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Validation of Learning Style Instruments and Holistic Intelligence on Achievement of Form Six Economics Students: Exploratory Factor Analysis (EFA)

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Abstract

The worldwide happening authenticated that learning styles and holistic intelligence are powerful to better student achievement. This research intended to analyse the learning style instruments and holistic intelligence on the achievement of Form Six economics students. The researchers examined the learning styles (deep, surface, organised and hard work) and holistic intelligence (intellectual, emotional, physical and spiritual) incorporated 29 items. For this purpose, the researchers involved 145 Form Six students as respondents in this analysis. The researchers analysed the data descriptively and measured reliability with Cronbach's Alpha employing Exploratory Factor Analysis (EFA). EFA data established four factors for learning styles and intelligence constructs with Eigenvalues each exceeded 1.0. The learning style construct had a KMO (Kaiser-Meyer-Olkin) value of 0.891> 0.5, indicating its items were sufficient for inter-correlation and the Bartlett test was significant (Chi-Square 1715.530, p <0.05). The anti-image value (Measure of Sampling Adequacy - MSA) for item correlation exceeded 0.5 by eliminating ten items based on the lowest value in the anti-image correlation in the data cleaning process. Learning style factors accounted for 59 per cent of the overall variance. The holistic intelligence construct had a KMO value of 0.840> 0.5, the Bartlett test was significant (Chi-Square 2187.241, p <0.05), the anti-image value (Measure of Sampling Adequacy - MSA) for item correlation exceeded 0.5. The researchers eliminated three items with a communalities value of less than 0.3 and a load factor of less than 0.5. Four factors in this variable accounted for 55 per cent of the overall variance. The report concluded that the Cronbach's Alpha values obtained were 0.86 for learning styles and 0.90 for holistic intelligence, respectively. The conclusions reported that the researchers appropriately used the items for the learning styles and holistic intelligence instruments and hence, confirmed them as relevant variables.

Keywords: Learning Style, Holistic Intelligence, Exploratory Factor Analysis (EFA)

Introduction

Undoubtedly, consciousness through pedagogy can boost essence, capacity, and aptitude (Hidayah et al., 2018). Hence, it validated that in rendering top-notch education, the ministry of education malaysia (KPM) function is quintessential. It formulates a progressive education arrangement to deliver a stable human capital comparable to all parties' commitments.

In discussing the dynamic education system, it is clear that the education system in Malaysia has experienced numerous paradigm transformations in upholding a quality education system. This shift is indisputable by the curriculum revision, an initiative by KPM in PPPM 2013-2025. These reforms are crucial to advance, improve, and boost the country's implementation system, delivery, quality standards, and education system to progress in line with the advancement of other countries.

Nonetheless, one can argue on the growth of developed countries. In the Malaysian setting, innovation transpires at all levels of education, whether at primary and secondary levels. At the upper secondary level, adjustments have also taken place in the form six education domain. It aims to attract SIJIL Pelajaran Malaysia (SPM) graduates to continue their studies in the form six stream. Hence, the management of form six has also undergone some modifications. JPA validates STPM. It applies too to the cambridge assessment, universities in the commonwealth, Ireland and the us. This shift is requisite for society to transform its frame of mind by recognizing it as the best platform to advance its education.

Form Six Management Changes

In malaysia, the pre-university level transpires among form six students, who are considered post-secondary school seniors. Further, there have been some modifications in the process of study and administration of form six. Through the brand-new management, principals lead in management backed by form six senior assistants, form six co-curriculum teachers, form six academic teachers, including outstanding teachers who teach form six subjects (Ministry of Education Malaysia, 2016).

Notable progress has Materialised in the management and administration of form six education by the Malaysian Examinations Council (MPM), which implemented new assessments in 2013. The reshuffle in 2012 in the SIJIL Tinggi Pelajaran Malaysia (STPM) assessment and evaluation system produced fresh hope for students to enjoy the best education from the national education system (Daily School Management Division, 2009). The overhaul is identified as the fresh STPM evaluation method via campus-fashion practice, results-based evaluation to offer outstanding human capital (Esa et al., 2005). These reforms were done in line with the intentions of the education transformation program to advance the quality of form six education and encourage the assessment system so that it eases the students and grows more holistic (malaysian examinations council, 2012). The rebranding of pte encompasses five fundamental focuses: image and mindset, information and infrastructure, management and administration, learning and facilitation mode (pdpc) and curriculum. This education system has turned from a terminal stpm system to a modular stpm system and is divided into three Modes, Particularly Mode One, Mode Two, And Mode Three (Kamalanathan, 2015).

The transition of the STPM system affects the type of mode of study and covers the new STPM assessment system. It is divided into two forms based on the final examination and school-based assessment (PBS). The final test is held for three terms, includes pbs in evaluating student achievement and incorporates MPM. In the new assessment, the results of the STPM examination are decided based on a combination of the best results for the three terms. It suggests that students can better their results in the final term (MPM, 2012).

Consequently, it is evident that it has yielded concrete reforms over a combination of results and benefited students as assessment is now holistic as it unites aspects of academic achievement and soft skills rather than mere examinations (Ahmad et al., 2017). Accordingly, shifts in assessment and evaluation are vital so that form six education can support students to do better and provide brighter opportunities to advance their education at university.

Economic Education

Several subjects have been put forward in Form Six, and one of them is the subject of Economics. The gravity of economics in human capital development prompted the introduction of Economics subjects in the Malaysian Higher Certificate of Education (STPM) in 2003. The curriculum and examination system were revised in 2012 to read and comprehend economics at the pre-university level. Thus, students can explore and evaluate economic arguments that impact the lives of communities and nations in a dynamic environment.

Schnell and Loerwald (2019) established Economic Education as a theory-building theory, and it operates on the critical basis of accountability, liberty and capacity, which means supporting the ability to act maturely, efficiently, and responsibly in economic living conditions. Therefore, this process offers young, economically literate people, cultivation thinking skills and empower them to interpret economic affairs rationally.

This novel education syllabus has undergone some changes where some new topics were included in the syllabus, such as the small and medium industries. According to the Chief Executive of MPM, the goal of the Economics syllabus is to equip students to address and discover economics at the pre-university level and enable students to further their studies in the field to a higher level. Thus, students can examine and assess economic issues that affect the lives of communities and countries in a dynamic environment. Subsequently, the Economics Education syllabus intends to permit students to (a) grasp economic ideas and theories, (b) be aware of and review contemporary economic dilemmas and arguments, (c) collect financial data from multiple sources, investigate, and determine conclusively, (d) use tables, diagrams, and equations to analyses economic concepts and theories (e) pitch economic information and notions in a relevant form and (f) acquire soft skills through self-learning. Hence, students can examine and assess economic matters that transform the lives of communities and countries in a dynamic atmosphere.

Academic performance or achievement is the learning experience students gain in intelligence through learning activities (Mardiana, 2018). Nonetheless, the evaluation of education in the country concentrates more on the pupils' educational accomplishments and other developments (Yunus et al., 2015). Most people are more focused on intellectual intelligence than other intelligence factors (Goleman, 2016; Nasution, 2019; Nggermanto,

2015; Said & Rahmawati, 2018; Sufriadi, 2016; Yuliana & Latrini, 2016). Nevertheless, the predicament is that low achievement results in Economics subjects compared to other elective subjects such as Business and Accounting. It is alarming and can hit the low CGPA grades for overall STPM results. Hence, student success factors need to be viewed from multiple aspects, including learning style and holistic intelligence, instead of intellectual intelligence individually.

Learning Styles and Holistic Intelligence

Each student operates a unique learning style and holds differing levels of intelligence. Teachers need to know the learning style practised and the intelligence held by the majority of their students because following the criteria of students is imperative to facilitate students to grasp concepts and apply computational skills in the subject of Economics more effectively. Hence, teachers need to recognise several techniques and manoeuvrings of PDPC and strive to use them according to the situation and fitness (Jamil, 2018).

Learning Styles

Learning style, in general, is a crucial ingredient to ascertain students' level of understanding and awareness about the knowledge they learn, and it differs from one student to another (Mohamad, 2012). Yusof and Zakaria (2018) defined learning style as the guide, form or manner of learning of an individual to describe, process, interpret the information obtained according to personal wishes fitness. According to Ahmad et al (2014), learning style covers various learning approaches encompassing educational methods that enable the individual to learn better. It is complex and effective in learning (Azrai et al., 2017). This behaviour is a typical style performed to acquire knowledge, skills and feedback through the learning process (Nasiri et al., 2016).

Tarigan and Sari (2019) decided that learning habits are a way of learning done by a person repeatedly, without stress, to construct permanent learning skills in students. Learning habits should be introduced and developed in every student because it is not inherent from birth. It is formed from the habit of independent learning either at home or at school. Selmes (1987) foregrounded each individual's diversity in learning styles by utilising the learning inventory in schools as a test tool to map multiple classifications of learning styles; deep, hard work, surface motivational and organized (Aziz et al., 2006; Yusof & Zakaria, 2018). Therefore, the dominant learning style of a student must be identified first so that the lessons delivered follow the requirements and desires of students, in addition to supporting students to accept what is learned productively and optimally and build a positive impression on the level of achievement of economics.

(I) deep learning style indicates that students are deeply interested in the lesson's content and can relate fresh information with current experience and knowledge. Students who apply this learning style will also continue to understand profoundly and relate a concept learned.
(ii) surface learning style generally signifies pupils who depend totally on teachers and only learn following lessons directed by others. They will memorise the facts learned, and there is no capacity to relate one fact or concept to another.
(Iii) motivational learning style points to the seriousness of a student to learn and work hard on the encouragement and motivation given either internal motivation (intrinsic) and external motivation (extrinsic). Those in this category will feel apprehensive if they fall behind

in lessons, are competitive, and constantly compete with friends. The student will strive and obtain a way to succeed in education.
(iv) Organised learning style describes students being able to plan and organise study time productively, copy lesson content systematically and outline answers before responding to questions thoroughly and orderly.
(v) Hardwork learning style outlines students' attitude who always work hard to learn without waiting for instruction from others to produce exceptional success. They will work individually by determining other alternatives to boost comprehension in learning, such as making their notes, reviewing lessons, and solving complex problems, issues, or questions.

Some students have a dominant learning pattern in themselves, and some employ a variety or combination of several learning styles in their learning process. Nevertheless, some of them face problems in implementing learning styles that are judicious and relevant to the learning process (Jamian, 2012), which can affect student achievement. Inadequate and inapt learning methods can lead to misinterpretations and fallacies of the content and questions of the subject. Thus, learning techniques also play an essential role in student accomplishment (Razali et al., 2015).

Teaching methods relevant to the student's learning style help draw students' interest, learn more effectively, and follow the intended knowledge. It is in accordance according to what Yusof and Zakaria (2018) mentioned; performing PDPC based on the suitability of students' learning patterns and styles could interest students to inspire them to focus, read and master well and correctly. Proper student learning methods or techniques appropriate to the course or field studied can also contribute to student achievement (Hassan & Azali, 2018). The learning style would help them recognise relevant designs or strategies to manage better academic levels (Chen et al., 2014). According to the study of Razali and Raop (2018), there is an imperative connection between student academic achievement and learning methods.

Analysis of learning styles and strategies for learning and their relationship with achievement is to name the reasons for achievement gaps (Jelas et al., 2014). Jelas et al (2014) proposed that students choose student-centred methods such as presentations, debates, gallery walks and question and answer sessions. Meantime, Hassan and Azali (2018) documented that the correlation connecting student achievement and learning designs in the marketing principles course was weak (negative), with a value of 0.0801. It suggests that students' learning methods impact their results in the marketing principles course. This study also discovered that most students choose group learning methods and rely on the training provided by educators. Students will make sure they understand before completing an assignment and often ask for re-explanations for questionable parts.
Nevertheless, a two-way analysis of variance (ANOVA) by Cimermanová (2018) in slovakia observed no significant findings. Thus, learning style and form of teaching do not affect academic achievement. This investigation employed the grasha-riechmann student learning style scale inventory (GRSLSS) on fifth-semester students in 81 universities. The conclusions of this study are also in line with the findings of Biçer (2014) in turkey on 139 students and 12 teachers that reported no statistically significant difference between student achievement of the same or different learning styles with teacher pedagogy. Similarly, the verdicts of a study by Khanal et al (2021) in Nepal discovered no statistically significant variations by gender,

nationality, and academic performance, although learning styles vary. Graduate students experience diversity in their learning styles, but most are multi-modal.

Holistic Intelligence

Many factors motivate student accomplishment, and one of them is intelligence. Intelligence is critical in student achievement, symbolising the student's sharpness level (Sulastyaningrum et al., 2019). Rayung et al (2018) demonstrated that holistic intelligence's power is the foundation for student achievement in education, which comprises four components: intellectual, emotional, physical and spiritual intelligence. These four dimensions of intelligence operate as the source for gauging student achievement in malaysia's education system. National education philosophy (FPK) promotes such a notion and is designed to foster harmonious and balanced human beings (Ministry of Education Malaysia, 2012).

Sulastyaningrum et al (2019) maintained that intellectual intelligence is a person's ability to manipulate and use formal rules such as grammatical rules or in terms of computation. Indicators of intellectual intelligence are the ability of calculation, verbal ability and the ability of numbers (Said & Rahmawati, 2018). According to Carter (2009), there are four components to measure intellectual intelligence, specifically (1) verbal intelligence (ability in the field of language), (2) numerical intelligence involving calculations or numbers, (3) logical intelligence and (4) spatial thinking intelligence (field of the form). Nevertheless, intellectual intelligence cannot be optimally used if it is not trained and nurtured despite having a genetic background that has high intellectual intelligence (Nggermanto, 2015; Yusuf, 2009).

Goleman suggested a change of view on the concept of intellectual intelligence by discovering the theory of emotional intelligence (eq). Goleman (2000) affirmed that emotional intelligence encompasses handling emotions thoroughly personally and with other individuals, accepting emotions, and driving oneself. The study's conclusions transformed the paradigm or assumption of the world's general public, who only consider iq crucial to achieving good results. Besides, Sufriadi (2016) stated that emotional intelligence symbolises a priority, advantage, ability to control one's feelings, self-understanding and others, self-motivation, and sound relationships with others. This study confirmed the influence of emotional intelligence on learning performance and should be emphasised in addition to the intellectual intelligence possessed (Sulastyaningrum et al., 2019). Students who possess high intellectual and emotional intelligence can better appreciate the knowledge presented, exhibit more enthusiasm to learn continuously, solve problems, and further enhance student performance. The ingredients in emotional intelligence incorporate social consciousness, association control, self-supervision, and attentiveness (Goleman, 2009). Goleman (2016) expanded this intelligence from Salovey (1990) into five central areas: conducting sentiments, developing relations, propelling and appreciating one's excitement, and noticing others' reaction emotions.

An intelligent mind links to an active body. Physical fitness is quintessential in fostering good mental and physical health. Optimal fitness can help students perform daily activities expeditiously and passionately (Azhari et al., 2017). Students need physical activity to guarantee their level of fitness and intelligence to be at an optimal level in acquiring knowledge (Azhari et al., 2017). Physical activity is part of a healthy and beneficial lifestyle, including reducing the risk of overweight and obesity (Fletcher et al., 1996). Physical fitness

splits into two chief divisions, namely health-based and motor behaviour-based. Health-based physical fitness refers to muscle strength, endurance, body composition, flexibility and muscular endurance. In contrast, motor behaviour-based fitness refers to speed, agility, muscle power, balance, coordination, and reaction time.

Spiritual intelligence defines an imperative type of intelligence and serves as the imminent foundation to enable intellectual intelligence and emotional intelligence to function competently. Zohar and Marshall (2000) introduced the concept of spiritual intelligence, proving that the highest human intelligence lies in its spiritual intelligence, which involves two key components, specifically the aspects of value and meaning. Furthermore, Yuliana and Latrini (2016) declared that spiritual intelligence is required to reflect creatively, foster vision, and make or change one's life for the better. In addition, spiritual intelligence serves as a problem solver based on morality and accountability in life. A person who owns a substantial and ample spiritual intelligence can apply the teachings of his religion optimally and to the maximum in himself. There are three components of optimal spiritual intelligence mastery: clarity of rational thinking, emotional competence, and peace of life (Said & Rahmawati, 2018). Furthermore, Said & Rahmawati (2018) maintained that spiritual intelligence holds self-observation, non-insistent piousness, foreground participation, complete reliability, and susceptibleness.

Therefore, successful students require a perfect mixture of physical, emotional, spiritual, and intellectual intelligence. Spiritual intelligence highlights the profound bond between man and god and man's connection with his surroundings in general. According to Goleman (2016), Iq intelligence accounts for only about 20 per cent compared to 80 per cent from other intelligence. In comparison, Nggermanto (2015) reported that human success is more determined by his emotional intelligence (eq), which is 75 per cent compared to only 25 per cent determined by his IQ.

In addition to intellectual intelligence, previous researchers have checked other intelligence such as emotional intelligence, physical intelligence, and spiritual intelligence. Rayung et al (2018) determined that holistic intelligence is a vital predictor of student achievement variables based on the study's empirical data. The value of the influence contribution of all four variables of holistic intelligence confirmed an influence rate of more than 40 per cent on the formation of student development. Analysis of respondents' responses to the four independent variables decided that the spiritual intelligence variable contributed the most substantial influence to student well-being, followed by the emotional intelligence variable, intellectual intelligence. At the same time, the variable of physical intelligence is the variable that contributes the lowest and irrelevant influence on the variable of student development. In comparison, the findings of a study attended by Asih and Fatchan (2015) on 187 accounting students determined that intellectual, social emotional, and spiritual intelligence significantly affect the performance of accounting students. The combination of these four variables could predict the performance of accounting students by 46.61 at the 0.01 significance level.

In Koronadal et al (2016) indicated a vital concrete link between emotional intelligence, intellectual and scholarly attainment. Nevertheless, there was no notable correlation connecting spiritual and difficulty bits of intelligence on academic attainment. Moreover, the data of Chandra and Azimmudin (2013) study on 614 secondary school students in Lucknow

Uttar Pradesh, India, revealed a significant weight of intelligence on academic achievement; intelligence influences student academic success. Students with high IQS hold more outstanding academic attainment than pupils with medium or weak IQ. Such students hold dependable understanding, memory, inclination and perception. The results established that students with high iq would acquire better marks than students with low IQ. Consequently, academic performance requires intelligence.

In contrast, Mitrofan, and Cioricaru (2014) research exhibited contradictory results in which emotional intelligence had no critical influence on learning performance. Likewise, Kannan and Visuvarasam (2017) proposed the corresponding result based on pearson correlation, including descriptive statistical analysis. It denoted that the emotional degree was at a moderate standard and offered no correlation with educational fulfilment. Physical intelligence is, too, inherent in contributing to student achievement. Azhari et al (2017) determined that the intelligence level of bright students was at the intelligence level. There was an essential distinction in the students' physical fitness degree among genders and intelligent and talented pupils' biology subject records. The analysis demonstrated a high mean score for the biology subject of 78 per cent consisted of students who had a high level of physical intelligence.

Exploratory Factors Analysis (EFA) For the Construct of Learning Styles and Holistic Intelligence

The researchers conducted EFA to examine whether the constructed items measured the variables set in this study. They employed Principal Component Analysis (PCA) method according to established recommendations (Hair et al., 2010; Tabachnick & Fidell, 2007).

The report of EFA analysis results considered the following criteria, namely: (1) items with an anti-image correlation value ≥ of 0.5 only were accepted, (2) Bartlett's Test of Sphericity test should be significant ($p < 0.05$) for correlations between items or variables (Yong & Pearce, 2013), (3) Kaiser-Meyer-Olkin (KMO) sample adequacy test of ≥ 0.5 was used in determining whether the sample size was sufficient for factor analysis (Tabachnick & Fidell, 2014), (4) the eigenvalues were ≥ 1.0 to determine the number of factors representing the dimensions of a construct that were measured and considered significant to maintain the number of factors (Hair et al., 2014) and (5) only items with factor load values (loading factor) greater than or equal to 0.5 was maintained (Hair et al., 2014).

Nevertheless, according to Tabachnick and Fidell (2007), items with a load size of 0.45 are an appropriate level to use for factor interpretation purposes. Meanwhile, Hair et al. (2010) reported that a load size of 0.30 is practical for samples over 350 and above (Syukri et al., 2019). Thus, the data analysis measures for the EFA procedure should meet the goodness-of-fit index as in Table 1.

Table 1
Goodness-of-Fit Index for Exploratory Factor Analysis (EFA)

EFA Model Index	Suggested Value
Barlett's Test of Sphericity)/ χ2 (Sig. < 0.05)	< 0.05
Adequacy of samples / Kaiser-Meyer-Olkin (KMO)	≥ 0.50
Loading factor	≥ 0.50
Communalities	≥ 0.3
Eigenvalue	≥ 1.00
Percentage contribution of variance to factors	≥ 3.00

Source: (Yong and Pearce, 2013; Tabachnick and Fidell, 2014; Hair et al., 2014).

The Bartlett Sphericity tests and Kaiser-Meyer-Olkin (KMO) recognise the data's suitability (Jaafar, 2018). To conclude whether the data were fitting for factor analysis or not, the researcher administered KMO tests. At the same time, Bartlett's Test of Sphericity was used to identify whether the relationship between items is sufficient to perform factor analysis. Coakes, Steed, and Ong (2009) stated that if the result of Bartlett's test is significant, i.e. p <.05, as well as the KMO test exceeds the value of .600, then the factor of factorability can be assumed, and the test can be continued. Moreover, factor analysis is also appropriate if the KMO value is greater than .50, indicating that the data do not have serious multicollinearity problems (Chua, 2009; Ismail et al., 2014). The guidelines for KMO values are shown in Table 2.

Table 2
Level Guidelines for KMO Values

KMO Values	Level
< 0.50	Unacceptable
0.50	Poor
0.60	Low
0.70	Moderate
0.80	Good
0.90 and above	Excellent

*Source: (*Ayob, 2015).

The EFA results of the study relied on an anti-image correlation analysis technique. It demonstrated that the correlation coefficient values were higher than 0.5 and that the adequacy measure for Kaiser-Meyer-Olkin (KMO) was equal to or higher than 0.5. for Bartlett's Sphericity Test. Thus, it confirmed its pertinence. The researcher fixed the number of factors to be retrieved by those classified in the initial literature review questionnaire. The researcher attended varimax rotation in the learning style as well as intelligence since it had sub-constructs and the number of complex structures could be reduced, and the possible results could be increased. The selected factor is based on the item with the greater weight if there are two distinct factors for the item (Ayob, 2015).

Objective

This research Endeavoured to substantiate the learning style instruments and holistic intelligence of form six students.

Methodology

This pilot study involved 145 form six students who had similar characteristics to the actual respondents, and this number was suitable for conducting exploratory factor analysis (efa) (Hair et al., 2014). This study used existing instruments adapted and modified from prior studies to measure learning styles (organised, surface, hard work and deep) and holistic intelligence (intellectual, emotional, physical and spiritual). The researchers applied the instrument items for learning style in the analysis of aziz et al, 2006 (Inventory of Learning in Schools by Selmes, 1987) and questionnaire items for intelligence in the study of Kannan & Visuvarasam, 2017; Mardiana, 2018; Ridzuan, 2015; Yuliana & Latrini, 2016, for information on these constructs. The instrument included parts a and b for demographics, and part c consisted of 58 items to measure learning style and holistic intelligence constructs, as presented in table 3. The researchers analysed findings from this efa pilot research employing statistical package for the social sciences (SPSS) version 23.

Table 3
Item Details by Section

Section	Variables (Dimensions)	Number of Items
Parts A and B	Demographics of students, parents and schools	26
Part C	Learning Styles • Organised • Surface • Hard work • Deep	29
	Intelligence • Intellectual • Emotional • Physical • Spiritual	29

Discussion

Exploratory Factor Analysis of Learning Style Construct

The EFA results on the learning style explained the anti-image correlation analysis procedure. It showed that the value of the correlation coefficient was more than 0.5, and this gave the impression that the factor analysis could be continued. The kaiser-meyer-olkin (kmo) sampling adequacy measures and bartlett's test of sphericity obtained presented a kmo value of 0.891, while bartlett's test of sphericity was significant with a chi-square value of 1715.530 at 253 degrees of freedom (table 4).

Table 4
The suitability test for the use of factor analysis and the uniformity of kmo items and bartlett's test on learning style constructs

Kaiser-meyer-olkin	*measure of sampling adequacy.*	.891
Bartlett's Test of Sphericity	*Approx. Chi-square*	1715.530
	df	253
	Sig.	.000

In this research, the five factors extracted were done based on Selmes's (1987) learning styles theory; deep, surface, motivation, organised and hard work. Nevertheless, only four learning styles were used, namely deep, surface, organised and hard work styles, which corresponds to the literature review of Aziz et al (2006) used only four sub-constructs in Selmes (1987) learning style. This study's motivational learning style could not be used because it did not meet the fitness requirement of the number of items in the sub-construct.

Table 5 presents the component matrix with varimax rotation. The researchers performed the varimax rotation method to reduce the number of complex constructs and advance the anticipated outcomes. The data concluded that items c3: 66, c3: 67, c3: 68, c3: 69, c3: 62 and c3: 70 were eliminated based on the lowest values in the anti-image correlation in the data cleaning process. In addition, items c3: 46, c3: 47, c3: 57 and c3: 58 were also eliminated in this study for failing to qualify. Other items were retained and grouped according to the specified factors. The values shown in table 5 are the coefficients or loading factors for each item inclined to each factor highlighted. This value symbolised the correlation between the item and the factors formed. Recognising what these variables are and how they work is quintessential to comprehend their essence. Next, factor analysis results showed that learning style factors accounted for 59 per cent of the overall variance.

Table 5
Component matrix with Varimax Round Constructs of Learning Style

	Factor			
Item	Organised	Surface	Hard work	Deep
c3:49	.828			
c3:50	.793			
c3:51	.693			
c3:52	.689			
c3:48	.521			
c3:63		.785		
c3:60		.764		
c3:61		.743		
c3:64		.620		
c3:42			.717	
c3:45			.679	
c3:43			.592	
c3:44			.579	
c3:65			.548	
c3:55			.519	
c3:54				.662
c3:53				.642
c3:59				.592
c3:56				.567

Exploratory Factor Analysis of Holistic Intelligence Construct

The EFA results on intelligence explained the anti-image correlation analysis procedure, and it recorded that the value of the correlation coefficient was more than 0.5, which symbolised that the factor analysis could be continued. The Kaiser-Meyer-Olkin (KMO) sampling

adequacy measures and Bartlett's Test of Sphericity obtained showed a KMO value of 0.840, while Bartlett's Test of Sphericity was significant with a Chi-Square value of 2187.241 at 406 degrees of freedom (Table 6).

Table 6
Suitability Test for the Use of Factor Analysis and Uniformity of KMO Items and Bartlett's Test on Intelligence Constructs

Kaiser-Meyer-Olkin	*Measure of Sampling Adequacy.*	.840
Bartlett's Test of Sphericity	*Approx. Chi-Square*	2187.241
	df	406
	Sig.	.000

Factor analysis was done by setting the number of factors extracted to four as categorised in the questionnaire. Table 3.21 shows the component matrix with varimax rotation to reduce complex constructs and improve the expected results. The results determined that items C4: 84, C4: 85 and C4: 86 were eliminated because they had commonalities values less than 0.3 and load factors less than 0.5. At the same time, other items were retained and grouped according to the specified factors. The values shown in Table 7 are the coefficients or loading factors for each item inclined to each factor highlighted. This value indicated the correlation between the item and the factors formed. It is the answer to understanding the nature of these factors. Next, the factor analysis results showed that the intelligence factor accounted for 55 per cent of the overall variance.

Table 7
Component Matrix with Round Varimax of Intelligence Constructs

	Factor			
Item	Intellectual	Spiritual	Emotional	Physical
c4:71	.851			
c4:74	.844			
c4:73	.836			
c4:72	.791			
c4:77	.764			
c4:78	.691			
c4:76	.553			
c4:75	.550			
c4:92		.778		
c4:98		.734		
c4:97		.728		
c4:99		.672		
c4:96		.667		
c4:91		.542		
c4:93		.536		
c4:81			.776	
c4:82			.752	
c4:83			.718	
c4:79			.595	
c4:94			.592	
c4:80			.575	
c4:95			.568	
c4:89				.792
c4:87				.734
c4:88				.705
c4:90				.552

Next, Table 8 summarises the total distribution of items before and after the EFA was performed.

Table 8
Total Item Distribution before and after Construct Confirmation

Part	**Dimension**	**Before**	**After**
C	Learning Styles	29	19
	Intelligence	29	26

Reliability of the Cronbach's Alpha Instrument for the Construct of Learning Styles and Holistic Intelligence

The data from the questionnaire were processed using IBM SPSS version 23.0 software to determine the level of reliability of the questionnaire items through the Internal Consistency method. This study chose 33 randomly selected respondents as a pilot test sample to test the reliability of the questionnaire items before being distributed to the actual study sample.

The contribution of each item to the study variables was measured and determined by ensuring that each item had an item-to-total correlation value within an acceptable range of

more than 0.30 (Hair et al., 2010). Elimination of items less than 0.30 could increase the reliability value of the measured variable.

There are multiple viewpoints to determine the value of reliability based on the literature review. Nunnally (1978); Carmines and Zeller (1979) stated that Cronbach's Alpha values should exceed 0.70 to be considered an acceptable level. Nevertheless, according to Darusalam and Hussin (2018), Konting (2005); Nunnally and Bernstein (1994), the interpretation of acceptable reliability coefficients according to research practitioners in the social sciences is more than a = .60. The Alpha value index score (α) if the value of the Alpha coefficient is low α = <.60 indicates the level of ability of the study instrument item to measure the dimensions or concepts in the study is low. Although there are no specific limitations for determining the appropriate reliability coefficient for a study tool, coefficient values greater than 0.6 are often used in studies (Babbie, 1992; Creswell, 2012; Konting, 2005; Sekaran, 2003) as in Table 9. Accordingly thus, the value of Cronbach's Alpha coefficient (α) adopted in this study is 0.6 and above.

Table 9
Reliability Index Classification

Indicator	Value of Cronbach Alpha coefficient, (α)
Very high	0.90-1.00
High	0.70-0.89
Moderate	0.3- 0.69
Low	0.0-0.29

Source: (Babbie, 2010; Creswell, 2012; Konting, 2005; Sekaran, 2003).

Following the EFA, there were some changes in the number of items in the study instrument. The items whose correlation value is less than 0.3 will also be eliminated because these items do not correlate well to the overall scale value (Field, 2009). Although 13 items were eliminated in this study particularly C3: 66, C3: 67, C3: 68, C3: 69, C3: 62, C3: 70, C3: 46, C3: 47, C3: 57, C3: 58, C4: 84; C4: 85 and C4: 86, Cronbach's Alpha values still presented values greater than 0.06. Table 10 shows the change in the total number of items and the Cronbach Alpha value after the construct validity following the EFA.

Table 10
Total Item Distribution and Cronbach Alpha Reliability Value before and after Construct Validity

Part	Dimension	Before EFA	Alpha	After EFA	Alpha
C	Learning Style Intelligence	29	0.90	19	0.86
		29	0.90	26	0.90
	Number of items	58		45	

Conclusion

Ergo, the data of this study authenticated that this instrument had a level of reliability of Cronbach's Alpha coefficient value that exceeded 0.6 and high according to Babbie's (2010) classification. Furthermore, EFA confirmed learning style constructs consisting of four factors

(organised, surface, hard work and deep) and a holistic intelligence construct, which also consisted of four factors (intellectual, emotional, physical and spiritual), with each item having satisfactory loading factors, i.e. exceeded of 0.5. Therefore, this instrument is valid, reliable, and fit for prospective studies to measure aspects of learning style and holistic intelligence in Malaysia, particularly pre-university education such as Form Six, Foundation programmes, and matriculation.

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