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A psychometric analysis of the Self-Efficacy Encouragement Questionnaire (SEEQ) in the university environment

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Abstract

This article presents the theoretical construct of self-efficacy encouragement and then introduces a 14 items scale known as Self-efficacy Encouragement Questionnaire (SEEQ) that is developed to measure what degree university lecturers encourage students to develop their academic sense efficacy. A Principal Component Analysis (PCA) and Confirmatory Factor Analysis were used to explore the psychometric properties of the scale. 194 undergraduate students participated in the pilot study section while another 300 undergraduate students involved in the Confirmatory Factor Analysis test. The PCA attempts to answer the research question 1: What is the psychometric soundness of the self-efficacy encouragement questionnaire? The CFA aims to answer the research question 2: Do the self-efficacy encouragement hypothesized model fit the collected data from the UKM undergraduate students? The PCA and CFA results indicated that the Self-efficacy Encouragement Questionnaire (SEEQ) is an established instrument with acceptable validity and reliability and it justified to be used in other studies.

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Keywords : A Psychometric analysis; self-efficacy university environment.

1. The conception of perceived self-efficacy

In 1977, Albert Bandura initiated the conception of perceived self-efficacy which influences and modifies human behavior. Self-efficacy refers to the personal beliefs or an individual's confidence in his own ability to perform effectively given or specified tasks. In another words, Self-efficacy theory stressed that human action and success depend on how deep the interactions between one's personal thoughts, that when it comes to managing one's own surrounding demands (Bandura 1986, 1997). On the other hand, people with low Self-efficacy are associated with anxiety, feeling of helplessness, and being less motivated to perform accordingly. Individuals with a low sense of self-efficacy will possess negative thoughts about their tasks and they think of event's demands as threatening not as challenging and therefore set low objectives for themselves to be obtained which is a predictor of failure (Bandura 1994). Furthermore, self-efficacy beliefs allow individuals to determine or measure how much effort and time are needed to be spent to obtain success in a given task. The more the individuals own sense of efficacy the better they

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plan and achieve. The lower the sense of Self-efficacy beliefs the lower the out come. The sense of Self-efficacy beliefs however, must be in the line with what we can term as efficacy balance or steadiness. (Bandura 1994).

Academic self-efficacy beliefs allow students to think about effective ways to approach a given task and divorce themselves from a lack of efficacy consequence. A strong academic self- efficacy allows students to believe in their own ability to carry out requested learning activities. When they are at any academic risks they considered that as part of learning's demands and as effective ways to master knowledge. Therefore, modern educational systems should prepare each student to consider himself as a behavior producer rather than thinking himself as an implementer of a fixed behavior. According to Bandura (1986), Humans seem to involve themselves in tasks when they feel capable and they avoid them when they feel the opposite. Self-efficacy, outcome expectations, relevant skills, and adequate knowledge help the individual to have a better choice. Also, people who enjoy adequate skills but, suffer from low sense of efficacy and outcome expectations will experience lack of confidence in themselves and not able to perform a given task as requested.

2. Determinants of self efficacy

Several factors and ways can lead to individuals' self-efficacy development.

2.1 Parents and Environment Influence on Self-efficacy

Self-efficacy begins at home, in infancy the child starts the learning process through being with his parents, other family members, and in the home environments. Children's' interaction with their surrounding helps them to explore different experiences which positively influenced self-efficacy development. Bandura (1997) ; Meece (1997) believe that people's self-efficacy is initially rooted in the family's interaction. This indicates that Children s' self-efficacy could be developed through parents' social activities, those who allow their children to interact with environment are actually enabling them to master various experiences. Home environments that contain different activity objects such as play grounds, collections of rich magazines, books, and computers stimulate more interest and Self-efficacy in children. They show to be initially encouraged to involve themselves in many activities, take challenges, and be ready to learn. Parents play an important role in providing their children self efficacy by allocating adequate time for discussions on their studies. In some homes, parents devote time to listen to their children's difficulties and even show them effective ways of solving problems in the presence or absence of their parents. Such effort helps children to develop self-efficacy and cognitive skills. It was reported by Bandura (1997); Jonson-Reid et al (2005); Turner et al. (2003) that Self-efficacy is less found in environments that discourage intellectual activities to take place.

People's self-efficacy can be enhanced by verbal persuasion which is a word of encouragement or a positive reinforcement. Such words strengthening one's abilities to carry out tasks at hand. Bandura assumed that when people are informed that they are capable to carry out a given task they are more likely to actualize the verbal persuasion into practical behaviours, expand effort, and even persist longer in-order to complete a task than those informed that they are incapable of completing an assignment. Thus, their sense of efficacy will drop down because poisonous verbal persuasion has destroyed the efficacy system that enables them to achieve. Verbal persuasion can easily put a sense of efficacy down rather than raise it, especially, when a sense of efficacy is not well rooted.

2.2 Collective Cognitive and teachers' self-efficacy

Bandura (1994, 1997) conceptualized that students' academic cognitive confidence is a combination of two systems, they being an individual efforts and a social contribution, these form collective efficacy. As an illustration, when students develop a personal efficacy to study in-collaboration with school effective leadership, classroom learning environments, teachers remarkable effort, and peer grouping will form a collective sense of efficacy for the school as a whole that their students have commanding abilities to undertake certain tasks, their teachers know effective ways of teaching, their administrators can create positive learning environments for the students, and decision makers have the capability to govern the school successfully. Empirically, Bandura, 1993; Hoy and Murphy 2003; Pajares 1992; Ashton & Webb, 1986; Ashton, 1985 found that collective efficacy has influence on students' academic achievement.

3. Research method

3.1 Instrumentation

Self efficacy encouragement questionnaire

The researchers developed the Self-efficacy encouragement questionnaire (SEEQ) to examine to what degree university lectures encourage their students to become self-efficacious learners. The SEEQ comprises 14 items and were rated on a 7-point likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). Initially, the researchers assumed that the Principal Component Analysis PCA will yield two factors for the SEEQ namely a "generic encouragement factor" and "directed encouragement factor" because lectures in the first factor generally encourage their students to be confident in their university course while lecturers in the second latent factor directed students to be confident in some certain specific academic behaviors such as having the confidence to plan for university courses and independent self-supervising.

3.2 Content validity

During the pilot study stage, the researchers consulted some experts in educational research such as experienced PhD students and lecturers at the faculty of education, Universiti Kebangsaan Malaysia (UKM). This was to gather their suggestions and comments on the instruments and to improve the fitness of the items. Some of their suggestions were considered to be helpful for improvement of the research instrument.

4. Data Collection and Data Analysis Procedures

In order to carry out the Principal Component Analysis (PCA), a total of 200 students from faculties of Social Science, Economics, Law, and Engineering at Universiti Kebangsaan Malaysia UKM, known as the National University of Malaysia participated in the first instrumental validation section. The selected students registered for semester 3, 2006/2007. The researchers distributed 200 questionnaires to the participants and managed to collect 194 questionnaires and more than 12 participants responded for each Item. In order words, more than 97% questionnaires were returned which was considered a good response. Babbie (1989) argues that achieving a fifty percent response can be considered adequate, sixty percent should be regarded as good, while seventy percent should be held as a very good response rate for data analysis. This is because a high response rate reduces chance of unfairness and bias among participants. Principal Component Analysis was applied to reduce the respondents' multiple information to a common meaningful pattern and to examine the dimensionality, fitness, and accuracy of the instrument. The items and factors that did not obtain a significant loading (.40) or that displayed factorial complexity were removed from the analysis. In order to consider a factor as a good one and one to be retained, it must have Eigen values of at least 1 or greater (rule of thumb). Another 300 UKM undergraduate students participated in second instrumental validation using Confirmatory Factor Analysis to investigate hypothesized model fit of the self-efficacy encouragement (SEEQ). The research surveys were administered during the 2nd semester of the 2007/2008 academic year.

5. Results of the self-efficacy encouragement construct

A Principal Component Analysis with varimax rotation was conducted separately and repeatedly on the Self-efficacy beliefs encouragement construct before obtaining the satisfactory results. In this regard, 14 Items were included in the self-efficacy encouragement construct investigation. The KMO and Bartlett's test results show that Kaiser-Meyer-Olkin measure of sampling Adequacy (MSA) was .951. That means the overall MSA result of the data fulfilled the requirement of at least .60. The MSA result is considered as a strong touch and go indicator to carry on the research. Bartlett's test of Sphericity was also statistically significant $p \leq .001$. Anti-image Correlation that used to test intercorrelation among the items shows 0.9 loading for each variable which is greater than the acceptable level (0.5).

Table 1.1 Items of the self-efficacy encouragement with Anti-image Correlation Loading

	1	2	3	Item no 4	5	6	7	8
Item 1	.942a							
Item 2		.924a						
Item 3			.942a					
Item 4				.933a				
Item 5					.951a			
Item 6						.976a		
Item 7							.971a	
Item 8								.952a

a = Measures of Sampling Adequacy(MSA)

	9	10	11	Item no 14
Item 9	.959a			
Item 10		.954a		
Item 11			.945a	
Item 14				.961a

a = Measures of Sampling Adequacy(MSA)

In addition, the measurement of Community also was tested and it reveals that all items are above the requirement of at least 0.5 (table 1.2). The result of Initial Eigen values and component Matrix in the Principal Component Analysis indicated only one component or we were only able to group the 12 Items into one factor namely encouragement factor. The total variance explained that the inter correlation among items with the one dimensional structure accounting for more than 63.% of the Self-efficacy encouragement and the remaining 30% upward of the total variance are not explained.

Table 1.2 Underlying component Matrix for the self- efficacy encouragement with eachitem loading

Item no	Component
1.	encouragement .848
2.	encouragement .814
3.	encouragement .817
4.	encouragement .750
5.	encouragement .758
6.	encouragement .758
7.	encouragement .833
8.	encouragement .761
9.	encouragement .839
10.	encouragement .827
11.	encouragement .754
14.	encouragement .770

Extraction Method: Principal Component Analysis. A 1 component extracted.

Finally, Chronbach's alpha method also reported a strong statistical internal consistency of the self-efficacy encouragement construct (.94). The summary table (1.3) consisted of only one component, number of Items, and Cronbach's coefficient alphas (Reliability).

Table 1.3 The reliability results of the self-efficacy encouragement questionnaire (SEEQ).

Component	Items	Factor Reliability	Overall Reliability
Encouragement	12	.94	.94

6. The result of self-efficacy encouragements hypothesized model using Confirmatory Factor Analysis

Confirmatory Factor Analysis attempts to answer research question two (RQ2): Do the self-efficacy encouragement hypothesized model fit the collected data from the UKM undergraduate students?

The items 12 and 13 that did not get hold of a statistical significant loading (.40) or that show factorial complexity in the PCA study were not directly deleted from the further statistical analysis of this research. This is to see the existence of the problem. However, items 1, 2, 3, 4, 7, and 10 were removed from the final test of the CFA because they increased the output credibility of the results. Finally, CFA’s fit indices satisfied that the self-efficacy hypothesized model (8 items) fit the collected data well. The overall model fit indicated that the minimum was achieved, the chi-square resulted a value of 1.76, degrees of freedom was 17 with probability of $p \leq 0.026$. Nevertheless, other measurement fits in table 1.4 proved the model to be reasonable and acceptable; the root mean residual (RMR) .039, the Hoelter critical number (CN .05) 203, Hoelter critical number (CN.01) 228, the root mean square error of approximation (RMSEA) 0.51, , the goodness-of-fit index (GFI) 0.975, the adjusted goodness-of-fit (AGFI) 0.947, the Tucker-Lewis Index (TLI) 0.976 and the comparative fit index (CFI) 0.986. The CFA results indicated that all 8 items were significantly correlated to the respective factor. Items’ loadings were above 0.4. In addition, the standardized regression weight illustrated that all items of self-efficacy encouragement model were statistically significant at 0.001. (Hoelter 1983: Holye 1995: Hair & Black 1998: Arbuckle & Wothke 1999: Hoy & Murphy 2003).

Table 1.4 Below the values of the Confirmatory Factor Analysis fit indices for the SEEQ

CIMNDF/ Chi-square	d.f.	P	AGFI	GFI	CFI	TLI	RMR	RMSEA	CN	CIMNDF	
1.764	17	0.026	.946	.975	.986	.976	.032	.051	203 & 228	1.764 .947 .975 .986 .976 .032 .051	

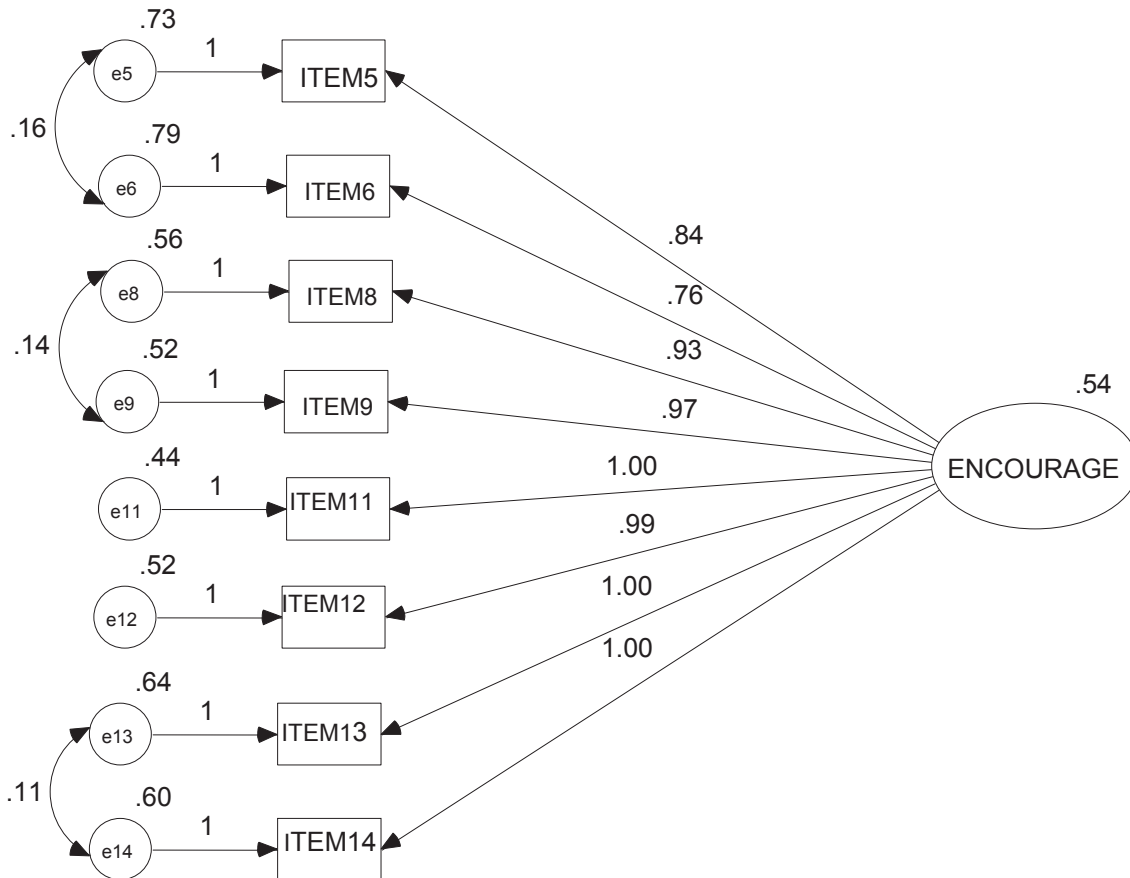


Figure 1. Self-efficacy encouragement hypothesised model

7. Overall model fit and conclusion of the research

Findings of PCA suggest that the SEEQ is an established and reliable instrument. KMO and Bartlett's Test overall results show good fit of the model. The (MSA) shows Adequacy Sampling values. Also, total variance explained was adequate indicating a strong correlation among SEEQ items. The CFA's fit indices fulfilled the requirement of good fit model. Combining the above estimations lead to a better conclusion that the SEEQ could be used in any other investigation. The SEEQ can thus be applied in educational settings to enhance and mobilize quality educational practices and achievement.

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