

## Relationship between Self-Efficacy, Higher Order Thinking Skill & Academic Performance among Polytechnic Students

*Mohd Zulfabli Hasan, Nur Ismalina Haris, Jamazuki Othman*  
Politeknik Tuanku Syed Sirajuddin  
02600, Arau, Perlis, malaysia

**Abstract:** A review of self-efficacy and higher order thinking skills (HOTS) is reflected to the academic performance. Hence, self-efficacy and HOTS can affect one's academic outcomes. There are some evidences that indicate self-efficacy as a better predictor for academic performances. Therefore, in order to ensure that the high value of self-efficacy, the factors that influence the self-efficacy and HOTS need to be discovered. Furthermore, this paper is important to the educators as it examines the factors that influence and the impact of self-efficacy on the academic performance of students, as well as the relationship between HOTS in increasing self-efficacy and instil HOTS among the students. Subsequently, the educators can organise activities and programs in order to improve and enhance self-efficacy and HOTS so that it reflects in the increase of the students' academic performance.

**Keywords:** Higher Order Thinking Skills (HOTS), Self-Efficacy, Academic Performance

### 1. INTRODUCTION

Education is now universally recognised to be prime catalyst for moral, cultural, political and socio-economic developments of a nation. Thus, many nations have taken major initiatives in education, by making revolutionary advances and performed miracles in the last two decades [1]. In recent years, many individuals are competing against each other in order to success in their respective academic field. In fact, the success in the academic field or the academic performance has been influenced by self-efficacy. Self-efficacy beliefs vary between individuals; it can fluctuate under different circumstances, and can change over the time. Moreover, Self-efficacy can facilitate the building of other resources, and the lack thereof can deplete the existing pool of resources as individuals dwell on their personal failures and deficiencies [2]. Besides that, it also can contribute to one's academic and occupational performances, as well as in other fields. As a matter of fact, the connections between self-efficacy and academic performance has been an area of interest among educators [3]. Klassen, Krawchuk, & Rajani [4], mentioned that self-efficacy for self-regulation reflects an individual's beliefs in his or her capabilities to use a

variety of learning strategies, resist distractions, complete schoolwork, and to participate in class learning. Historically, the Malaysian education system has emphasised the development of strong content knowledge in the teaching of subjects such as science, mathematics, and languages. However, the increasing global demand for 21<sup>st</sup> century skills make it no longer enough for a student to leave school with only the 3 R's skills (Reading, writing & arithmetic). The education system should also develop higher-order thinking skills (HOTS) among the students. HOTS basically means thinking that is taking place in the higher-levels of the hierarchy of cognitive processing. Higher-order thinking by students involves the transformation of information and ideas. This transformation occurs when students combine facts and ideas with synthesising, generalising, explaining, hypothesising and finally, arriving at a conclusion or interpretation. The most widely accepted hierarchical arrangement of cognitive process in education is the Bloom's Taxonomy. This taxonomy views a cognitive processing as a continuum of thinking skills starting with knowledge-level thinking to evaluation-level of thinking.

For many years, the topic on self-efficacy has created many debates in the education field. Self-

efficacy has always been controversial because it affects academic performances; hence, the education field had been dominated with the discussions on factors affecting self-efficacy, higher order thinking skills (HOTS) and academic performance. There are several problems pertaining self-efficacy that involve the factors affecting self-efficacy, HOTS and academic performances. The first problem is regarding deficiencies of self-efficacy among the students. According to Concannon & Barrow [5], most of the students who did not performed in academic field showed a lack of self-efficacy or they were not concern about self-efficacy at all. Students will typically engage in tasks and activities, interpret the results of their actions, and then use these interpretations to develop beliefs about their capability to engage in subsequent tasks or activities. This act is in concert with the beliefs created of their feeble performances. Besides that, students usually obtain information about their own capabilities by observing others, especially peers who can offer suitable possibilities for comparison. Sometimes, they may feel a lack of confidence and their might be too reserved due to lack of self-efficacy. In addition, persuasive communication and evaluative feedback can be the most effective when people who provide this information are viewed by students as knowledgeable and reliable, and the information is realistic. Nonetheless, if the students are not viewed in a respected manner, this can indicate deficiencies in the development of self-efficacy beliefs. Moreover, the lack of self-efficacy can bring out negative feelings such as anxiety, stress reactions and tension. These feelings will consequently be interpreted as signals of failure and debility. This will then affects the students; causing the problems such as absenteeism, lack of focus in the class and as a result, the fluctuation of one's the academic performance. A study by Marra & Bogue [6] shows that self-efficacy among engineering students is lower at the beginning of study and will get higher as they progress over the years of study.

Over the past two decades, international student assessments, such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS), have emerged as the means of directly comparing the quality of educational outcomes across different education systems. These assessments assess a variety of cognitive skills such as the skills of application and reasoning. According to the Preliminary report on the Malaysia Education Blueprint 2013-2025, when Malaysia first participated in TIMSS in 1999, its average student score was higher than the international average. By 2007, the last published cycle of results, the country's performance had slipped to below the international average due to lack of HOTS. Nowadays, the Malaysian education system will not only just

emphasizes on the development of strong content of knowledge in the teaching and learning process. Instead, there is a move to create a strong emphasis of HOTS as well, in order to increase the 'global' recognitions needed by the system. Correspondingly, HOTS include skills such as creative and critical thinking, analysis, problem solving and visualisation. These skills involve categorising items, comparing and contrasting ideas and theories, and being able to write about and solve problems. In the classroom, the abilities and skills that include the use of HOTS involve complex thinking that go beyond the basic recall of facts, such as evaluation and invention, and the application of problem-solving solutions to real-world problems.

The purpose of this present paper is to examine the relationship between self-efficacy, Higher Order Thinking Skill and academic performance among students at Polytechnics in northern area of Malaysia. Therefore the objectives of this present paper are as follow (i) To determine the factors that influence self-efficacy; (ii) To examine the relationship between self-efficacy and academic performance; (iii) To examine the relationship between HOTS and academic performance; (iv) To examine the relationship between self-efficacy and HOTS towards improving academic performance; (v) To develop a model of relationship between self-efficacy and HOTS that is capable to improve academic performance.

## **2. LITERATURE REVIEW**

### *2.1 Self-Efficacy Theory*

Self-efficacy theory is a key concept in the social cognitive theory [7]. It is often defined as 'how students perceive their own ability to successfully solve a task, to learn an activity, or to perform behaviours at designated levels' [8]. The concept takes into account the dynamic relationship between personal factors (cognitive and affective), human behaviour, and the environment. Whether people can make efforts to handle given situations will depend on the strength of their beliefs in effectiveness. . Self-efficacy is expected to affect one's task effort, persistence, expressed interest, and the level of goal difficulty selected for performance [3]. Researchers have also frequently found that the higher the induced level of self-efficacy, the greater the performance attainments are. Furthermore, self-efficacy refers to student's beliefs in their ability to master new skills and tasks, often in a specific academic domain [9]. Hence, learners obtain information to appraise their self-efficacy from their actual performances as well as their vicarious experiences and the persuasions they received from others along with their physiological reactions. Thus, Bandura [8] suggested that there four categories of

experience or influential factor that are used in the development of self-efficacy, which are, mastery experience, vicarious experience, verbal persuasion, and physiological arousal.

## 2.2 Factors influencing Self-efficacy

Self-efficacy theory based on Bandura's Social Cognitive Learning Theory [6] is considered an essential theory for teachers. This theory emphasises the knowledge, skills and attitudes necessary to fulfil one's responsibilities and the tasks required for a teacher. However, it is not sufficient to explain teacher efficacy only with efficiency. In other words, self-efficacy is not a passive ability about the self; rather, it is an active ability that intertwines self-regulation mechanisms and motives.

Bandura [8] suggested that four categories of experience to be used in the development of self-efficacy; which are, mastery experience, vicarious experience, verbal persuasion, and physiological arousal. Mastery experience is the interpreted results of one's previous performances. As experience is obtained through students' engagement in tasks and activities, their interpretation of the results of their actions, their use of these interpretations to develop beliefs about their capability to engage in subsequent tasks or activities, and how they act in concert with the beliefs created. In contrast, vicarious experience, or modelling, refers to the positive influences of efficacy beliefs in the observation of how other people succeed [10]. Zhu *et al.* [11] empirically tested these propositions with middle school students and reported significant correlations between mastery experiences, vicarious experiences, verbal persuasions, physiological arousal, and self-efficacy. This provides support for the validity of the self-efficacy theory. On the other hand, verbal and social persuasions an individual received from influential others such as teachers, parents, and peer can conversely help them ; encouraging feedback and judgments foster students' self-efficacy to perform a task, whereas, deflating messages will undermine their self-efficacy. Bandura [12] argued that these deflating messages might actually be more effective in lowering self-efficacy than encouraging messages are at raising it. This fourth hypothesised source came from individuals' physiological and affective states such as anxiety, stress, and fatigue. Interpretations of these states often served as indicators of the students' competence [8]. Furthermore, self-efficacy beliefs are formulated by processing information derived from direct domain-specific engagement (enactive mastery experiences), and to a lesser degree, the verbal persuasion, vicarious experiences, and physiological states [10]. The present study hypothesizes that:

H<sub>1</sub>: Mastery experience is the most influential factor for self-efficacy.

H<sub>2</sub>: The higher the self-efficacy is among the students, the better they will perform academically.

## 2.3 Higher Order Thinking Skills (HOTS)

Higher-order thinking, which is known as higher order thinking skills (HOTS), is a concept of education reform based on learning taxonomies (such as Bloom's Taxonomy). The idea is that some types of learning require more cognitive processing than others, while others have more generalised benefits. In Bloom's taxonomy, for example, skills involving analysis, evaluation and synthesis (creation of new knowledge) are thought to be of a higher order. Such skills require different learning and teaching methods than the learning of facts and concepts [13]. There are several factors that account for these views about thinking and learning. First, different types of learning require different teaching strategies; a single method may work for all learning, meanwhile, other strategies may only work for specific types of learning. Second, intelligence is no longer seen as an unchanging general ability, but rather a kaleidoscope of abilities that can be affected by a variety of factors, including teaching strategies. Third, the understanding of the thinking process has shifted to a multidimensional view which is much more like a complex network of interactive capabilities rather than a linear, hierarchical, or spiral process. Fourth, the researches over the last two decades have focused on more specialised topics such as insight, problem solving, visual imagery and metaphors, and schemata. The present study hypothesizes that:

H<sub>3</sub>: The greater Higher Order Thinking Skill is among the students, the better they will perform academically.

## 2.4 Academic Performance

Academic performance refers to standardised test scores, grades, and overall academic ability and performance outcomes [14]. Besides that, it is an index for all future success in life. It is claimed that superior achievers in the academic world generally tend to maintain their superior level of achievement in the occupational field [1]. This is influenced by a multitude of factors. For example, attitude leads to achievement and aptitude is needed for successful performance. In addition, academic performance is a result of intellectual capability and motivation as well. Based on the replicable findings from several studies, Witt-Rose [2] stated that gender and attitude can influence academic performance to some extents through their mediating effects on an individual's self-efficacy beliefs. Furthermore, the relationship between gender and self-efficacy also influences an individual's academic performance [15]. Through results of previous study, it

can be claimed that boys and men tend to be more confident if compared to girls and women in academic areas related to mathematics, science, and technology despite the fact that the achievement differences in these areas either are diminishing or have disappeared completely. On the other hand, in areas that are related to language arts, male and female students exhibit the similar confidence despite the fact that the achievement of girls typically is higher [16]. Moreover, academic variables, such as study hours, study skills, and absenteeism, were the only statistically significant contributors to performance [3]. The present study hypothesizes that:

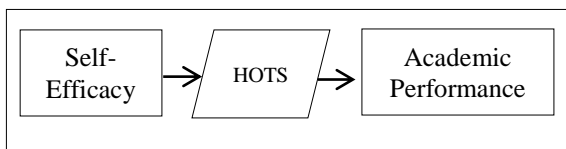
H<sub>4</sub>: The higher the self-efficacy and higher order thinking skill among the students, the superior they in academic performance.

H<sub>5</sub>: The interrelationship between self-efficacy and academic performance is affected by the mediating variables of Higher Order Thinking Skills (HOTS) among the students.

### 3. PROPOSED METHODOLOGY

The present study will collect primary data from interviews sessions and the distribution of questionnaire to Polytechnic's students in Northern part of Malaysia. On the other hand, the secondary data will referenced from review of past studies from books and government's publications of the education indicator in the field of Higher Order Thinking Skills as well as Malaysia Education Blueprint 2013-2025. Meanwhile, PLS SEM will be use in the data analysis.

The summary of this model tell us about the influences of self-efficacy towards the development higher order thinking skills (HOTS) and at the same time , can give an impact to academic performance as shown Figure 1.



**Figure 1: Proposed Framework**

This conceptual framework is a combination between self-efficacy, HOTS and factors that affected the academic performances. This instrument was developed by Schwarzer & Jerusalem [17]. This instrument will guide this research, helps in determining what variables to measure, assist in formulating an instrument, and finally, finding the statistical relationships between independent and dependant variables. Therefore, self-efficacy is reflected to the

academic performances. Such performances can be measured through one's cumulative grade average points (CGPA). This conceptual framework shows that there are four factors that influence the self-efficacy, they are, mastery experience, vicarious experience, verbal persuasion, and physiological arousal. Such factors can influence self-efficacy and at the same time, affecting the academic performances. Besides, HOTS can also influence the academic performance of the students.

### 4. CONCLUSION

The fundamental objective of any education system is to ensure that its students are being equipped with the knowledge and skills required to success in life. Nowadays, Malaysian education system emphasis is no longer on just the importance of knowledge, but also on developing higher-order thinking skills among the students. For this reason, self-efficacy plays a vital role in improving academic performances. This is also affected by mediating variables of Higher Order Thinking Skills. This study investigate the factor influencing self-efficacy as well as to examine the effectiveness of the Higher Order Thinking Skills towards the improvement of academic performances. As a result, a model will be developed to reflect the relationships between self-efficacy and Higher Order Thinking Skills that is capable to improve academic performance.

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