

Malaysian National Philosophy of Education Scale: PCA and CFA Approaches

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Abstract

This study assesses the psychometric properties of the Malaysian National Philosophy of Education (NPE) Scale. The study argues on the grounds of literature obtained that since the emergence of NPE no empirical validation of the scale was performed. As such, the study sampled 230 participants in secondary schools in Kuching, Malaysia to develop and validate the scale. The results demonstrate that the NPE comprises eight distinct factors. The fit statistics of the NPE eight-factor model demonstrate that the model fitted the data. This quantitative scale is deemed as the first of its kind to device the NPE instrument quantitatively, assess the psychometric properties, and establish evidence for composite reliability, construct, convergent, and discriminant validities of the instrument across selected secondary schools. Theoretically, the NPE quantitative measures initiated and contributed a new body of knowledge to the NPE in the context of Malaysia other than the conceptual dimensions proposed by Ministry of Education. Practically, the results provided school principals and the Ministry of Education with appropriate tools to assess the extent to which school teachers translate and infuse the ideas of the NPE in the day-to-day lesson delivery.

Keywords: confirmatory factor analysis, national philosophy of education, principal component analysis, validity

1. Introduction

A coherent vision and goals are vital to any educational efforts in any given nation. Generally, the philosophy of education provides essential principles and guidelines, with respect to teaching and learning, intellectual and moral building and education goals (Mohamed, 1990). Educational assumptions and practices are structured by these principles and are core to formulating “the aims of education, and the functions of educational institutions in a society” (Butler, 1968, p. 486).

In view of this importance, the Ministry of Education in Malaysia introduced the National Philosophy of Education (NPE) in 1988. The NPE was formed in line with the *Rukun Negara* (National Principles) (Ministry of Education 2001). The National Principles or National Philosophy (i.e. Believe in God, loyalty to King and country, upholding the constitution, the role of law and good behaviours and morality) were laid down by royal proclamation in 1970, with the aim of creating harmony and unity among the various races in Malaysia (Ministry of Education, 2013).

The formulation of the NPE was done given the background of various education policies and acts (Education Ordinance, 1957; Education Act, 1961; Razak’s Report, 1956; Rahman Talib Report, 1960; Special Cabinet Committee Report, 1979) and taking careful account of political, social and economic needs and satisfaction of Malaysia’s multi-ethnic citizens (Hashim, 2004; Sang, 2008). In other words, the combination of two core dimensions; how important education is for everyone and the received wisdom on the role of education had led to the birth of NPE in the educational sector (Allen, 1988).

The NPE acts as the basis for building a united and progressive society and nation. According to Ministry of Education (2008), NPE reads:

Education in Malaysia is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious based on a firm belief in and devotion to God. Such an effort is designed to produce

Malaysian citizens who are knowledgeable and competent, who possess high moral standards and who are responsible and capable of achieving a high level of personal well-being as well as being able to contribute to the betterment of the family, society and the nation at large. (p. ix).

NPE can be translated into the four national educational objectives, which are: “(a) to produce a loyal and united Malaysian nation, (b) to produce a faithful, well-mannered, knowledgeable, competent and prosperous individuals, (c) to produce the nation’s human resource for development needs and (d) to provide educational opportunities for all Malaysians” (Ministry of Education, 2008, p. xii).

Furthermore, the formulation of the NPE was based on six basic factors; religion, society, politics, economy, individuals and globalisation (Ee, 1996).

With regard to education, the important role of the NPE as general aims of education in Malaysia, and its direct implication on the school curriculum are evident in the latest KSSR (*Kurikulum Standard Sekolah Rendah*) [Primary School Standard-based Curriculum] introduced in 2011 (Note 1), KBSR (*Kurikulum Bersepadu Sekolah Rendah*) [Malaysian National Primary School Syllabus], first introduced in 1982 and reviewed in 2003 and KBSM (*Kurikulum Bersepadu Sekolah Menengah*) [Malaysian National Secondary School Syllabus] introduced in 1988 (Ee, 1996; Lee, 1999).

Accordingly, both KBSR and KBSM took on a whole new course and holistic approach to human development focusing on child centred approaches. Student participation was incorporated into the teaching and learning activities, both classroom and co-curricular (Ahmad, 1998).

The KBSR aims at making learning to be gained through a variety of experiences, such as group learning depending on the skills, interests and ability of the differentiated group of students. The teaching and learning process should, as far as possible, be improved through the use of local prototype materials and orientations to reflect a truly Malaysian curriculum (Ahmad, 1998). In other words, specific aspects of education, such as moral values, patriotism, science and technology, language, environmental education, and study skills should be infused across the subject disciplines, with the purpose of consolidating these aspects which need further emphasis (International Bureau of Education, 2005).

The underlying philosophy of KBSR is a “child-centred curriculum” which recognizes the importance of individual differences, individual achievement and emphasizes the overall development of the child (Azizah, 1987).

KBSM is a continuation of the KBSR, which aims at providing general education until the 11th year of schooling, through the offering of core subjects, and elective subjects to enable students to make choices in selecting subjects of their interest. At the lower secondary level, KBSM retains the structure and subject offerings, except that the choice of electives of pre-vocational subjects is eliminated. Instead of a new subject, “Life skills” is introduced as part of the core, taken by all students. The contents comprise some basic elements of Industrial Arts, Home Economics, Commerce and Agricultural science, to enable students to acquire manipulative skills in coping with their day-to-day lives.

It is observed that major changes occurred at the upper secondary level. The KBSM aims to continue providing general education (implying that specialization is to be deferred to the pre-university level, which is beyond what is covered by the KBSM). As such, the eleven years of schooling (six years elementary and five years secondary) would at a go prepare students for the job market as well as to further their education to higher levels. Students are thus no more streamed into specialized areas, (Arts, Science, Technical or Vocational streams), although they still have the option to have subject concentration through their choice of elective subjects. This is because the upper secondary curriculum consists of core subjects required of all students (i.e. general education), and four groups of subjects from four areas (Humanities, Science, Technical and Vocational, and Islamic Education). Students are allowed to choose their electives from two of the four areas. This may also mean paving the way for the ultimate abolishment of the technical and vocational schools.

In 1988, the Integrated Secondary School Curriculum (referred to as KBSM) was introduced as a continuation of the curriculum reform efforts at secondary level. Wilson (1977) argued that integrating educational philosophy across curriculum and identifying means of actualising the components of philosophy in the educational processes is paramount to any educational success.

The emphasis of the new secondary school curriculum is on “integration”, which stresses the teaching of language and values across the curriculum (Abdullah & Kumar, 1990). New subjects like Moral Education (for non-Muslim students), Islamic Studies (for Muslim students) and Living Skills were included in the integrated curriculum. Another distinctive feature of KBSM is that students are no longer streamed into Arts or Science

streams. The new curriculum has done away with early specialization allowing students to choose subjects from different groups of electives. Sang (2008) indicated changes occurring in school curriculum that were associated with the objectives of the NPE. The KBSR and KBSM are anticipated to be able to reflect the NPE. But, quantitative investigations to validate NPE instruments were not found across NPE related literature. Let alone the absence of empirical studies on NPE dimensions, the educational reform initiatives took place in Malaysia also rendered more emphasis on public examination results rather than the basic ideas structured the NPE in the school context. Molly (1999, p. 96) clearly stressed that:

Much of the public discourse on school effectiveness in Malaysia has focused solely on public examination results despite the fact that the national philosophy of education stresses the importance of the development of an all-around individual with respect to intellectual, emotional, spiritual and physical development.

In general, NPE elements are categorised into fifteen dimensions; (15) sub-groups as stated in the manual entitled [National Philosophy of Education, Goal and Mission] (*Falsafah Pendidikan Kebangsaan, Matlamat dan Misi*). The sub-groups of the NPE included (a) education is an on-going effort, (b) developing the potential of individual, (c) develop the potential in a holistic and integrated manner, (d) a balanced and harmonious individual, (e) intellectual dimension, (f) spiritual dimension, (g) emotional dimension, (h) physical dimension, (i) firm belief in and devotion to God, (j) Malaysian citizens who are knowledgeable, (k) Malaysian citizens who are competent, (l) Malaysian citizens who possess high moral standard, (m) Malaysian citizens who are responsible, (n) Malaysian citizens who are capable of achieving a high level of personal well-being, and (o) Malaysian citizens who are able to contribute to the betterment of the family, society and the nation. These dimensions are the underlying key concepts that this study attempted to develop quantitative measures based on the key concepts outlined in the manual (Ministry of Education, 2001).

Other than al-Hudawi, Fong, Musah, and Tahir's (2014) study, studies that empirically investigated all the dimensions of the NPE in the secondary school context were not found in the literature. A handful of researchers studied certain dimensions of the NPE such as 'How effective should Malaysian national education philosophy be?' (Hassan & Abiddin, 2010), 'the holistic development' (Ismail & Hassan, 2009b), 'firm belief in God' (Ismail, Aida, Wan, Ramlah, Rosini, & Hapsah, 2009a) and 'academic productivity and the impact of the national education philosophy in higher education institutions as viewed by Malaysian academics' (Hassan, 2006). All these studies did not attempt to develop quantitative measures rather than investigating the implementation, teacher belief about the NPE and effectiveness of NPE based on the selected dimensions of NPE. Even the NPE actualization level itself remained vague. Given the absence of the quantitative measures for NPE dimensions, this study poses the following research question and hypothesis:

Research question: How many interpretable and reliable factors constitute NPE across the selected secondary schools in Kuching?

Research hypothesis: NPE factors indexed through the application of principal component analysis (PCA) are valid and reliable.

2. Methodology

2.1 Sample

This study employed stratified random sampling technique to collect data from the participant of selected secondary schools in Kuching, Malaysia. In total, 300 survey questionnaires addressing components of NPE were distributed to secondary school teachers across selected secondary schools in Kuching. Participants were asked to express their level of agreement or disagreement with the propositions in the survey questionnaires. Of the distributed survey questionnaires, 230 were returned, representing 76.66% of response rate.

2.2 Instrumentation

The process of data collection on NPE in this study used a survey questionnaire. The questionnaire comprises both survey instruments and demographic data. Apart from demographic information of the participants (gender, race, and religion), the questionnaire comprised 85 measures seeking information on 15 sub-dimensions underlie NPE (Ministry of Education, 2008; Sang, 2008). The researchers devised the measures of NPE through extensive reading on the related literature on NPE from Ministry of Education handbook and other relevant sources.

The measures in the NPE have been divided into fifteen constructs in accordance with the elaboration provided in the handbook of Ministry of Education and then further broken down into eighty five (85) measures al-Hudawi et al. (2014) as outlined in Table 1.

Table 1. Background of items according to variables investigated

Variables Measured	Measure
On-going effort	Q1-Q3
Potential individual development	Q4-Q8
Holistic and integrated potential development	Q9-Q11
Balanced and harmonious individual	Q12-Q20
Intellectual dimension	Q21-Q29
Spiritual dimension	Q30-Q36
Emotional dimension	Q37-Q42
Physical dimension	Q43-Q48
Belief and devotion to God	Q49-Q55
Knowledgeable citizens	Q56-Q58
Competent citizens	Q59-Q62
High moral citizens	Q63-Q67
Responsible citizens	Q68-Q73
Achieving high personal well-being	Q74-Q76
Contributive citizens	Q77-Q85

Each measure was revised by adding personal pronoun, so that respondents are able to understand and make logical sense of the measures. Participants were required to rate each measure from 0 (not at all) to 10 (fully possessed) using formula suggested by (Arieh, 1978). This scale was then recoded on a 5-point Likert type scale for interpretability of the dataset. The recoded scale is interpreted as: 0-2=not at all (1), 3-4=rarely possess (2), 5-6=No answer (3), 7-8=somewhat possess (4) and 9-10=fully possess (5).

3. Data Analysis and Results of the Study

The data collected were analysed following a three-step procedure. First, PCA using predictive analytics software (PASW) version 20.0 software was used to test the underlying factors and validate measures constituted NPE factors. This was then followed by the application of confirmatory factor analysis (CFA) using AMOS version 21.0 software to assess and confirm the validity of the constructs (Arbuckle, 2008). Finally, assessment of construct validity through average variance extracted (AVE) and construct reliability through composite reliability index (CRI) was performed.

3.1 Unit of Analysis

Table 2. Frequency and percentages of respondents' gender, race and religion

Variable	Frequency	%
Gender		
Male	146	63.5
Female	84	36.5
Total	230	100
Race		
Malay	80	34.8
Chinese	94	40.9
Others	56	24.3
Total	230	100
Religion		
Muslim	88	38.3
Christian	80	34.8
Atheist	7	3.0
Others	3	1.3
Total	230	100

The results of the descriptive analysis indicated that (n=146, 63.5%) of the participants were males, while (n=84, 36.5%) were females. With reference to participants' race, the analysis showed that the majority of participants

were Chinese ethnic group (n=94, 40.9%). This was followed by the Malay ethnic group (n=80, 34.8%). In addition, participants who were classified as other ethnic group were the smallest number in terms of proportions of participation (n=56, 24.3%).

Furthermore, the analysis demonstrated that the majority (n=88, 38.3%) of the participants, who participated in the study were Muslims. Followed by participants, who identified themselves as Christians (n=80, 34.8%). Then participants who identified themselves as Buddhists (n=7, 3.0%). Finally, participants who ascribed themselves as others (n=3, 1.3%) were the smallest denominations represented in this study. Table 2 depicts the details.

3.2 Principal Component Analysis of NPE Constructs

Prior to the application of PCA to test the underlying structures of NPE dimensions, a reliability test was performed to assess the internal consistency of the pool of the items constituted NPE factors. The results of reliability analysis revealed overall Cronbach's alpha of .95. This value is greater than 0.70, and therefore presents a substantial support for the internal consistency of the items (Morgan, Leech, & Gloeckner, 2007; Nunnally, 1978).

A PCA was then performed on the constructs. The analysis involved an iterative process to reach the final solution, whereby items that did not contribute significantly and practically to the extracted factors were automatically discarded. Furthermore, factors with eigenvalues of 1 or greater were considered as good factors, and therefore retained. Given a rule of thumb as such, a number of factors were extracted from the pool of items. The correlation matrix table yielded more than 3 correlations greater than 0.30. The measures of sampling adequacy (MSA) requirement of ($\geq .50$) were also satisfied. Thus, the anti-image correlations ranged between .53 and .96. Furthermore, all communalities were greater than .50 (ranged between .51 and .98), which indicates fulfilment of the requirement. Items that loaded at .40 or greater on a factor and were more than 2 were deemed as representative of a valid factor.

Moreover, the analysis revealed fifteen interpretable factors with eigenvalues of the first eight factors greater than one. The extracted factors accounted for 75.85% of total variance explained in the constructs analysed. Interestingly, the degree of inter-correlation among the items also reached a satisfied level. Bartlett's test of Sphericity was statistically significant $\chi^2 (3570) = 1845.88, p < .001$, KMO = .92. More specifically, the analysis revealed fifteen interpretable factors. However, only eight factors were returned for further analysis, since each factor contained more than two items and exhibited eigenvalue ≥ 1 or greater.

Factor one, which was initially labelled as potential individual development contained valid items. Of the five items initially hypothesised on this factor, four items were accurately loaded under this factor. To expatiate upon this result, it is clearly evident that the items exhibited practical and statistical significant loading (Hair, Anderson, Tatham, & Black, 2010). Item QB4 however, was omitted for exhibiting factorial complexity on two factors.

Regarding factor two, which was labelled as spiritual dimension, seven items were initially hypothesised on this factor. Of the seven items, five items were accurately loaded under their hypothesised factor except items QF6 and QF7 which were highly weighted on different factors. Consequently, they were discarded from further analysis.

Factor three was labelled as high moral citizens, and was initially indexed by five items. However, two items were discarded due to the issue of factorial complexity on two different factors and low loading issue ($< .40$). The loadings of the retained three items demonstrated practical and statistical significance (Hair et al., 2010). Consequently, the factor was retained.

Pertaining to factor four which initially contained nine items that represented contributive citizens. Of the nine items initially hypothesised on this factor, seven items substantially loaded on the factor. However, items QO1 and QO8, which exhibited factorial complexity, were discarded from further analysis.

Three items were initially hypothesised on factor five, which was labelled as knowledgeable citizens. Interestingly, all three items were accurately loaded under its hypothesised factor showing neither factorial complexity nor low loading issue associated with this factor.

With regards to factor six, labelled as intellectual dimension, nine items were initially hypothesised on this factor. However, only three items were accurately weighted on this factor. While items QE1, QE4, QE3 and QE6 exhibited factorial complexity, items QE2 and QE5 associated with low loading issues. Therefore, they were discarded from further analysis.

Factor seven, which represented physical dimension, was initially constituted of six items. Of the six items, only

three items were accurately loaded on their hypothesised factor. Items QH1, QH2 and QH6 exhibited factorial complexity on different factors. Consequently, they were dropped from further analysis.

The final factor which was labelled as balanced and harmonious individual was initially hypothesised on nine items. Of the nine items, only three items were properly loaded on their hypothesised factor. While items QD1, QD2 and QD9, demonstrated low loading issues, items QD3 and QD7 exhibited factorial complexity related issues. Therefore, they were discarded from further analysis. The per factor internal consistency of the eight retained factors demonstrated reasonable reliability indexes for all eight factors, ranging from .61 through .95 respectively.

In addition, construct validity, which was employed using total variance explained by each factor in NPE construct showed that the eight factors composing the NPE construct are valid. The construct validity index for the eight factors of NPE were 69.63%, 83.39%, 76.10%, 68.45%, 76.75%, 74.66%, 54.25%, and 62.36% respectively. As such, construct validity criteria was met (Hair et al., 2010). These results address the research question posed earlier with the finding that there were reliable and interpretable factors of NPE across selected secondary schools in Kuching. The extracted factors along with their items are shown in Table 3.

Table 3. NPE factor loading, anti-image, means, reliability, eigenvalues, variance explained and standard deviation

No.	Item	<u>Factor loading</u>		HMC	CC	KC	ID	PHD	BHI	MSA	M	SD
		IPD	SD									
QB2	My student puts effort to develop his/her potential.	.79								.94	3.97	1.01
QB3	My student is given the opportunity to develop his/her potential.	.72								.91	3.70	1.10
QB1	My student knows there are potentials in him/her to be developed.	.67								.91	3.92	1.01
QB5	My student has potential to success in life.	.66								.93	4.08	.94
QF2	My student recognizes that there is a Creator.		.87							.90	4.24	1.10
QF1	My student realizes that there is a Creator.		.84							.92	4.29	1.09
QF5	My student is aware and acknowledge own responsibility in God.		.83							.93	4.25	1.08
QF3	My student appreciates things given by the Creator.		.81							.87	4.29	1.02
QF4	My student is thankful to things given by God.		.78							.91	4.44	.92
QL5	My student			.68						.94	4.17	.93

No.	Item	<u>Factor loading</u>								MSA	M	SD
		IPD	SD	HMC	CC	KC	ID	PHD	BHI			
QL3	seeks opportunity to do what is good. My student believes in the good values.			.62						.95	4.36	.88
QL1	My student knows the value of good and bad.			.55						.93	4.35	.89
QO7	My student is patriotic.				.80					.92	3.90	1.06
QO3	My student maintains stabilisation of the nation.				.73					.94	3.71	1.08
QO6	My student practises the National Principles (<i>Rukunegara</i>).				.69					.92	3.94	1.09
QO4	My student obeys, maintains and defends the constitution.				.69					.93	3.80	1.04
QO5	My student appreciates the National Principles (<i>Rukunegara</i>).				.69					.92	4.05	1.09
QO8	My student loves Malaysia.				.66					.92	4.21	1.07
QO2	My student is able to advance the economy towards development of race and nation by using science and technology.				.48					.93	3.79	1.02
QJ3	My student is broad and open-minded.					.64				.94	4.04	.99
QJ2	My student is always pursuing new knowledge.					.56				.94	3.96	1.05
QJ1	My student loves reading.					.52				.91	3.72	1.29
QE8	My student can think critically.						.71			.94	3.78	.96
QE7	My student thinks creatively.						.68			.93	3.91	.99
QE9	My student uses knowledge for the self-benefit and others.						.47			.96	3.99	.88
QH5	My student has a fixed schedule to do exercise or							.73		.84	3.39	1.28

No.	Item	Factor loading								MSA	M	SD
		IPD	SD	HMC	CC	KC	ID	PHD	BHI			
QH4	sport. My student likes to exercise.							.73		.86	4.06	1.00
QH3	My student develops his/her technical talent and skill (e.g. Sport).							.62		.93	4.03	1.00
QH2	My student has ample time for leisure (outdoor activity).							.46		.51	4.11	2.87
QD8	My student exhibits a stable emotion.								.69	.89	3.91	.98
QD5	My student feels peace all the time.								.63	.91	3.59	1.13
QD6	My student is physically healthy and fit.								.49	.91	3.95	.92
Eigenvalue		35.15	5.82	3.58	2.72	2.23	2.06	1.86	1.81			
Construct Validity		69.63	83.39	76.10	68.45	76.75	74.66	54.25	62.36			
Construct Reliability		.85	.95	.84	.92	.84	.83	.61	.70			

Note: IPD = potential individual development, SD = spiritual dimension, HMC = high moral development, CC = contributive citizens, KC = knowledgeable citizens, ID = intellectual dimension, PHD = physical dimension and BHI = balanced and harmonious individuals.

3.3 Parallel Analysis of NPE Construct

Table 4. Comparison of PCA and PA eigenvalues for data from NPE construct

Component no.	Actual eigenvalue from PCA	Criterion eigenvalue from PA	Decision
1	35.15	2.46	Accept
2	5.82	2.36	Accept
3	3.58	2.28	Accept
4	2.72	2.20	Accept
5	2.23	2.13	Accept
6	2.06	1.99	Accept
7	1.86	1.82	Accept
8	1.81	1.79	Accept
9	1.55	1.70	Rejected
10	1.48	1.66	Rejected
11	1.42	1.59	Rejected
12	1.33	1.55	Rejected
13	1.22	1.48	Rejected
14	1.21	1.31	Rejected
15	1.04	1.22	Rejected

An analysis of PA was performed on the NPE constructs to validate the factors extracted through the application of PCA. The analysis revealed that the eigenvalues of the eight factors extracted through the application of PCA were greater than their corresponding eigenvalues of the PA, and were thus significant at $p = 0.05$. Therefore, the eight factors were retained for further interpretation. In other words, the decision failed to reject these eight factors, but the other seven factors which earlier did not meet the requirement through the application of PCA

were further rejected since their eigenvalues were greater than that of PCA values (Franklin, Gibson, Robertson, Pohlmann, & Fralish, 1995; Horn, 1965; Pallant, 2007). This result further confirmed and cross validated the accuracy and reliability of the eight factors extracted through the application of the PCA. Table 4 demonstrates the details.

4. Construct Validity

4.1 Testing the Validity of NPE Measurement Model

A CFA was performed to validate the measurement model of the retained factors and further investigate items indexed the retained factors. The analysis demonstrated that the measurement model exhibited reasonable fit statistics to the sample data: $\chi^2 = 1082.84$, $df = 436$, CFI = .87, TLI = .86, NFI = .81, RMSEA = 0.08 and SRMR = .06. Furthermore, the squared multiple correlations (SMC), which indicate how well the observed variables serve as reliable measures of the latent variables were also investigated. It is worth noting that the values of SMC of the NPE measurement model had fulfilled the requirement $\geq .25$ (Schumacker & Lomax, 2004). The values ranged from .28 to .94. This provides substantial evidence of the reliability of the parameter estimates.

However, the values of CFI = .87, TLI = .86 and NFI = .81 were less than the accepted threshold of $\geq .90$ (Bollen, 1989; Byrne, 2010; Kline, 2011). Since the study sought a better fitting model, Post Hoc modification indices (MIs) were investigated in order to identify a more parsimonious model. As such, the measurement model of NPE was re-estimated.

The MIs investigation disclosed that QO5, QO8, and QF4 were cross loaded with different error terms. The cross-loaded indicator variables were then dropped from the construct. Consequently, the model demonstrated good fit to the observed data: $\chi^2 = 727.07$, $df = 349$, CFI = .91, TLI = .90, NFI = .85, $\chi^2/df = 2.08$, SRMR = .04 and RMSEA = 0.06. Furthermore, all values of critical ratios (CRs) were above the cut-off score of 1.96. This is an indicative of statistical significance of indicators (Bollen, 1989; Byrne, 2010; Hair et al., 2010; Kline, 2011). Furthermore, the model is consistent with the valid measurement, since the absence of model contamination related issues or being confounded with error term connection is established (Levine, 2005). Figure 1 depicts the details.

In addition, the investigation of the regression weights also provided more supporting information about the loadings' significance (consistency, statistical significance and practical importance) for the indicator variables. All values exhibited a magnitude greater than 1.0. Nonetheless, all CRs were also above the cut-off point of 1.96. This evidence further confirmed the consistency of the theoretical bases in terms of the supported hypothesis. Tables 5 and 6 provide for more details about regression weights with CRs and standardised regression weights.

Table 5. Regression weights with critical ratios

			Estimate	S.E.	C.R.	P	Label
QB2	<---	IPD	1.000				
QB3	<---	IPD	.863	.077	11.177	***	par_1
QB1	<---	IPD	.906	.068	13.322	***	par_2
QB5	<---	IPD	.810	.064	12.622	***	par_3
QF2	<---	SD	1.000				
QF1	<---	SD	.970	.025	38.104	***	par_4
QF5	<---	SD	.814	.041	19.845	***	par_5
QF3	<---	SD	.852	.031	27.440	***	par_6
QL5	<---	HMC	1.000				
QL3	<---	HMC	.966	.076	12.746	***	par_7
QL1	<---	HMC	.953	.077	12.431	***	par_8
QO7	<---	CC	1.000				
QO3	<---	CC	1.261	.093	13.496	***	par_9
QO6	<---	CC	1.116	.094	11.817	***	par_10
QO4	<---	CC	1.169	.089	13.077	***	par_11
QO2	<---	CC	1.016	.088	11.544	***	par_12
QJ3	<---	KC	1.000				
QJ2	<---	KC	1.391	.107	13.057	***	par_13
QJ1	<---	KC	1.238	.113	10.916	***	par_14

			Estimate	S.E.	C.R.	P	Label
QE8	<---	ID	1.000				
QE7	<---	ID	1.064	.099	10.736	***	par_15
QE9	<---	ID	1.049	.089	11.797	***	par_16
QH5	<---	PHD	1.000				
QH4	<---	PHD	.820	.103	7.936	***	par_17
QH3	<---	PHD	1.083	.115	9.389	***	par_18
QH2	<---	PHD	1.054	.121	8.715	***	par_19
QD8	<---	BHI	1.000				
QD5	<---	BHI	1.669	.232	7.201	***	par_20
QD6	<---	BHI	1.176	.173	6.781	***	par_21

Table 6. Standardized regression weights

			Estimate
QB2	<---	IPD	.857
QB3	<---	IPD	.684
QB1	<---	IPD	.782
QB5	<---	IPD	.750
QF2	<---	SD	.975
QF1	<---	SD	.959
QF5	<---	SD	.815
QF3	<---	SD	.900
QL5	<---	HMC	.796
QL3	<---	HMC	.810
QL1	<---	HMC	.791
QO7	<---	CC	.727
QO3	<---	CC	.900
QO6	<---	CC	.790
QO4	<---	CC	.871
QO2	<---	CC	.772
QJ3	<---	KC	.722
QJ2	<---	KC	.933
QJ1	<---	KC	.745
QE8	<---	ID	.733
QE7	<---	ID	.753
QE9	<---	ID	.839
QH5	<---	PHD	.617
QH4	<---	PHD	.648
QH3	<---	PHD	.852
QH2	<---	PHD	.739
QD8	<---	BHI	.535
QD5	<---	BHI	.779
QD6	<---	BHI	.669

4.2 Average Variance Extracted, Composite Reliability Index and Discriminant validity Evaluations

The assessment clearly indicates that the CRI of all the factors is more than the cut-off value of $\geq .70$, which is desired (Bagozzi & Burnkrant, 1985; Fornell & Larcker, 1981). Furthermore, the assessment of the AVE demonstrated that all factors (except for BHI .45) have shown significant threshold values for all NPE factors retained. In other words, the AVE for each factor is $\geq .50$, which further supports the convergent validity of the constructs.

Table 7. AVE, squared inter-factor covariance and CRI

Construct	IPD	SD	HMC	CC	KC	ID	PHD	BHI	CRI
IPD	(.59)								.85
SD	.19	(.84)							.95
HMC	.36	.25	(.64)						.84
CC	.25	.24	.38	(.66)					.91
KC	.42	.10	.56	.36	(.65)				.85
ID	.45	.25	.56	.31	.53	(.60)			.82
PHD	.23	.10	.22	.37	.32	.31	(.52)		.81
BHI	.42	.07	.32	.35	.38	.40	.40	(.45)	.71

Note: Diagonals in parentheses are square roots of the AVE from observed variables (items), whereas off-diagonals are squared inter-factor covariance.

Moreover, discriminant validity was then assessed using the formula suggested by Fornell and Larcker (1981) and Kline (2011), which states that if AVE values are found to be greater than their corresponding inter-factor squared covariance values, then evidence of discriminant validity is established. Thus, the measurement model reflects good construct validity and desirable psychometric properties (Ganguli & Roy 2011).

Interestingly, the results show that the eight factors exhibited substantial evidence of discriminant validity based on the AVE values observed with their squared inter-factor covariance obtained (Kline, 2011). Succinctly, the measurement model demonstrates adequate and substantial reliability, convergent and discriminant validity. Table 7 depicts the details.

In addition, the graphical investigation of Figure 1 provided supporting evidence of discriminant validity, since the highest inter-factor covariance observed was .75. According to Kline (2011), if inter-correlations of a set of variables that are presumed to measure different factors are not too high ($\leq .85$), then evidence of discriminant validity is established. The obtained results supported the research hypothesis with the finding that NPE factors indexed through the application of PCA were valid and reliable.

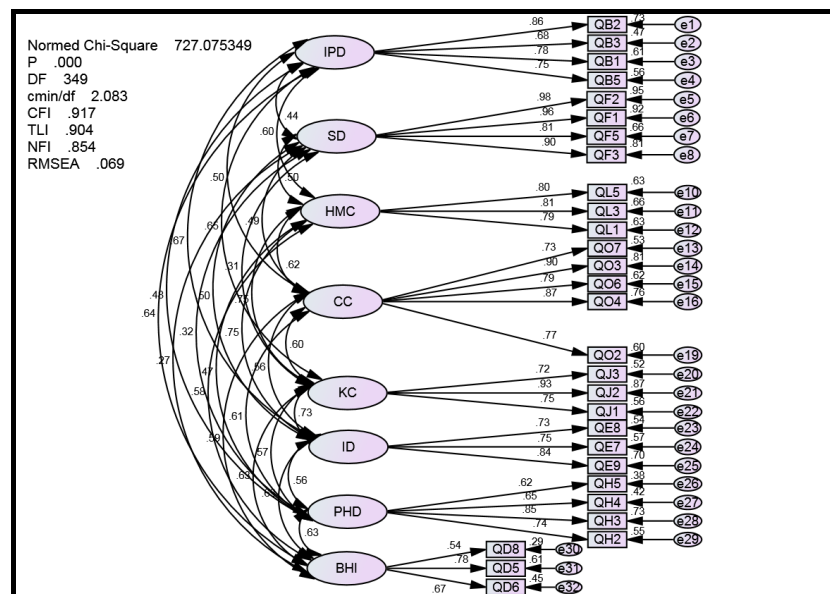


Figure 1. Generated output of NPE eight-factor measurement model

5. Discussion

This study was designed to devise quantitative measures for the NPE dimensions and empirically validate the psychometric properties in the context of secondary schools. The empirical findings of the study will serve as a point of departure towards filling a gap in the educational philosophy literature.

The application of PCA in this study demonstrated that NPE in the context of the selected secondary schools is

represented by eight components. The findings reached the conclusion that the loadings of the clustered items under their extracted factors and the total variance explained by each factor exceeded the acceptable thresholds, indicating statistical significance and practical importance of the retained items, and therefore could be used in future studies, especially in the context of local secondary schools and perhaps in other Asian secondary schools, with particular reference to the NPE. Thus, the components of NPE initially demonstrated substantial high construct validity ($> 50\%$) after the application of PCA through the examination of the total variance and construct reliability.

The results of PCA together with the results of CFA demonstrate that the NPE construct is an eight-factor model in the context of the selected secondary schools. The proposed measurement model in this preliminary quantitative study was found to exhibit an acceptable fit statistics, thus lending further confirmatory evidence for construct validity.

Furthermore, the results rigorously validated the goodness of fit indices pertaining to the NPE initially validated instrument through the application of various advanced evaluation mechanisms (AVE, CRI, DV and PA). Drawing on the aforementioned results, it is clearly evident that the retained measures demonstrate high regression weights on their respective factors, signifying appropriateness and soundness of the NPE measures.

Moreover, the study provided additional evidence for the usefulness and soundness of the NPE quantitative measures by demonstrating significant critical ratios across all indicator variables in the revised measurement model.

6. Conclusions

Given the foregoing discussion, the study examined the factorability and validity of NPE measures, using the conceptual dimensions outlined by the Ministry of Education. The study argued that devising quantitative measures of NPE are necessary since studies on the concept did not disclose any previous quantitative initiative of the measures or testing and validating the factor structure of NPE in the Malaysian educational sector.

The analysis reached the conclusion that the preliminary quantitative measures of NPE in the selected schools exhibit eight valid and reliable factors. The study provided evidence through fit statistics that the eight-factor model fitted the sample data adequately.

7. Implications of the Findings

In correspondence with the findings and conclusions emanated from this study, both theoretical and practical implications were drawn. Theoretically, the present study has yielded valid and reliable preliminary measures for measuring NPE dimensions at the secondary school level by conducting empirical analysis using survey data collected from the selected secondary school teachers in the State of Sarawak, East Malaysia. These measures are valid and reliable for Malaysian secondary schools and other neighbouring countries taking the cultural aspect into consideration to investigate the nature and dimensions of NPE. These quantitative measures initiated and contributed a new body of knowledge to the NPE in the context of Malaysia other than the conceptual dimensions proposed by Ministry of Education. Practically, the findings, though preliminary in nature, provide school principals and the Ministry of Education with appropriate tools to assess the extent to which school teachers translate and infuse the ideas of the NPE in the day-to-day lesson delivery. Similarly, the measures serve as appropriate instruments for measuring the extent to which school students' capture and internalise the NPE concepts hand-in-hand with academic development.

8. Limitations and Future Research Direction

Although findings of these quantitative measures of NPE presented a preliminary sound and reliable measures, several limitations had been driven from the study. One of which was the small sample size on which the analyses were performed. The study sampled 230 participants with 85 variables. Sample size as such did not fulfil the minimum requirement of 5 observations to 1 observed variable as a fundamental requirement for PCA analysis, in addition to the fact that only Sarawak in East Malaysia was sampled. This limitation suggests that future research works should sample larger participants to include the remaining twelve states. This inclusion is necessary for the increment of precision level, the validity of the conclusions reached, generalizability of the findings and meeting the requirement of reasonable representativeness. Moreover, the study was not able to gather opinions of the subject matter experts (SME) concerning the NPE, as such; future replication studies should report SME prior to data collection.

Second, it is clearly evident from the results of the descriptive frequencies that only Malay ethnic group, the Chinese ethnic group and few non-Malaysians participated in the study. Thus the opinions of the Indian ethnic group on the NPE were not obtained in the survey. Given the demographic formation of Malaysians, the study,

therefore, suggests that future studies should take all necessary measures to include the opinions of the Indian ethnic group in the survey. Since there would be a possible cultural bias playing a significant role in the findings as different ethnic group might hold different perceptions on the same dimensions.

Furthermore, it should be kept in mind the development and validation of any scale requires retesting from a given time to another and in different geographical locations. As such, replication of this preliminary finding of the NPE in different states is highly encouraged.

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Note

Note 1. An evaluation was recently carried out following which improvements were made to the KBSR (*Kurikulum Bersepadu Sekolah Rendah*), which in turn resulted in the development of KSSR (*Kurikulum Standard Sekolah Rendah*). More holistic and less examination-oriented for pupils.

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