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Examining the construct validity of the Approaches and Study Skills Inventory for Students using the Rasch model

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ABSTRACT: *The Approaches and Study Skills Inventory for Students (ASSIST) is an important instrument to measure students' approaches to learning. However, the construct validity of the measurement used is not always sufficiently evaluated. The aim of this study was to examine the construct validity of ASSIST with 1155 Senior One students studying in 17 Malaysian Independent Chinese Secondary Schools (MICSS). The Rasch model was employed, focusing on local independence, dimensionality and measurement invariance analyses. The results confirmed the three-factor structure of ASSIST and supported the unidimensionality of the three scales. There was also no evidence of a violation of the principle of local independence for all pairs of item residuals and negligible evidence of differential item functioning (DIF) on gender and course. These results indicate that ASSIST has good construct validity and can be used as a tool for measuring students' approaches to learning. Using the Rasch model, measures are of an interval scale, and empirical evidence about the item clusters, dimensionality and measurement invariance can be determined. Additionally, issues pertaining to dimensionality, item dependency and non-equivalency across subgroups can be detected at an early stage of the instrument development to be addressed properly in the subsequent instrument administration.*

KEYWORDS: **Rash model, local independence, differential item functioning, principal component analysis, ASSIST.**

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1. Introduction

Research on students' learning approaches has shed light on the understanding of student learning that is critical in designing and implementing effective instructional strategies (Biggs, 1987; Ramsden, 1985). Many of these studies have shown evidence of a positive impact on their language or academic achievement (Cano, 2005; Greene et al., 2004; Li & Chun, 2012; McInerney et al., 2012). The construct of students' learning approaches has been largely based on the work of Marton and Säljö (1976a), in which they identified two qualitatively different ways students used to approach learning: deep and surface approaches to learning. Building on the work of Marton and Säljö (1976a, 1976b), Entwistle (1981), and Entwistle and Ramsden (1983) identified three key learning domains of deep, surface apathetic and strategic learning approaches, and developed one of the most frequently used instruments, the Approaches and Study Skills Inventory for Students (ASSIST; Entwistle, 2001). In light of the increased number of studies using the ASSIST, there is a need to conduct a validation examination of the instrument. A substantial body of research has been conducted to validate the ASSIST among various samples and cultures (Adedin et al., 2013; Bryne et al., 2004; Christina et al., 2009; Diseth, 2001; Gadelrab, 2011; Simelana-Mnisi & Mji, 2017; Speth et al., 2007). However, they focussed mainly on higher education and not the secondary school setting. Moreover, most of this research was conducted in Western countries, despite the call for such research in Asian countries such as Malaysia. Researchers examining the validity of ASSIST have documented the psychometric properties of ASSIST by means of internal consistency (e.g., Cronbach's alpha) and factor analysis (e.g., exploratory and confirmatory factor analysis). These are important evidence of instrument reliability and validity, but they mainly involve

ordinal level data which are dependent on the sample. Hence, the purpose of this paper is to examine the construct validity of the ASSIST with secondary school students studying the English language subject in Malaysia using the Rasch model.

The remainder of the paper is structured as follows. The first section explores the nature of students' learning approaches and reviews prior studies on the development and validation of the main instrument measuring students' learning approaches, i.e., ASSIST. It also discusses the application of the Rasch model in examining the construct validity of an instrument. The subsequent section describing the research methods and the results of the study are then presented and discussed. This paper concludes by considering the implications of the findings.

2. Literature review

2.1. Measuring approaches to learning

Approaches to learning describe students" intentions and how they carry out learning tasks in a given context (Entwistle, 1991). As McCune and Entwistle (2000) illustrated, approaches to learning were widely used to describe students" ways of handling tasks, and these approaches were consistent with their conceptions of learning within a particular learning context. Early research conducted by Marton and Säljö (1976a) identified two distinct approaches: deep and surface learning approaches. These two learning approaches in educational research have become the "canon of educational development" (Webb, 1997, p.195). However, deep and surface approaches have also been criticized for labelling students as "surface" or "deep" learners. Webb (1997) and Howie and Bagnall (2012) questioned the good and bad of surface and deep learning, for researchers have always been describing Western learners as "deep learners "while Asian learners as "surface learners". Biggs (1996) noted the lack of understanding of the culture and putting Asian learners in the lens of Western learners were the major problems. Biggs (1996) further clarified that the surface strategies used by Chinese students were actually used for deep learning purposes. Similarly, Entwistle (1998) also noted the paradox of Asian learners and indicated that the learning process was much more complex than just describing it as a deep or surface approach.

Building on the earlier work of Marton and Säljö (1976a, 1976b), Entwistle (1981, 1983, 2000), and Entwistle and Ramsden (1983) further developed approaches to learning to also include the strategic approach. The strategic approach, according to Entwistle et al. (2000), is related to self-regulation and metacognition strategies. It is used by students to manage their studies in order to obtain higher grades or marks. In terms of deep and surface apathetic approaches to learning, the former is related to students' actions in looking for thorough understanding, and the latter is related to students' action in routine memorization and coping minimally with the requirements of the studies (Enwistle, 1981, 2000).

Instruments related to students' learning approaches include Approaches to Studying Inventory (ASI), Revised Approaches to Studying Inventory (RASI) and Approaches and Study Skills Inventory for Students (ASSIST), which is a revised version of ASI and RASI. Entwistle et al. (2000) conducted a study to confirm the structure validity of the three approaches and found that the structure of deep, surface apathetic and strategic approaches was consistent with what they proposed earlier. Duff (1997, 2004), who examined the reliability and validity of RASI, found that the instrument had satisfactory construct validity and internal consistency. Diseth (2001) and Bryne et al. (2004), who examined the construct validity via the exploratory and confirmatory factor analysis, confirmed the three-factor structure of deep, surface apathetic and strategic approaches. In more recent validation studies, Speth et al. (2007), Valadas et al. (2010), Gadelrab (2011), Adedin et al. (2013), and Simelana-Mnisi and Mji (2017) also confirmed the three-factor structure of both the long and short versions of the ASSIST with high internal consistency.

These validation studies on the ASSIST commonly took place via the estimation of Cronbach's alpha and factor analysis (e.g., exploratory factor analysis, confirmatory

factor analysis, principal component analysis). Moreover, these studies were conducted in the higher education setting, with no attempt has been made to examine the construct validity of the ASSIST in the secondary school setting. The present study is timely to examine the construct validity of the ASSIST in the secondary school setting using the Rasch model.

2.2. Construct validity and the Rasch model

The Rasch model is based on the Item Response Theory (IRT) and is referred to as the one-parameter IRT. Employing the Rasch model to examine the construct validity and to improve measurement has many advantages. Alagumalai et al. (2005) highlighted that models based on Rasch are capable of developing interval scales; equating tests; detecting item bias; bringing persons and items onto a common scale that is independent of the specific situation in which data were collected; and estimating errors for each individual person and item instead of the instrument as a whole.

More recently, many researchers have suggested Rasch analysis as a powerful tool for evaluating construct validity (Abbitt & Boone, 2021; Bailes & Nandakumar, 2020; Leeming & Harris, 2022; Planinic et al., 2019; Robershaw et al., 2022). The Rasch model provides a more thorough assessment of the psychometric properties of a scale and tests for specific properties such as unidimensionality, local independence and invariance. Items which do not fit the Rasch model are instances of multidimensionality and indications that the construct theory requires amendments. Items that do not demonstrate invariance are indications of differential item functioning (DIF).

3. Methodology

This study aimed to examine the construct validity of the ASSIST using the Rasch model. In particular, this study investigated (1) the unidimensionality of the three scales of deep, surface apathetic and strategic approaches to learning; (2) whether the items within each scale are locally independent; and (3) whether DIF due to gender and courses existed.

3.1. The ASSIST

The ASSIST is a self-reported questionnaire consisting of 36 items to which respondents are asked to rate their level of agreement (1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree). The ASSIST has a proposed three-factor structure, and the items are organized accordingly into three main scales of deep, surface apathetic and strategic approaches to learning. The deep approach scale comprises 12 items, the surface apathetic approach scale comprises 8 items, and the strategic approach scale consists of 16 items.

3.2. Data collection

The data in this study were collected by means of a questionnaire, the ASSIST, from 1155 Senior One students studying the English language subject in 17 Malaysian Independent Chinese Secondary Schools (MICSS). Of 1155 students, 641 (55.5%) were male, and 514 (44.5%) were female. There were generally two main courses in this study: Science and Arts/Business. Of 1155 students, 506 (43.8%) took the Science courses and 649 (56.2%) students took the Arts/Business courses.

The ASSIST was distributed to students during the English language classes, and they were instructed to complete the questionnaire in respect of their study of the English language. The purpose of the research was explained, and students were assured that their responses were confidential and would only be used for the purpose of the research study.

As Linacre (1994) suggested, a sample size of 500 is required to conduct a robust analysis using the Rasch model. The samples in this study exceeded the sample size required for the Rasch model.

3.3. Data analysis

This study employed the Rasch model to examine the construct validity of the ASSIST. To establish the unidimensionality of the three scales, the point-measure (PTMEA) biserial correlations and fit statistics were examined, and the principal component analysis of residuals (PCAR) was conducted. Following Linacre (2023), items with INFIT and OUTFIT mean square values

between 0.50 and 1.50 are acceptable as they are productive for measurement and do not suggest the existence of additional dimensions. Items with positive PTMEA correlations are essential to support unidimensionality, and items with negative or near-zero PTMEA correlations should be investigated closely as they might indicate multidimensionality. For PCAR, a first contrast with an eigenvalue of less than two is not a concern to unidimensionality.

To confirm the local independence of the three scales, Yen's Q_3 (i.e., the largest standardized residual correlations) and fit statistics were examined. Items with INFIT and OUTFIT mean square values below 0.50 (i.e., overfit) and Yen's Q_3 correlation of higher than ±0.32 provide evidence of the potential violation of Rasch's item independence requirement (Linacre, 2023).

To examine whether items function equally in different gender and course groups, DIF analysis was conducted. Both DIF contrast and significance test were used to determine whether the DIF was substantial. DIF contrast of >0.50 with $p<0.05$ is an indicator of items not functioning equally (Linacre, 2023).

4. Results

4.1. Item fit statistics

The item measure and fit statistics for the three scales in the ASSIST are presented in Table 4.1. Overall, all items fit the model well, with the INFIT and OUTFIT mean square values between 0.50 and 1.50. Table 4.1 also reported that all items within the three scales had positive PTMEA correlations, indicating that they all functioned in the same direction. These results provided

Table 4.1 Rasch item measures and fit statistics of the three scales in ASSIST (N=1155)

Item	Measure	Error	INFIT		OUTFIT		PTMEA correlation
			MnSq	ZStd	MnSq	ZStd	
Deep Approaches to Learning							
DESM1	-0.49	0.06	0.94	-1.30	0.92	-1.80	0.56
DESM10	-0.55	0.06	0.99	-0.30	0.98	-0.50	0.62
DESM19	-0.23	0.06	0.90	-2.20	0.90	-2.30	0.62
DESM28	0.11	0.05	1.09	2.10	1.09	2.00	0.61
DERI2	0.23	0.05	0.93	-1.60	0.93	-1.60	0.56
DERI11	-0.32	0.06	0.89	-2.60	0.86	-3.00	0.62
DERI20	0.62	0.05	1.11	2.60	1.12	2.80	0.57
DERI29	0.17	0.05	0.99	-0.20	0.96	-0.80	0.56
DEUE3	-0.09	0.06	0.91	-2.00	0.91	-2.10	0.59
DEUE12	0.47	0.05	1.10	2.40	1.11	2.60	0.55
DEUE21	0.18	0.05	0.96	-0.90	0.96	-0.90	0.60
DEUE30	-0.10	0.06	1.12	2.50	1.11	2.30	0.54
Surface Apathetic Approaches to Learning							
SURM8	0.38	0.05	0.88	-3.10	0.88	-3.00	0.66
SURM17	0.08	0.05	0.95	-1.10	0.96	-0.90	0.53
SURM26	0.11	0.05	1.01	0.20	1.01	0.40	0.54
SURM35	-0.13	0.05	1.07	1.60	1.08	1.80	0.56
SUCM9	0.26	0.05	1.00	-0.10	1.00	0.00	0.66
SUCM18	0.10	0.05	0.96	-1.00	0.95	-1.20	0.67

Item	Measure	Error	INFIT		OUTFIT		PTMEA correlation
			MnSq	ZStd	MnSq	ZStd	
SUCM27	-0.48	0.05	0.95	-1.20	0.94	-1.50	0.49
SUCM36	-0.33	0.05	1.15	3.40	1.13	3.10	0.51
Strategic Approaches to Learning							
SAOS4	-0.48	0.05	0.97	-0.60	0.97	-0.80	0.52
SAOS13	0.48	0.05	0.98	-0.50	0.98	-0.40	0.56
SAOS22	0.56	0.05	0.98	-0.40	0.99	-0.10	0.54
SAOS31	0.90	0.05	1.04	1.10	1.05	1.30	0.56
SATM5	0.34	0.05	0.92	-2.00	0.93	-1.90	0.59
SATM14	0.20	0.05	0.93	-1.90	0.93	-1.80	0.58
SATM23	0.24	0.05	1.01	0.20	1.02	0.40	0.55
SATM32	0.58	0.05	0.93	-1.80	0.93	-1.80	0.60
SAAA6	-0.36	0.05	1.09	2.10	1.08	1.90	0.56
SAAA15	-0.57	0.05	1.12	2.80	1.11	2.60	0.56
SAAA24	0.21	0.05	1.16	3.70	1.16	3.80	0.49
SAAA33	-0.40	0.05	1.09	2.10	1.08	1.80	0.54
SAME7	-0.64	0.05	0.96	-1.00	0.98	-0.50	0.56
SAME16	-0.49	0.05	0.75	-6.50	0.75	-6.50	0.62
SAME25	-0.24	0.05	0.96	-0.80	0.96	-0.90	0.51
SAME34	-0.32	0.05	1.05	1.10	1.04	1.00	0.56

evidence to support the unidimensionality within each scale of deep, surface-apathetic and strategic approaches to learning.

4.2. Principal component analysis of residuals (PCAR)

Table 4.2 reports the standardized residual variance in eigenvalue units. The Rasch measures explained 34.8%, 34.7% and 34.6% of the total raw variance for deep, surface apathetic and strategic approaches to learning, respectively. The relatively smaller variance explained could be due to the narrow range of person abilities and item difficulties for these three scales. As demonstrated in Table 4.2, the first detected contrast for deep, surface apathetic and strategic approaches to learning had an eigenvalue of 1.60, 1.60 and 1.90, respectively, which was within the threshold of less than two, as recommended by Linacre (2023). Given that the eigenvalue of the first contrast was small, this provided evidence of unidimensionality for all three scales.

Figures 4.2.1, 4.2.2 and 4.2.3 show the standardized residual of the first contrast plots for deep, surface-apathetic and strategic

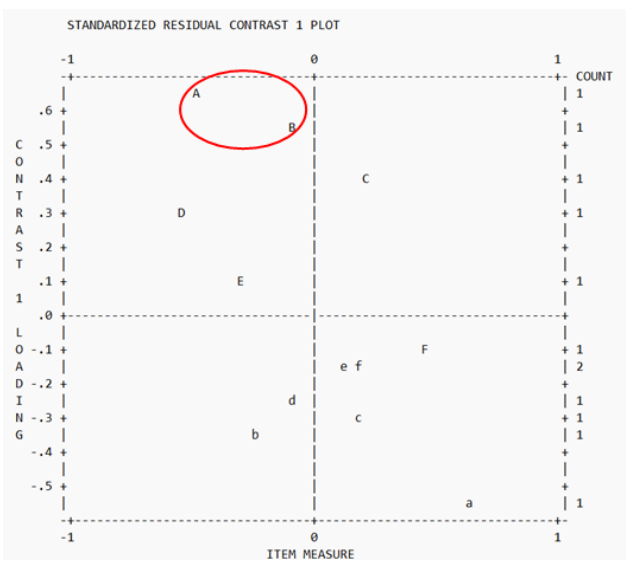

Figure 4.2.1. Standardized residual of the first contrast plot for deep approaches to learning

Table 4.2. Standardized residual variance of the three scales in ASSIST

Items	Eigenvalue	Observed	Expected
Deep Approaches to Learning			
Total raw variance in observations	18.40	100%	100%
Raw variance explained by measures	6.40	34.8%	34.7%
Raw variance explained by persons	4.00	21.8%	21.8%
Raw variance explained by items	2.40	13.0%	13.0%
Raw unexplained variance (total)	12.00	65.2%	65.3%
Unexplained variance in the first contrast	1.60	8.5%	13.0%
Surface Apathetic Approaches to Learning			
Total raw variance in observations	12.20	100%	100%
Raw variance explained by measures	4.20	34.7%	34.4%
Raw variance explained by persons	2.30	19.1%	18.9%
Raw variance explained by items	1.90	15.6%	15.4%
Raw unexplained variance (total)	8.00	65.3%	65.6%
Unexplained variance in the first contrast	1.60	13.2%	20.1%
Strategic Approaches to Learning			
Total raw variance in observations	24.50	100%	100%
Raw variance explained by measures	8.50	34.6%	34.4%
Raw variance explained by persons	4.40	18.0%	17.9%
Raw variance explained by items	4.10	16.6%	16.5%
Raw unexplained variance (total)	16.00	65.4%	65.6%
Unexplained variance in the first contrast	1.90	7.9%	12.1%

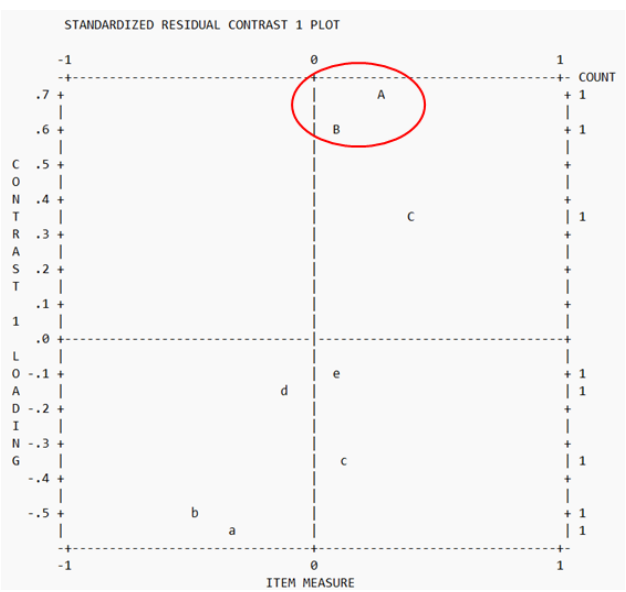

Figure 4.2.2. Standardized residual of the first contrast plot for surface apathetic approaches to learning

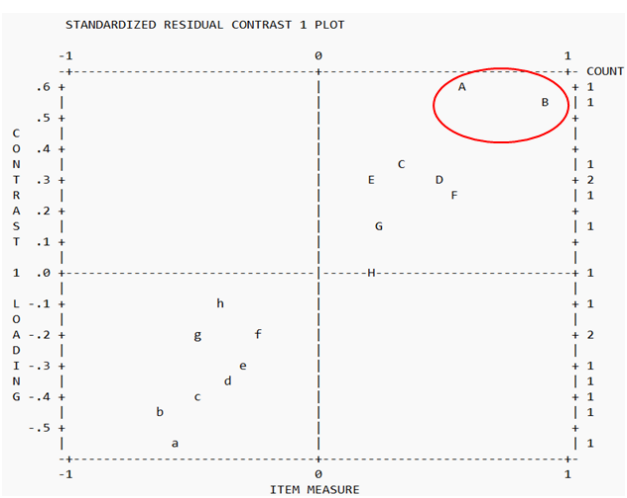

Figure 4.2.3. Standardized residual of the first contrast plot for strategic approaches to learning

approaches to learning. In conventional PCA, items with loadings of more than 0.40 should be examined closely (Stevens, 2002). In these three plots, items A and B had loadings of over 0.40. After examining the contents of these two items within each scale, they did not form a meaningful dimension for interpretation. Therefore, the results of PCAR indicated the unidimensionality of each of the three scales.

4.3. Local independence

Table 4.3 presents the largest standardized residual correlations for deep, surface apathetic and strategic approaches to learning. As shown in Table 4.5, all correlations were below ±0.32, and no substantially high correlations were observed. In addition, all item INFIT and OUTFIT mean squares were above 0.50, indicating no evidence of overfitting. In view of the results from both the correlation and item fit analyses, they provided evidence that there was no violation of the principle of local independence of the items for the three scales of learning approaches.

Table 4.3. Largest standardised residual correlations of the three scales in ASSIST

Item	Item	Correlation
Deep Approaches to Learning		
DESM1	DERI20	-0.23
Surface Apathetic Approaches to Learning		
SUCM9	SUCM36	-0.30
SUCM18	SUCM36	-0.24
SURM26	SUCM18	-0.23
SUCM9	SUCM27	-0.22
SURM17	SURM35	-0.21
SURM35	SUCM18	-0.21
SUCM18	SUCM27	-0.21
SURM8	SUCM27	-0.21
SURM26	SUCM9	-0.21
SURM17	SUCM9	-0.20
Strategic Approaches to Learning		
SAOS31	SATM32	0.22
SATM32	SAAA15	-0.23
SAOS31	SAME7	-0.22
SAOS31	SAAA6	-0.21
SAOS31	SAAA15	-0.20

4.4. Differential item functioning (DIF)

Table 4.4. reports the results of the DIF analysis for male and female students, as well as students taking Science and Arts/Business courses in terms of their deep, surface apathetic and strategic approaches to learning. The DIF contrast size for all items within the three scales was smaller than or close to ±0.50. Since the DIF contrast size was rather small, this indicated that all items functioned equally in the different gender and course groups.

Table 4.4. DIF on gender and courses for the three scales in ASSIST

Items	DIF on gender		DIF on courses	
	Contrast	Welch Prob.	Contrast	Welch Prob.
Deep Approaches to Learning				
DESM1	0.41	0.00	0.00	1.00
DESM10	0.35	0.00	-0.15	0.20
DESM19	-0.12	0.29	0.09	0.44
DESM28	-0.29	0.01	0.21	0.06
DERI2	0.00	1.00	0.00	1.00
DERI11	0.32	0.00	0.09	0.45
DERI20	-0.32	0.00	0.27	0.01
DERI29	-0.14	0.21	-0.38	0.00
DEUE3	-0.20	0.08	0.10	0.35
DEUE12	0.00	1.00	0.06	0.60
DEUE21	0.06	0.60	0.02	0.83
DEUE30	0.05	0.63	-0.32	0.01
Surface Apathetic Approaches to Learning				
SURM8	-0.11	0.25	0.36	0.00
SURM17	-0.14	0.14	0.00	1.00

Items	DIF on g ender		DIF on courses	
	Contrast	Welch Prob.	Contrast	Welch Prob.
SURM26	0.07	0.46	-0.10	0.31
SURM35	0.00	1.00	-0.11	0.25
SUCM9	0.16	0.10	0.29	0.00
SUCM18	-0.17	0.08	0.29	0.00
SUCM27	0.25	0.01	-0.38	0.00
SUCM36	0.00	1.00	-0.40	0.00
Strategic Approaches to Learning				
SAOS4	0.22	0.04	-0.15	0.15
SAOS13	-0.18	0.07	0.23	0.02
SAOS22	-0.36	0.00	-0.02	0.82
SAOS31	-0.12	0.23	0.54	0.00
SATM5	-0.14	0.16	0.31	0.00
SATM14	-0.25	0.01	0.13	0.18
SATM23	-0.28	0.01	0.00	1.00
SATM32	-0.26	0.01	0.30	0.00
SAAA6	0.02	0.83	-0.12	0.25
SAAA15	0.55	0.00	-0.46	0.00
SAAA24	-0.17	0.09	0.11	0.28
SAAA33	0.27	0.01	-0.28	0.01
SAME7	0.20	0.06	-0.38	0.00
SAME16	0.27	0.01	-0.17	0.10
SAME25	0.00	1.00	-0.03	0.79
SAME34	0.36	0.00	-0.06	0.53

5. Discussion

In this study, the main purpose was to examine the construct validity of ASSIST in the context of secondary school students studying the English language subject in Malaysia. Overall, the 36-item ASSIST has demonstrated good construct validity and can be used to measure students' learning approaches. Using the Rasch model to evaluate item characteristics and psychometric properties, an empirically validated instrument can be developed.

The findings from this study show clear evidence of the three-factor structure of approaches to learning: deep, surface apathetic and strategic approaches to learning. These findings are consistent with the findings from many validation studies conducted among various samples and cultures by means of internal consistency and factor analysis (Adedin et al., 2013; Bryne et al., 2004; Christina et al., 2009; Diseth, 2001; Gadelrab, 2011; Simelana-Mnisi & Mji, 2017; Speth et al., 2007).

The Rasch analyses conducted in this study support that each approach to learning is essentially unidimensional. First, the fit statistics for all items fell within the range for productive measurement of 0.50 and 1.50. Second, no negative PTMEA correlation was observed. Third, the first contrast in PCAR was below 2.0. As two items within each approach to learning had loadings of more than 0.40, detailed examinations of item clusters to ascertain whether they form meaningful sub-dimensions were conducted. As noted by Fan and Bond (2019), the clustering of items is more important than the magnitude of component loading in PCAR. The results showed that no meaningful clusters were formed, providing evidence of no secondary dimension for deep, surface-apathetic and strategic approaches to learning.

Empirical indicators, essentially the item fit statistics and correlations between item residuals (Yen's Q_3), provide evidence of the potential violation of local independence. In this study, there was no evidence of a violation of local independence for the three approaches to learning. No substantial high correlations were found among the items, indicating that item pairs are not related to each other. Additionally, the INFIT and OUTFIT mean square values were below 0.50, indicating that all items are independent of one another.

No significant DIF was identified across gender and courses for all three approaches to learning. The results provide evidence that the deep, surface-apathetic and strategic approaches to learning function similarly between male and female students and between Science and Arts/ Business courses.

6. Limitations and future research

This study used a large sample size, which is beneficial for statistical analyses. However, it is limited to students studying in the MICSS. Students enrolled in secondary schools other than MICSS in Malaysia might differ in terms of how they perceive approaches to learning, impacting the construct validity of ASSIST. Future research could use the Rasch model framework to investigate the generalisability of the results found in this study across different types of secondary schools in Malaysia. Future research could also include a more diverse range of students, such as students from different locations, backgrounds and social-economic status.

Additionally, as this study was cross-sectional by design, any changes in the approaches to learning among the students could not be identified. Future research could focus on measuring the changes in approaches to learning and investigating factors affecting the changes in students' approaches to learning.

This study used a self-reported questionnaire which may be limited in terms of capturing the complexity of students' individual ways of learning and studying the English language subject. Future research could combine both quantitative and qualitative methods to examine students' approaches to learning.

7. Conclusions

Approaches to learning are an important variable influencing student success in learning (Cano, 2005; McInerney et al., 2012). In efforts to better understand how students learn and what they are doing in the classroom, the ASSIST is increasingly used. The critical question is then whether ASSIST is capable of measuring what they are supposed to measure and what meaning can be derived and interpreted from the results obtained from this instrument. Although ASSIST is regularly used and validated by means of Cronbach's alpha and factor analysis, this has been the first study to use the Rasch model to examine its construct validity. Using the Rasch model, measures are of an interval scale, and issues pertaining to dimensionality, item dependency and non-equivalency across subgroups can be detected at an early stage of the instrument development to be addressed properly in the subsequent instrument administration.

Rasch's analyses of ASSIST in this study provided evidence for unidimensionality, local independence and measurement invariance of the individual scales of deep, strategic and surface-apathetic approaches to learning. In other words, ASSIST is a robust instrument that can be used with confidence to measure students' approaches to learning.

A greater understanding of students' approaches to learning the English language subject via the ASSIST could help teachers identify students who require support in their learning and design appropriate instructional activities for these students. Identification at an early stage is an important step in effectively targeting educational resources for students who experience challenges in their learning. Central to this understanding is an instrument of good construct validity, and this has been illustrated in the current study through the Rasch analyses.

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