness, and preparedness to implement inclusive education. The MATIES scale has been widely utilised in various studies to explore teachers' attitudes toward inclusive education across different educational contexts. Its reliability and validity have been established in numerous investigations. This scale has provided researchers with a valuable tool to measure and understand teachers' beliefs, opinions, and perceptions regarding inclusive practices.

For example, in a study, the MATIES scale was employed to measure the inclusive attitudes of pre-service teachers in Hong Kong and Australia. The researchers examined various factors, including personal characteristics and prior experience, that might predict inclusive attitudes. The use of the MATIES scale allowed for a reliable and valid measurement of preservice teachers' attitudes toward inclusive education (Forlin & Lian, 2011). In another study, Forlin (2018) conducted a comprehensive literature review on teachers' attitudes towards inclusion and utilised the MATIES scale as a prominent instrument in the field. The review highlighted the importance of examining teachers' attitudes as a crucial factor influencing the successful implementation of inclusive education.

Alotaibi (2018) compared the attitudes toward inclusion of pre-service teachers in Saudi Arabia and the United States using the MATIES scale. The researchers investigated the influence of cultural factors on attitudes toward inclusive education. By employing the MATIES scale, the study was able to assess and compare the attitudes of pre-service teachers across different cultural contexts. A study by Çekici and Erdem (2019) utilised the MATIES scale to examine the relationships among preservice teachers' attitudes, self-efficacy, and concerns regarding inclusive education. The findings revealed significant associations between positive attitudes toward inclusive education and higher self-efficacy, as well as lower concerns among preservice teachers. Additionally, Sadeh and Shonfeld (2019) conducted a systematic review of studies measuring preservice teachers' attitudes toward inclusive education, in which the MATIES scale was frequently employed. The review emphasised the utility of the MATIES scale in assessing and comparing preservice teachers' attitudes across different cultural and educational contexts.

These examples demonstrate the widespread use of the MATIES scale in researching teachers' attitudes toward inclusive education. The scale has been instrumental in providing valuable insights into the factors that shape teachers' perceptions, beliefs, and readiness to embrace inclusive practices. Its

application in various studies has contributed to the advancement of knowledge and understanding in the field of inclusive education. These studies, along with numerous others, provide evidence of the utilisation of the MATIES scale in exploring teachers' attitudes toward inclusive education. The rigorous psychometric testing conducted in the original development of the scale and its subsequent use in various studies highlight its reliability and validity as a measurement tool. Furthermore, the application of the MATIES scale has allowed researchers to examine factors that influence teachers' attitudes toward inclusive education, including personal characteristics and prior experience.

Drawing from the literature on the MATIES scale, the adaptation of the Preservice Teachers' Behavioral Affection toward Inclusive Education Scale (PTBAIES) within the Malaysian context can benefit from this foundation. By reviewing previous studies employing the MATIES scale, researchers can identify the dimensions and factors that have been explored in relation to teachers' attitudes in Malaysia. This review will inform the adaptation and refinement of the PTBAIES, ensuring its relevance and alignment with the Malaysian context. Additionally, the literature on the MATIES scale provides insight into the limitations and gaps that the PTBAIES aims to address. For example, while the MATIES scale primarily focused on measuring teachers' attitudes, the PTBAIES expands upon this by incorporating preservice teachers' attitudes in inclusive practices. In summary, this expansion allows for a more comprehensive assessment of preservice teachers' behavioral affection toward inclusive education within the Malaysian context.

METHODOLOGY

The newly adapted Preservice Teachers' Behavioral Affection toward Inclusive Education Scale (PTBAIES) within the Malaysian context can be related to its initial scale, the Multidimensional Attitudes toward Inclusive Education Scale (MATIES) (Mahat, 2008), in terms of their conceptual similarities and the context in which they were developed. The purpose of the MATIES is to obtain information about teacher's attitudes toward the inclusion of students with disability in regular classrooms. Inclusive education is defined as "the education of all students in age appropriate regular classrooms, regardless of the degree or severity of a disability. It involves students accessing the regular curriculum; with the necessary support; and within a welcoming social atmosphere" (Mahat, 2008). It is criterion-based and could measure attitudes' affective, cognitive, and behavioural components in a way that is useful for inclusive education, which includes physical, social, and academic inclusion.

To suit with this study, researcher adopted the MATIES (Mahat, 2008) in order to allow preservice teachers to describe their perspectives about including students with disabilities in regular classes. All the 18 questions in MATIES were adopted to form the assessment tool. There were three subscales involved, namely, cognitive – 6 items, affective – 6 items, and behavioural – 6 items. The respondents rated the child on a six-point scale ranging from "Strongly Agree" to "Strongly Disagree".

Cross-cultural Adaptation Procedures

Researchers have gone through a few crucial steps for the cross-cultural adaptation of scales, which are highlighted in Bourzgui et al. (2015), Silveira et al. (2013), and Chae, Kim & Yoo (2010). These steps included ethical concerns, forward and backward translation, as well as expert validation.

Construct Validation

In this study, 254 preservice teachers participated as respondents. To evaluate the construct validity of the questionnaire, the researcher used WINSTEPS Version 3.72.3 (Linacre, 2005) and the Rasch Measurement Model (RMM) item analysis. Two key RMM assumptions—that the data fit the model and are unidimensional—must be satisfied in order to produce a reliable instrument (Wright & Masters, 1982). It was also necessary to pinpoint the fundamental ideas behind the instrument's adapted scale within the context of Malaysia. In this study, using data from the entire population of 254 respondents via IBM SPSS Statistics 27, the researcher explored the underlying constructs of the three adapted subscales via Exploratory Factor Analysis (EFA) and applied the five-step EFA protocol proposed by Williams, Brown, & Onsmann (2010).

Reliability Testing

For the modified scales in the questionnaire, internal consistency reliability has been established as one of the standard estimators of reliability (Nasrin, & Trisha, 2009). As a result, using IBM SPSS Statistics 27, the researcher calculated the Cronbach's alpha for each of the instrument's adapted subscales used in this study.

RESULTS AND FINDING

Item Statistics

A three-step comparison process was used by the researcher to determine whether the data were consistent with the model. Point measure correlation value (PMC), infit and outfit mean square (MNSQ), and infit and outfit standardised z value (ZSTD) are listed in that order. Within the range of acceptable fit indices, all of the values indicated above were scrutinised and contrasted sequentially. The item with greater value may be considered to be excessively good compared to other things when calculating the item discrimination index by PMC. The range for PMC that is acceptable is 0.28 to 0.86 (Nurhazirah, *et. al*, 2012). The association between the item difficulty and individual ability level is determined using the two data from the MNSQ, infit and outfit, as well as ZSTD. Between 0.50 and 1.50 is the appropriate range for both infit and outfit MNSQ (Linacre, 2005). However, only within 2.0 (Wright, & Linacre, 2002) will infit and outfit ZSTD be approved. In accordance with Haliza, *et. al* (2012), an item will be classified as misfit if none of the three controls indicated above can be met.

The 18-item-PTBAIES remained 10 items after the RMM item analysis, which was carried out stepwisely. Item number 1, 2, 3, 4, 5, 6, 12 & 18 were underfit of which infit or outfit MNSQ (<0.50) or ZSTD (≥ 2.0). The researcher chose to remove eight inappropriate items from the original 18-item-PTBAIES based on the findings. Separation is described in the context of the RMM item analysis as the relationship between the true distribution of the measures and their measurement error (Bond & Fox, 2001; Linacre, 2005). According to estimates of separation (Smith, 2001; Linacre, 2005), a person or item can be reliably separated to what degree. Linacre (2005) made the suggestion that separation index values greater than 2 for both person and item should be regarded favourably.

According to Franco *et al.* (2007), the person separation index provides an assessment of the distribution of people along the measurement construct. Low dependability of the items is indicated by low person separation value, which makes it difficult to detect individual differences (Randall & Everett, 2007). Consequently, the instrument requires more components (Lu, 2014). Additionally, the item separation index estimates how far apart the items are along the measurement construct (Franco *et al.*, 2007). When item separation is low, more responders are required to authenticate the instrument's item hierarchy (Lu, 2014). Finally, Linacre (2012) discovered that construct validity is comparable to item reliability whereas person reliability is equivalent to Cronbach's Alpha Coefficient. The person separation index and item separation index were at 13.03 and 1.95, respectively, according to the fit statistics. The reliability scores for the person and item were at .99 and .79, respectively. These findings demonstrated the validity and reliability of the 10-item-PTBAIES, a novel measure.

Unidimensional

The raw variance explained by measurements according to the Rasch residuals' Principal Component Analysis (PCA) was at 63.0%. Additionally, the first factor's unexplained variance was 11.7%. The 10-item-PTBAIES was thus found to be unidimensional and a satisfactory instrument in terms of concept validity by the dimensionality test (Conrad *et. al*, 2011; Fisher, 2007)

Exploratory Factor Analysis

The raw variance explained by measurements according to the Rasch residuals' Principal Component Analysis (PCA) was at 63.0%. Additionally, the first factor's unexplained variance was 11.7%. The 10-item-PTBAIES was thus found to be unidimensional and a satisfactory instrument in terms of concept validity by the dimensionality test (Conrad *et al.*, 2011; Fisher, 2007). Researchers examined the key dimensions from a sizable number of latent constructs, which were frequently represented by a set of

items (Henson & Roberts, 2006; Thompson, 2004; Swisher *et al.*, 2004; Pett *et al.*, 2003). The Williams *et al.* (2010) five-step EFA methodology was used in this study by the researchers.

The first stage is determining whether the data are appropriate for EFA. The fundamental premise of conducting factor analysis is that the interval or ratio data will be regularly distributed, according to Walker & Madden (2008). Additionally, according to Chua (2014), ordinal data with at least four response categories is sufficient for factor analysis because it is presumed to be regularly distributed when more than 200 samples are collected. Prior to factor extraction, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and the Bartlett's Test of Sphericity should be carried out (Kaiser, 1956; Bartlett, 1950). The EFA is suggested to be suitable for the KMO index of $\geq .50$ and $p < .05$ for the Bartlett's Test of Sphericity by Hair *et al.* (1995) and Tabachnick and Fidell (2007). The factor analysis was consequently permitted because the KMO index and Bartlett's Test of Sphericity showed that there was a link between the items (Burton & Mazerolle, 2011).

Table 1: KMO and Bartlett's test for the EFA on 10-item-PTBAIES

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.824
Bartlett's Test of Sphericity	Approx. Chi-square	1109.573
	df	45
	sig.	<.001

Table 1 shows that the scale's KMO coefficient was determined to be .824, which is satisfactory. Bartlett's test of sphericity revealed a significant association between the variables, with $p < .05$. In this study, researchers then chose an extraction strategy for carrying out the EFA in step two. Researchers chose to utilise the Principal Axis Factoring (PAF) method uses communality estimations and examines the relationships among measured variables during the factor extraction process.

In step three, the correct amount of components are retained to assess the quality of the EFA (Conway & Huffcutt, 2003). Several guidelines and methods were to be followed during the factor extraction process. For instance, at least 40% of the variance was extracted using the eigenvalue, $EV > 1$ (Kaiser, 1956), the Scree test (Cattell, 1966), and the cumulative percent of variance (Thomas & Brad, 2015). Reckase (1979) further states that legitimate scales should have a prime factor that accounts for at least 20% of the variance. In any case, in order to prevent erroneous results, the $EV > 1$ rule and Scree test should be triangulated with the supporting priori theory (Treiblmaier & Filzmoser, 2010).

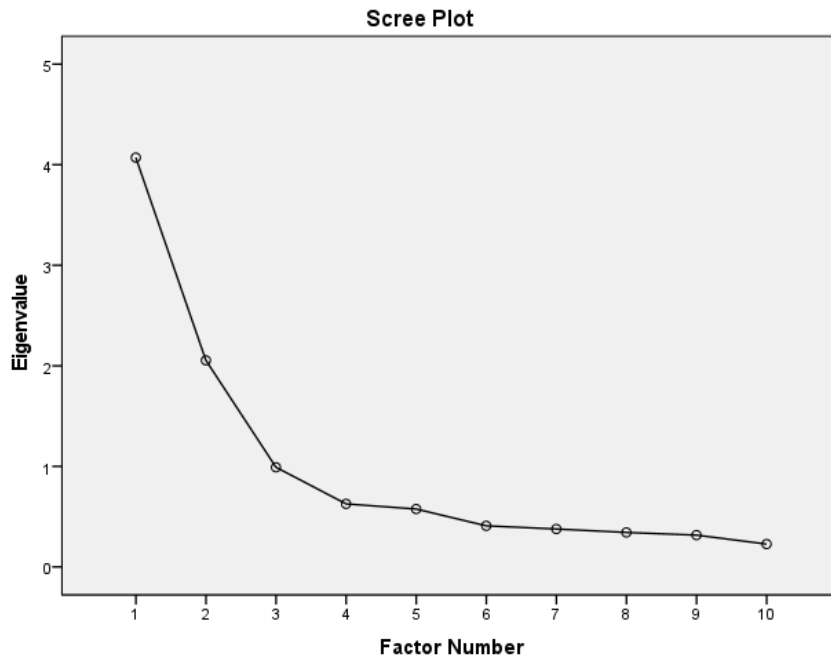
Table 2: Total variance explained for the EFA on 10-item-PTBAIES

Initial Eigenvalues				Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a Total
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	4.072	40.717	40.717	3.644	36.439	36.439	3.351
2	2.055	20.553	61.270	1.538	15.380	51.819	2.273
3	.992	9.918	71.188				
4	.628	6.729	77.467				
5	.577	5.766	83.233				
6	.410	4.095	87.330				
7	.378	3.780	91.110				
8	.344	3.438	94.548				
9	.317	3.171	97.719				
10	.228	2.281	100.000				

Extraction method Principal Axis Factoring.

^a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Figure 1: Scree test criterion for the EFA on 10-item-PTBAIES



The cumulative percentage of variance shown in Table 2 was 40.7%, and a total of two factors had eigenvalues greater than 1. The two factors' eigenvalues ranged from 2.055 to 4.072. 40.7% of the total variance was accounted for by the prime factor. Furthermore, the Scree plot in Fig. 1 showed that a visual "elbow" was discovered at the second point. The Scree test therefore suggested that two aspects should be considered while analysing the data.

According to Ruscio and Roche (2012), choosing the rotation technique increases the interpretability of the derived components. Rotation maximises high item loadings and minimises low item loadings, according to Williams *et al.* (2010). The elements under the adapted scales were thought to be intercorrelated, hence in step four, researchers used the oblique Direct Oblimin (DO) rotation approach for this study. According to Schmidt (2011) and Costello & Osborne (2005), oblique rotations provide the linked components that were thought to produce more accurate results for psychological and educational studies, such as those examining human actions.

The EFA's final phase was factor interpretation. A factor's attributable variables were investigated by the researchers. To determine the association of a particular component without affecting other factors, the correlation matrix and factor pattern matrix were analysed (Stevens, 1992). The interpretation of a factor depends heavily on the factor coefficients or loadings (Henson & Roberts, 2006). The very minimum loadings that are permissible are at least 0.32 (Treiblmaier, & Filzmoser, 2010). For a factor to be meaningful and understandable, it is usually desirable to have at least two or three variables placed on it (Henson & Roberts, 2006; Raubenheimer, 2004; Isaac, & Michael, 1997). According to Munro (2005), it is best to get rid of any unconnected components that don't define the construct.

Table 3: Pattern matrix for the EFA on 10-item-PTBAIES

	Factor	
	1	2
A1		.591
A2		.620
A3		.703
A4		.628
A5		.565
B1R	.588	
B2R	.720	
B3R	.893	
B4R	.798	
B5R	.758	

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalization. ^a

^aRotation converged in 5 iterations.

With factor loadings over 0.32 as advised, the Pattern Matrix in Table 3 revealed that two factors, each with five items, were produced using the PAF extraction and DO rotation approaches. As there was no factor deletion or factor merging, the researchers kept the names of the two factors exactly as they were in the original scale. Affective, A, for instance, has five items: A1, A2, A3, A4, and A5. It is intended to gauge the preservice teachers' level of empathy, and favourable attitudes towards children from varied origins and those with disabilities. Five components made up the second factor, behavioural factor, B: B1R, B2R, B3R, B4R, and B5R. This R stands for recoded item. B was used to gauge how prepared, competent, and confident preservice teachers were to instruct and support children with a variety of needs in inclusive settings (Sindhu et al., 2021).

Reliability Coefficient of PTBAIES

By calculating the internal consistency coefficient of Cronbach's alpha, the reliability of the items for the final PTBAIES model was determined. According to Nunnally (1994), good reliability requires that Cronbach's alpha be greater than or equal to .70.

Table 4: Reliability of each factor in 10-item-PTBAIES

Factor	Number of item	Cronbach's Alpha Values
Affective, A	5	.775
Behavioural, B	5	.860

The reliability analysis (N=254) in this investigation produced acceptable results (Table 4). The reliability of the entire PTBAIES scale with 10 items was determined to be .802. However, the Cronbach's alpha values for the variables A and B were at .775 and .860, respectively. In conclusion, the 10-item-PTBAIES was confirmed to be reliable.

DISCUSSIONS, RECOMMENDATIONS AND CONCLUSIONS

The PTBAIES within the Malaysian context encompasses two key dimensions: affective and behavioral. These dimensions capture different aspects of preservice teachers' attitudes and actions related to inclusive education.

The dimension of affective in the PTBAIES refers to preservice teachers' emotional and affective responses toward inclusive education. It assesses their feelings, beliefs, and values regarding the inclusion of students with diverse needs in regular classrooms. This dimension explores the depth

of preservice teachers' acceptance, openness, and understanding of inclusive practices (Forlin et al., 2019). It aims to measure their level of empathy, and positive attitudes toward students with disabilities and diverse backgrounds. For instance, within the dimension of affective, the PTBAIES may include items that measure preservice teachers' empathy toward students with disabilities, their appreciation for the benefits of inclusive education, and their recognition of the rights of all students to receive an equitable education. This dimension provides insights into the emotional and attitudinal aspects of preservice teachers' support for inclusive education.

The behavior dimension in the PTBAIES focuses on the actions and practices exhibited by preservice teachers in relation to inclusive education. It assesses their observable behaviors, intentions, and actions in promoting and implementing inclusive practices within the classroom and school environment. This dimension evaluates their readiness, competence, and confidence in effectively instructing and supporting students with diverse needs within inclusive settings (Sindhu et al., 2021). Within the behavior dimension, the PTBAIES may include items that measure preservice teachers' self-reported ability to differentiate instruction, adapt teaching strategies, collaborate with other educators, and manage diverse classrooms effectively. It also assesses their efforts in creating a positive and inclusive classroom climate, implementing inclusive teaching practices, and fostering the social-emotional development of all students.

By incorporating both affective and behavior dimensions, the PTBAIES provides a comprehensive assessment of preservice teachers' behavioral affection toward inclusive education. While the affective dimension captures the emotional and attitudinal aspects of their support, the behavior dimension provides insights into their actual practices and intentions in implementing inclusive education strategies. The combination of these two dimensions allows for a more holistic understanding of preservice teachers' readiness, commitment, and preparedness to embrace and promote inclusive education within the Malaysian context. It provides valuable information for teacher education programmes, policy-making, and professional development initiatives to address potential gaps and challenges in preservice teachers' attitudes and actions toward inclusive education.

When using the PTBAIES (Preservice Teachers' Behavioral Affection toward Inclusive Education Scale) within the Malaysian context, it is important to consider the following recommendations. Prior to using the PTBAIES, it is recommended to conduct validity and reliability testing within the specific context and sample of preservice teachers in Malaysia. This will help ensure that the scale is appropriate and provides accurate measurements of preservice teachers' behavioral affection toward inclusive education within that context. Provide clear and concise instructions to the respondents regarding how to complete the PTBAIES. It is important to explain the purpose of the scale and how to respond to the items. Additionally, establish consistent and reliable scoring guidelines to ensure accurate interpretation of the results. Take into account the cultural context of Malaysia when using the PTBAIES. Ensure that the scale and its items are culturally appropriate and relevant to the Malaysian educational setting. Consider adapting or modifying certain items to better align with the cultural and social context of preservice teachers in Malaysia.

Provide necessary training and support to individuals administering the PTBAIES to ensure consistency in administration and data collection. This may involve providing instructions and clarifications, as well as addressing any questions or concerns raised by the administrators. Ensure that ethical guidelines and procedures are followed when using the PTBAIES. Obtain informed consent from the participants and assure them of the confidentiality and anonymity of their responses. Adhere to ethical guidelines regarding data storage, protection, and reporting. Consider conducting longitudinal studies using the PTBAIES to track preservice teachers' behavioral affection toward inclusive education over time. This will provide valuable insights into the development and changes in their attitudes and behaviors throughout their teacher education programmes. In addition to using the PTBAIES, consider utilising other established measures related to inclusive education to gather a more comprehensive understanding of preservice teachers' attitudes and behaviors. This can help validate and triangulate the findings obtained from the PTBAIES.

By following these recommendations, researchers and educators can effectively utilise the PTBAIES to assess preservice teachers' behavioral affection toward inclusive education within the Malaysian context. The scale can provide valuable insights for teacher education programmes, policy-making, and professional development initiatives aimed at promoting inclusive practices in Malaysia.

In a nutshell, this study provided evidence that the 10-item-PTBAIES can be a valid and reliable scale to assess preservice teachers' behavioural affinity for inclusive education in Malaysia.

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