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Research Article

The Impact of Self-Efficacy Beliefs on Academic Achievement of High Achieving Science Students: A Full-Fledged Analysis

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Abstract

The primary aim of this study is to investigate the impact of the self-efficacy beliefs (SEB) on academic achievement (CGPA) of high achieving school students in science subjects. Students' SEB means the self-confidence and ability to perform a given task or assignment. The Malaysian high achieving school students in the science stream were randomly selected to participate in this study applying the Principal Component Analysis (PCA) and the Structural Equation Modeling (SEM) to answer two research questions: 1) what is the relationship between the control of learning beliefs and SEB for learning of the high achieving school students in science stream? 2) What is the impact of SEB beliefs on the academic achievement of the high achieving school students in the science stream? The finding shows a considerable relationship between the variables of SEB and indicates the effects of SEB on science achievement significantly. The direct effect of control of learning beliefs on academic achievement was.51 while the direct effect of SEB for learning on academic achievement was also. 60 indicating that the SEB play an important role in the lofty attainment of the participants. In conclusion, educators should strategically maintain a high SEB of high achieving students to boost science attainment in the country

Keywords: Self-efficacy beliefs, academic achievement, science subject

1. Introduction

Self-efficacy beliefs and academic performance

SEB is an individual's self-belief in his own capabilities to carry out a given assignment effectively [1]. SEB is people's judgments about their abilities to perform a task successfully [2]. It was emphasized by Pajares that SEB enhance one's accomplishments feelings to remain strong when approaching difficulties and challenging tasks [3]. Developing students' SEB in multiple areas increases their confidence to master new domains, explore new ideas, and encourage them to set higher expectation goals for future performances and better persistence than before [4]. The SEB actively inject and facilitate other aspects of success, such as self-regulation and motivation. Accordingly, SEB thoughts regulate someone's execution through cognitive function and elements of motivation [1][5]. SEB are probably among the most cardinal components that lead to academic performance, including the science subject attainments of the high achieving students. It was found that there is a correlation between SEB and subject attainment. According to Klassam & Lynch, (2007)[6], students that

have high SEB tend to attain predicted expectations while low SEB students often do not attain their real potentials. Individuals with a high degree of SEB are able to attempt challenging tasks, persist longer in them, and exert more effort in the process [1][7]. The study of Schunk &Pajares, 2002)[8] reported that the boys were often found to have higher SEB. This may relate to the boys' social exposure and safety compared to girls in human societies.

Emily, (2014)[9] discovered that lack of SEB makes students perceive science and math to be more difficult subjects and at the same time, the processing involved in SEB development help students to build up capabilities to excel in science and mathematics. SEB also enable students to monitor study activities, solve problems, and persist to carry out a given task than peers with low SEB. Students who possess high degrees of SEB do not give up easily to achieve academic goals [10][11][12]. It was reported by Ellen et al, (2006) [13] that students who have self-confidence in their academic attainment seem to perform effectively and regulate their studies strategically in which promotes success in their academic performances. In fact, Learners with high SEB attribute failure to low effort while low SEB students possess low achievement to low ability [14]. Researchers have examined the association between SEB and its four hypothesized sources. Accordingly, there are many reasons for people to believe in themselves. The reasons are related to four factors: 1) past mastery experiences (PME), 2) exposure to vicarious experiences (EVE), 3) access to verbal persuasion (AVP) and 4) experience of emotional arousal to task performance (EEATP) [15]. The main influential source of SEB is the interpreted result of one's past performance or individual's mastery experience. Viewing past accomplishments positively is a powerful key to boost students' self-efficacy further [16].

2. Method

A total number of 988 of high achieving school students in the science stream were randomly selected from several Malaysian upper secondary schools located in Tanjung Malim, Ipoh, Wilayah Persekutuan, Selangor, and Putrajaya. In this study, the principal component analysis (PCA) with Varimax was employed on the construct of SEB to investigate the validity of the two dimensions, control of learning beliefs (CLB) sub-scale and SEB for learning and performances sub-scale. Initially, the control of learning beliefs sub-scale contains four items while SEB belief for learning and performances sub-scale contains eight items respectively. SEM was used to investigate the model fit of the study. Finally, the reliability test was applied to examine the internal consistency of the items.

3. Findings

3. 1 The Result of the Pca and Cfa on Self-Efficacy Beliefs

The results of the Principal Component Analysis on the SEB revealed that all the loadings for the two dimensions were strong and valid and no items need to be deleted. The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) was .912 while Bartlett's test of Sphericity yielded a significant level p=.000. The anti-image correlation within each item was ranged between.9 and above indicating that all items were statistically and adequately related. In the same vein, the communality was also employed for the data which met a required level of at least .5. The eigenvalues extracted was greater than one with 66% of the proportion of total variance in the analysis.

The two factors were furtherly used for the SEM analysis named control of learning beliefs factor (COLEB - 4 items) and self-efficacy for learning and performance factor (SEBLAP - 8 items). According to the first result of the CFA, the items A2 and A4, A9, A11, and A12 were suggested to be deleted due to small and high loadings. Modification indices were checked which shows that e5< >e8, e5< >e9, e2 < > e10, e1 < > e9, e1 < > e8 and e1 < > e5 must connect together by setting them as a free parameter. The analysis of CFA was re-run again and model fits improved which means the items measured the underlying constructs perfectly. The results showed that CMIN was 25.328, CMIN/DF 3.618, CFI .995, TLI .984, NFI .993 and RMSEA .052. The model fit met the required level. Likewise, the standardized regression weight demonstrated that the two underlying factors were acceptable at 0.001. For that reason, the results signified that CFA's fit indices for the construct of the self-efficacy beliefs statistically satisfied the goodness fits. Item reliability and the critical values of the measurement model were between the minimum suggested levels.

3.2 Result of Direct Effect Estimation

Analysis of the direct and indirect techniques in SEM was conducted to examine the causal relations between COLEB, SEB for learning and performance, and students' academic performance ((Figure 1.0).

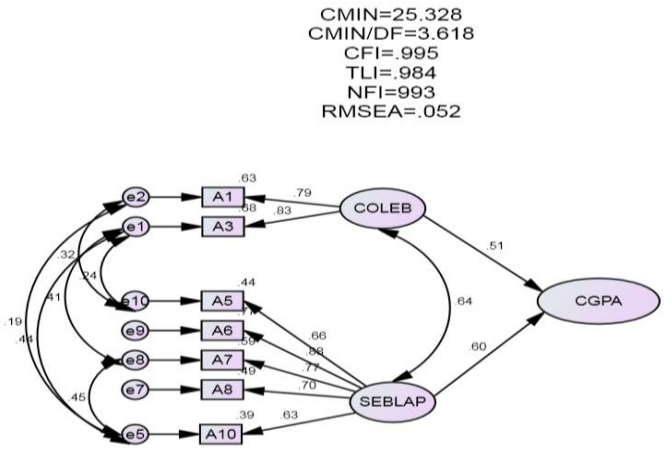

Figure 1.0: Structural Equation Model Result for Self-

Efficacy Beliefs

Significantly, the direct effect of COLEB on students' academic achievement was .51 while the direct effect of SEB for learning on students' academic achievement was .60. The correlation between the two factors in the model was .64.

4. Conclusion of the Study

In this study, the PCA and SEM were adopted to validate the instrument and to provide the answer to all the research questions involving 988 Malaysian high achieving school students in the science stream. Accordingly, the measurement model of this study is an apt model with reliable psychometric properties. The findings of the full-fledged analysis of the SEM shows a considerable relationship between the COLEB and SEB for the learning of the high achieving science stream students. The direct and indirect results indicate the effects of SEB on the students' science achievement significantly.

The present study also shows a strong relationship between the SEB of Malaysian secondary school students in the science stream and their high science attainment. These findings were supported by past studies. For illustration, students with high SEB tend to attain predicted expectations. They were able to attempt challenging tasks, persist longer at them, and spend huge effort along the process (Bandura, 1986; Witt-Rose, 2003). The implication of this study is summarized here; 1) Malaysia educators and stakeholders should strategically maintain high self-efficacy beliefs of high achieving secondary school students in the science stream to maintain their high science attainment. Likewise, 2) the SEB of low and medium secondary school students in the science stream should be improved to boost their high science attainment since the high SEB students master new domains, explore new ideas, and actively inject other factors of success into their academic interactions and requirements.

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