MODELING THE RELATIONS OF MOTIVATIONAL VARIABLES AS EXPLANATORY FACTORS OF SCIENCE ACHIEVEMENT IN MALAYSIAN CONTEXT

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ABSTRACT

Adapting a combination of theory of epistemological beliefs, achievement goal theories, implicit theories of intelligence and theory of self-efficacy, this study examined the role of epistemological beliefs and implicit theories of intelligence in relation to students' achievement in science , mediated by achievement goals, self-efficacy and learning approach. A quantitative correlation study was designed to relate and model these factors for science achievement. The samples for the present study were 350 form four students from selected districts in Pahang, Malaysia. By using adapted questionnaires, data was collected and analyzed using SPSS and Smart PLS software. The analysis of the direct paths revealed that epistemological beliefs, self-efficacy, implicit theories of intelligence, learning approaches and goal orientation strongly affected students' achievement in science. In the second phase of the study, mediation roles were identified and the findings revealed that epistemological beliefs strongly effected science achievement via mastery performance, but the effect of avoidance goal was non-significant and negative. While considering the mediation effect of self-efficacy, results revealed that self-efficacy played partial mediation role with respect to epistemological beliefs, but no such effect was observed from implicit theories of intelligence. In learning approach, deep approach only played a partial mediation role with respect to epistemological beliefs, implicit of intelligence, performance goals and self-efficacy while surface approach played a partial mediation role to avoidance goal only. On the whole, it can be concluded that epistemological beliefs, goal orientations (both mastery and performance goals) and deep approach can be effectively employed to boost the students' science achievement and to ensure that teaching and learning of science may become more effective and excellent.

PEMODELAN HUBUNGAN ANTARA PEMBOLEH UBAH MOTIVASI SEBAGAI FAKTOR PENJELASAN PENCAPAIAN SAINS DI DALAM KONTEKS MALAYSIA

ABSTRAK

Berdasarkan kombinasi teori kepercayaan epistemology, teori kecenderungan matlamat, teori implicit kepandaian dan teori efikasi kendiri, kajian ini mengkaji peranan pengantaraan kepercayaan epistemology dan implicit kepandaian terhadap pencapaian sains pelajar, melalui pencapaian matlamat (penguasaan, prestasi dan matlamat penghindaran), efikasi kendiri dan cara pembelajaran. Kajian koleras ikuantitatif telah direkabentuk untuk mengkaji faktor-faktor tersebut. Sample kajian ini terdiri daripada 350 orang pelajar tingkatan empat di daerah-daerah terpilih di Pahang, Malaysia. Dengan menggunakan soal selidik telah disesuaian, data telah dikumpul dan dianalisis dengan perisian SPSS dan Smart PLS. Dalam fasa pertama analisa, analisa laluan langsung menunjukkan kepercayaan epistemologi, efikasi kendiri, implicit kepandaian, cara pembelajaran dan kecenderungan matlamat amat mempengaruhi pencapaian sains..Di dalam fasa kedua kajian, peranan pengantaraan telah dikenalpasti. Hasil kajian menunjukkan bahawa kepercayaan epistemologi amat mempengaruhi pencapaian sains melalui penguasaan dan prestasi tetapi kesan matlamat adalah negatif dan tidak ketara. Di samping mempertimbangkan kesan pengantaraan bagi efikasi kendiri memberi kesan ke atas kepercayaan epistemologi tetapi tiada kesan ke atas teori kepandaian teori implicit kepandaian. Didapati juga cara pembelajaran mendalam telah memainkan peranan sebagai pengantaraan bagi kepercayaan epistemologi, implicit kepandaian, efkasi kendiri, matlamat prestasi efikasi kendiri, manakala tiada pembelajaran cetek hanya berperanan ke atas penghindaraan. Secara keseluruhannya, boleh disimpulkan bahawa kepercayaan epistemologi, matlamat

kecenderungan (penguasaan dan matlamat prestasi), efikasi kendiri dan pembelajaran mendalam boleh digunapakai dengan berkesan untuk merangsang kebolehan pelajar untuk pencapaian sains dan juga untuk memastikan bahawa pengajaran dan pembelajaran menjadi lebih berkesan dan cemerlang.

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LIST OF SYMBOLS AND ABBREVIATIONS

ACH	:	Achievement
AVO	:	Avoidance Goal
β	:	Beta Value
CER	:	Certain
DEV	:	Development
EPI	:	Epistemological Beliefs
EFF	:	Self-Efficacy
IMP	:	Implicit Theories of Intelligent
JUS	:	Justification
MAS	:	Mastery Goal
PER	:	Performance
MA	:	Mastery Goal
PLS	:	Partial Least Squares
RMSEA	:	Root Mean Square Error Approximation
SE	:	Standard Estimate
SEM	:	Structure Equation Modeling
SPSS	:	Statistical Package for the Social Sciences
KMO	:	Kaiser-Meyer-Olkin
SDT	:	Self-Determination Theory

CHAPTER 1

INTRODUCTION

Introduction

Currently, the curriculum in Malaysia is emphasising on the acquisition of learning ability, inculcation of scientific attitudes, and thinking skills. In addition, the acquisition of scientific and technological knowledge and their application to the natural phenomena is also equally emphasized (Al-Emadi, 2001). In the Malaysian context, the education systems are trying to enhance the effectiveness of learning and success in studying, which have become the focus among teachers, students, policy makers, and also educational researchers (Barkur, Govindan, & Kamath, 2013). Confronting issues of academic motivation is critical for them. Teachers who design curricula aimed at increasing student interest in the subject matter they teach must also be cognisant to what motivates their students and leaves them languishing in their seats. Those who study questions such as why students succeed or fail in certain academic contexts must address motivational factors that influence how students perform in particular situations.

Since the early 1960s, research work in the psychology of motivation has focused on the factors such as individual differences in study methods, parental involvement, school facilities, belief, demographic, and intelligence variables (Al-Emadi, 2001). Recently, some researchers (Barkur et al., 2013) have also sought the antecedents to students' approaches to learning that are important for predicting the approach and outcome of learning. Educational psychologists have viewed the epistemological beliefs typically as systems of beliefs about the nature of knowledge held by students.

In recent decades, the literature supports the achievement goals, self-efficacy, achievement goal orientation, and learning strategies as contributing factors of academic success (Elliot & McGregor, 2001). The prediction and explanation of the factors that contribute to learners' academic success are important. To date, however, very few attempts are made to amalgamate these two strands of inquiry within one research and see how the variables determine the success of learning. Adopting a combination of motivation variables, the present study explored the model of the relations of motivational variables as explanatory factors of science achievement in Malaysia.

The review of related literature proposed that motivational constructs of students have important impacts on student achievement. However, there are limited studies about the relationships between motivational variables and secondary school students' science achievement in the Malaysian context. The variables in this study are epistemological beliefs, self-efficacy, students' achievement goals and learning approaches. The epistemology beliefs and achievement goal theories are the two most dominant theories of motivation in contemporary literature. However, in the Malaysian context, not many studies have examined how these constructs derived from both theories are related to Science achievement (Ong, 2014). Moreover, although there is evidence demonstrating the links between achievement goals and learning approach, very few studies have examined how the mediating processes are involved (Ong, 2014; Bakrur et al., 2013).

Background of the Study

In Malaysian tertiary education systems, transformation has been made due to an increasing awareness of the indispensability of education. In Malaysia, the Primary School Standard Curriculum has been implemented in stages since 2011 and will be fully implemented by 2016. Students in the secondary school level in Malaysia have often been reported to lack motivation and learning approaches (Habshahet al., 2013). Educators have been concerned for years about the decline in achievement and motivational beliefs of students. Although learning has become the most important issue in psychology today, it is one of the most difficult concepts to define because the importance and complexity of the paradigm shift in education is in progress concerning the way educators view students. In a period of considerable progress and at the same time of many global challenges, education means a greater emphasis on the selection of active construction of knowledge, information, creativity, critical thinking, synthesis and generalization.

Educators have concluded that learner' views about the nature of learning and knowledge may affect their reasoning modes, learning approaches and decisions when acquiring and processing information (Hofer, 2001). Thus, in general, students who are highlighting the process of knowledge construction and interpretation tend to utilize better cognitive strategies and attain higher learning outcomes than those holding more shallow views or beliefs about the nature of knowledge and the learning process. In this context, the basic pillars of any educational society are to learn to act, learn to know and also learn to live together. From this perspective, learning is understood in a broad sense, as learning about oneself, an inner journey and at the same time as the process of forming relationships with others (Barvarz, Nami& Ahmadi, 2014).

The beliefs about the ability in science are important for building science learning. In the Malaysian scenario, teachers always perceive that there is insufficient time to complete the science syllabus. The emphasis in most schools is only on passing the examinations. All these factors have led teachers to only emphasize on the memorization of facts rather than on the learning approach in science.

Literature reviews show that the relation between students' implicit theories of intelligence, their goal orientations, and also their learning approach is supported (Duperyat, 2005, Diseth, 2011). The model in many researchers' studies also reveals that there is a significant link between children's beliefs about intelligence and their self-efficacy in school subjects. This finding is congruent with the earlier studies, which discovered that students who believe that intelligence can be in developed nature are more likely to be of high self-efficacy (Dweck, 1999). This suggests that students' implicit theories of intelligence do not have a direct influence on goal orientation; it may be moderated by their self-efficacy(Phan, 2006).Studies indicate that highly efficacious students may tend to engage in more difficult tasks and use better learning approaches than low efficacy students (Bandura, 1997).For this reason, students' self-efficacy ought to be taken into account when their beliefs about intelligence, goal orientations and learning approach are examined.

The current empirical study examines the motivational variables in different theoretical frameworks and their influences on students' academic performance, epistemological beliefs; achievement goals, self-efficacy, implicit theories of intelligence and study approaches (Bandalos, Finney, &Geske, 2003; Cao & Nietfeld, 2007; Chan & Lai, 2006; Diseth, 2011; Diseth & Kobbeltvedt, 2010). Although there has been a substantial body of findings supporting the separate strands of research inquiry, very few researches if any, have explored these inquiries in totality. From this focus, the premise of this study is also based on the theoretical and empirical contention that students' socio-cultural settings may play a pivotal role in influencing the factors that are under investigation.

Problem Statement

In Malaysia, it has been found that the level of educational achievement in the subject of science is deemed somewhat less satisfactory. To realize the 2020 Vision and the National Science and Technology Policy, the Malaysian Ministry of Education (MOE) has launched a mission to ensure that the student ratio in Malaysia will be 60:40 - to represent 60% science stream and 40% arts stream students in the upper secondary school, since the year 1994 (Mok, 2008). Generally, this policy aims to encourage more science students to participate in the field of health work, engineering, science education, ICT and others science related courses. The MOE was optimistic that the ratio of 60:40 between science and arts stream students can be achieved by the year 2010 through students' early exposure towards integrated science and technology curriculum. However, it is found that up to now, in most of the schools in Malaysia, the number of students pursuing science subjects is still far behind the targeted figure. Most of the schools can only provide less than 40% science students compared to arts students. At the tertiary level, a study also showed that the percentage of graduates produced by universities is only 32.4 of the targeted 60% (Utusan Malaysia, 2009).

In an era when science and technology play an ever-increasing role in lives and our nation's economy as our world pushes new frontiers in the digital revolution, Malaysian youth's interest in these fields are declining. Increasingly more of students have opted out of pursuing STEM (Science, Technology, Engineering and Mathematics) fields on secondary and tertiary school levels as recently reported by the Science and Technology Human Capital Report and Science Outlook 2015 by Akademi Science Malaysia. Based on these reports, Malaysia may soon experience a serious human capital shortage in the science field if the number of students enrolled in STEM courses does not meet up its annual expected standards, which is at 270,000 per year or 60% of the national annual cohort favouring STEM subjects. As of now, there are only 90,000 science streamed students sitting for the Sijil Pelajaran Malaysia (SPM) annually, much less than the targeted 270,000 out of 500,000 students enrolled in form four every year. In comparison to global economic giants like the United States, Japan, Germany and Singapore that have a solid 30% of its workforce covering the STEM fields, Malaysian falls drastically behind with only less than 3% of workforce in STEM-related fields.

If the numbers continue to drop, Malaysia may have to depend on technological expertise from imported professionals in the near future, a phenomenon that is already happening in many other fields that could potentially derail country progress to be a developed nation by 2020. Experts highlight fear of STEM subjects for being 'too difficult' and only meant to be taken by the exceptionally brilliant and being seen as a 'less glamorous' field of studies as among the most likely causes. The more general assumption is that students in the millennial generation tend to show preference for fields that will give them more immediate work results such as law, accountancy or business.

There is no denying that academic excellence in schooling is a feat for recognition and implementation (Phan, 2013). From a proactive perspective, for example, exceeding academic achievement in secondary schooling has substantial effects on individuals, such as cognitive transformation and consideration of positive future anticipations and planning of career choices, post-secondary (Dweck, 1999). A desire to achieve in motivational contexts, in this analysis, entails academic resilience and modest effort expenditure, enabling individuals to engage in deep cognitive strategies for learning. Academic achievement for success, in essence, precipitates a selection of cognitive processes that facilitate quality learning and enriched experiences.

Academic resilience, in particular, is of significance as it instils a set of characteristics that define individuals' cognition and behaviors in various learning contexts (Dweck, 1999). Dweck's (1999) theoretical overview, for instance, has yielded some crucial information pertaining to resilience in educational settings. A heightened sense of resilience, in contrast to helplessness, entails individuals to seek out challenging tasks with a view towards mastery and personal improvement. Resilient individuals tend to view effort as pivotal in the accomplishments of learning tasks. Success or failure is attributed internally to one's own effort expenditure, rather than ability or "intelligence" students.

The intricacy of the matter discussed also emphasizes, similarly, other negative lasting outcomes, such as a weakened sense of self-esteem and self-concept (Phan, 2013). Cognizant of this potency, focus on individuals' self-image and worthiness and their sense of livelihood for both short-term and long-term outcomes. There is a continuous motive and need for individuals to experience contentment, satisfaction, accomplishment, etc. Students' achievement in schooling is more than just a prediction and enhancement of one's own aspirations for the future. Rather, success and enriched learning experiences serve to assist and sustain one's self-concept.

From the aforementioned emphases, it is important for educator to consider policies, strategies, and innovations that could, in turn, encourage and facilitate positive learning science experiences. Again, similar to previous mentioning, there is substantial research to advocate for the use of theoretical tenets to promote and enhance equality learning in science achievement contexts (Phan, 2013). The structuring of the classroom social milieu, instilling a mastery goal structure (e.g., emphasis on personal growth of skills), for example, has been considered and noted by a number of scholars and educators (Urdan, 2006). In this analysis, utilizing a number of psychosocial facets available, it is possible for teachers and educators to emphasize the saliency of mastery and quality of science learning. Instructional policies that indicate the saliency of non-evaluative and non-competitive criteria may in still confidence and favourable perceptions about the purpose of science learning.

Students' interests as a source for engaging and motivating students to high levels of achievement. Motivation can be an antecedent to and an outcome of learning. Thus, students must be interested and motivated to learn before learning will take place and this success can lead to motivation to learn more. Sorting through those students' interests can make teachers' job a bit easier in connecting the needed science concepts and skills to the students. Addressing the affective domain can lead quite well into success in the cognitive and psychomotor domains.

Secondary school students' attitude towards science is as important as the science content and scientific skills they must learn. Research findings show that teachers who are effective at supporting learners via the affective domain are also able to show improvements in student learning and academic achievement in science. Making the science real, relevant and rigorous for young children can help them be more successful.

In the Malaysian context, a sense of competition for good results and grades is felt at all levels of education to various degrees. A reason for that is that grades usually are part of what determines entrance into the next level of education or into attractive programs with limited access, or into good universities. A general claim is that students aiming for good grades design their study activities to fit the exam requirements, giving less attention to the course objectives and scheduled learning activities, if these are not well aligned with what is important in order to get good exam grades. Kvale (1980) found that "grade behavior" made students in high schools move their self-image towards grade identification, shifting motivation towards focus on rewards (extrinsic motivation), and adopting a surface approach to learning. This is behavior that is contrary to the educational goals expressed in policy documents, namely student independence, peer cooperation, self-development, intrinsic motivation and a deep approach to learning (Ghorban, 2007).

Although there were researches examining factors that influence science learning in Malaysia, the studies were not comprehensive. Among the aspects investigated include language influence on students' understanding (Nabilah, 2006; Loo & Sarmiento, 2005); problems with translating and analyzing texts, pictures, charts and diagrams as well as failure to come up with the right conceptions of science objects or processes (T. Subahan, 1996; Yee, 1998); difficulty arising from complexity of terminology and its ideological or technological nature (Mohd Zakaria, 1992); inability to apply process skills (Mohammad Najib, 1999; MOE, 1998) and failure to classify, synthesize and evaluate information (MOE, 1994; MOE, 1995; MOE, 1996; MOE, 2001b). To date, however, there have been very few attempts made to study these strands of inquiry within one study and how they in totality determine the success of academic studying. Previous research has provided support for the link between goal orientations, implicit theories of intelligence and learning approach (Habibah Elias et al. (2010) However, these findings may not be peculiar to Malaysian students. Most students' beliefs about intelligence and goal orientations may also be moderated by self-efficacy. Therefore, there are obvious needs to exam the relationships among motivational variables as explanatory factors of Science achievement in the Malaysian context.

Recently, analysis of the evidence to date suggests that there are two main strands of research inquiry: (1) the relations between achievement goals and study strategies (Simons et al., 2004) and (2) the relations between achievement goals, epistemological beliefs, achievement goals and study processing strategies (Phan, 2006). There is not much research at present that has attempted to explain these two lines of inquiry within one study. Such unification is important and is an additional insight into the interrelationships and mediating mechanisms amongst the main theoretical frameworks of learning as well as the antecedents of academic performance (Simons et al., 2004; Phan, 2006).

The goal orientation theory has been a major concern for various educational researches because of its influence on the performance of students (Meece & Hoyle,1988). According to goal orientation theorists, students are engaged in academic tasks to achieve their own various goals. Thus, some students strive to earn better grades in the course, some other students motivated not to expose their inability in academic tasks. Still some other students are concerned on comprehending specific content domain . Therefore, according to Bandalos & Geske (2003) goal orientations are classified in to two: Master goals and performance goals. Mastery goals are goals that help students to master specific content domains and encourage them to focus on tasks at hand. They help students to improve their knowledge about something. Thus, student who have mastery goal orientation focus on mastering the task irrespective of comparison with others. Mastery goal oriented students spent longer time working on difficult or challenging tasks. They are also attributing their accomplishment and failure to factors that are internal to them. However, performance goals focus on better performance comparing with others. Unlike mastery goals, performance goal orientated students attribute their success and failure to factors external to them. Previous studies conducted on the relationship between level of goal orientations and academic achievement revealed that level of goal orientations are associated with academic achievement. (Walker & Mansell, 2006, Ames, 1992; Anderman et al., 1994; Dweck et al., 1988; Nicholls, 1984a; Pintrich et al., 1996; Urdan et al., 1995). Moreover Dweck (1988)showed that unlike performance goals, mastery goal orientations predict students' academic achievement. However in their conditional finding, , Ames (1992) showed that goal orientation predicts achievement when the goal is Vague. Besides, they further report that performance goal orientation makes the correlation between goal orientation and achievement weak.

Academic self-efficacy is also another factor that may affect students' academic achievement. Bartels, Magun-Jackson, and Ryan's (2010) defined academic self-efficacy as "the belief in one's capability to organize and execute courses of actions required to produce given attainments." Like the other factors that may affect academic achievement, academic self-efficacy is correlated with academic achievement. For example Vancouver and his colleagues (Vancouver & Kendall, 2006; Vancouver et al., 2008) disclosed that academic self-efficacy influence students efforts, choices and academic achievement. To the understanding of the researchers, although in the past several studies were conducted on domain specific self-efficacy like mathematics self-efficacy, very few studies have been conducted on general self-efficacy In this regard, students who have high general self-efficacy tend to obtain better grades in school activities. (Vancouver, Thompson, and Williams, 2001) However, as to the knowledge of the researchers, so far in Ethiopia, there is no any local studies conducted on the inter correlation between gender, level of goal orientation, general academic self-efficacy and academic achievement though each of the variables have been correlated by various researchers with other variables. Thus, studying the relationship between these variable is important to improve students' achievement.

This study will also emphasize the critical roles in influencing learning approach. It will provide a set of principles for meaningful and effective learning experiences in learning Science. While this study is exploratory, it is guided by previously published literature that has indicated that epistemology and self-efficacy are linearly related to student achievement (Bandura & Cervon, 1983; Braten & Strømsø, 2004). It would be interesting to determine how they function as independent variables in a multiple regression setting. Despite the connections between epistemology and academic achievement, there has been no published research to examine them in a multiple regression setting (Callahan& Fowler, 2013; Chai & Wong, 2010). This research may extend upon the scientific knowledge in literature.

There is credence, as researcher indicated previously, for the study of theoretical and practical approaches that could assist in the building of a better nation. This avenue of inquiry and development is an ambitious undertaking, entailing theoretical visions and proposals for continuing research development. That's a need to consider how educational psychology theories could transform into effective practices for both educators and teachers to implement for effective learning in science achievement. Psychology theory, social cognition (Bandura, 1986) and its related theoretical tenet, personal self-efficacy (Bandura, 1997), is quite effective in its explanatory power to explain human cognition and behavior. Based on these findings, this study has to refine and extend the model of motivational variables as explanatory factors of Science achievement in the Malaysian context.

Research objectives

1. To examine whether epistemological beliefs, self-efficacy, implicit intelligence, and learning approach are related to students' science achievement.
2. To examine whether goal orientations play a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement.
3. To examine whether self-efficacy plays a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement.
4. To examine whether learning approach plays a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement.
5. To examine whether learning approach plays a mediating role between goal orientation and science achievement.
6. To examine whether learning approach plays a mediating role between self - efficacy and science achievement.

The present study also aimed to find out whether students' achievement goals contribute to the prediction of dimensions of learning approaches. A review on the research of achievement goals has indicated that students who employ achievement goals are more likely to obtain a better academic achievement (Dweck & Legget, 1988;

Duperyat & Marine, 2005). Not many studies have been conducted to examine the Malaysian students' learning approaches (for an exception, see Habshah Ismail et al., 2013). The present study, therefore, aimed to investigate Malaysian students' learning approaches in managing their science learning.

Research Questions

The following research questions and hypothesis assess whether there are any relationships between the predictor variables to the achievement in science.

1. Are epistemological beliefs, self-efficacy, implicit theories of intelligence, and learning approach related to students' science achievement?
2. Does goal orientation play a mediating role between epistemological Beliefs, implicit theories of intelligence, and science achievement?
3. Does self-efficacy play a mediating role between epistemological beliefs, Implicit of theories intelligence, and science achievement?
4. Does learning approach play a mediating role between the implicit theories of Intelligence, epistemological beliefs, and science achievement?
5. Does the learning approach play a mediating role between goal orientation and science achievement?
6. Does the learning approach play a mediating role between self-efficacy and science achievement?

Hypothesis of the Study

The following hypotheses were designed for statistical purposes:

H_1 The epistemological beliefs, self-efficacy, implicit theories intelligence, and learning approach are related to students' science achievement.

H_2 The goal orientations play a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement.

H_3 The self-efficacy plays a mediating role between epistemological beliefs, implicit theories of intelligence and science achievement.

H_4 The learning approach plays a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement.

H_5 The learning approach plays a mediating role between goal orientation and science achievement.

H_6 The learning approach plays a mediating role between self-efficacy and science achievement?

Rationale for the Study

Generally, the rationale of this study is to examine a meditational model to see if epistemological beliefs, self-efficacy, implicit theories of intelligence and learning approach are related to students' science achievement, mediated by achievement goals (mastery, performance-approach, and performance-avoidance) and learning approach. Different specific pathways will be used to test the model. Based on epistemological beliefs theories, implicit theories of intelligence and achievement goals theory, this model will be tested on students.

By profiling individual students' beliefs and learning approach ability to learning science, educators will become more aware of the students' attitude, perception and ability towards science and science learning. Drawing on the students' profile, the teachers on a personal level, or the school on a more general ground, could come up with appropriate intervention strategies to address specific problems in aspects the students are found lacking. These include the provision of specific guidance or help such as alternative pedagogical approaches that will complement their existing learning strategies and learning styles, change of perception towards individual ability and attitude in science learning. Finally, relevant aspects pertaining to factors influencing science learning outcomes could and should be incorporated into the curriculum and when developing textbooks.

A review of research on achievement goals has indicated that students who employ achievement goals are more likely to obtain better academic achievement (eg. Dweck & Legget, 1988; Duperyat and Marine 1988). Hence, this study aims to highlight two pertinent points relating to science education in Malaysia; first, identifying aspects underlying students' motivation to learning science, and second, outlining the profile of performance indicators leading towards successful science learning among secondary students in Malaysia. It is acknowledged that good science learning outcome does not only rely on the way teaching is carried out but also on other factors such as students' ability and talent, language proficiency, and the right attitude towards science learning, just to name a few. However, to know little of the extent to which these factors will contribute towards students' successful science learning. Information pertaining to these factors is therefore used to develop a comprehensive yet psychometrically sound inventory that will help assess students' potential to excel in science.

Significance of the Study

Since 28th February 1991, during the launching of the Malaysian Trade Council, the Prime Minister in his paperwork entitled 'Malaysia: Step Forward' has emphasized the nine challenges in Vision 2020. One of the challenges is to create a society which thinks ahead, has science competency and is progressive and innovative. This society is also expected to use modern technologies as well as to contribute to future civilization and new inventions. Malaysia is now stepping forward towards becoming a developed country in the year 2020. In today's world, a country's power of competition with other countries is determined by its development and achievement in Science and Technology. As a developing country, we need more expertise in both fields. On top of that, Science is one of the most essential subjects in secondary schools. The knowledge embedded in this subject is vital to every individual. That is why in the curriculum plans in Malaysian schools, this subject is placed as the top most priority. Until now, students still have the perception that Science is the most difficult subject. This is proven by the students' lack of confidence in their Science answers. They constantly seek for confirmation on their answers from teachers and parents. Therefore, a student's motivation is vital for more effective learning. The study is aimed to identify modelling the relations of motivational variables in students' achievement in Science in Malaysian secondary schools.

For the past twenty years, most research in Malaysia examined factors influencing science learning focused primarily on the cognitive domain, particularly investigations on conceptual understanding, and misconceptions held, of science concepts. However, in more recent years, attention has been paid on how students' affective, social and value domains (Habshah et al., 2013; Barvarz et al., 2013) affect their science learning outcomes.

Studies on the performance indicators in science education through the development of questionnaires is of significant importance (Liu & Treagust, 2005). There is a complex interaction of a large set of variables and processes in the study of science education improvement. Malaysia should learn from international studies by examining which effective factors are important in the local cultural contexts. Hulpia and Valcke (2004) categorized a basic set of process variables relating to school improvement in terms of performance indicators into meso (i.e.: assessment and evaluation, parental support, and internal and external support and pressure) and micro (i.e.: opportunity to learn and achievement orientation) aspects that may be of influence towards improvement in science learning in general. Tuan et al. (2005), on the other hand, looked into both cognitive and affective components to cognition that affect students' motivation towards science learning. According to them, students' motivation towards science learning may be influenced by factors listed under six scales, namely: self-efficacy, active learning strategies, science learning values, performance goals, achievement goals, and learning environment stimulation.

Due to broad and varying factors, this study complements the research field with student specific models of learning science effectiveness. The main focus of this study is to build a model to understand the factors influencing Malaysian students' learning motivation in science via identification and development of the profile of good science students regardless of the way science teaching is carried-out. This premise is important because good science students are believed to have some kind of personal quality which makes them better in their performance regardless of who their teachers are, where their schools are and how they are taught.

With the study investigating various variables contributing towards science achievement, the understanding of how those variables influence the students' performance will help identify students with the aptitude to excel in science. This study also allows science teachers and policy makers in science education to extend appropriate guidance, activities and any other support needed to further nurture the students' science learning. It will contribute to our understanding of student motivation in a number of ways.

Moreover, researchers, educators, and institutions are interested in the predictive factors that support students' retention and academic success. Literature has provided evidence that epistemological beliefs, achievement goal orientation, and learning strategies, as predictors of academic success, are contributing factors of academic success (Elliot & Harackiewicz, 1996; Harackiewicz, Barron, & Elliot, 1998; Meece, Blumenfeld, & Hoyle, 1988). The salient predictor components may be incorporated into course designs to increase the current less than optimal retention and performance rates. This study provides empirical evidence, adds to scientific knowledge and expands upon the literature.

Definition of Operational Variables

The following definitions are drawn from a number of models and theories, which are discussed in detail in Chapter II.

Epistemological Beliefs. Epistemological beliefs are beliefs about the nature of knowledge and learning. In this study it is defined into four categories: source, justification, certainty and development. Source and justification reflect beliefs about the nature of knowing. Certainty and development involve the nature of knowledge (Hofer, 2001). In particular, certainty of knowledge describes the perceived stability and strength of supporting evidence. Development is concerned with beliefs that regard science as an evolving subject and that ideas and theories can change on the basis of new evidence (Conley et al., 2004). Nature of knowing, however, comprises source of knowledge and justification. Source of knowledge focuses on whether knowledge resides internally or externally. Justification explains how individuals evaluate and justify knowledge (Conley et al. 2004).

Achievement Goals Orientation. "Achievement goals" stands for a comprehensive semantic system of situations or contexts which have cognitive, emotional, and behavioral outcomes and learners use them to interpret their performances (Dweck & Legget, 1988; Kaplan & Midgley, 1999).

In this study, the concept of achievement goals refers to the desired outcomes in achievement situations, either a performance goal or a learning goal. It generally denotes the students' reasons for doing tasks (Braten & Stromso, 2004). Recently, Elliot et al. (Elliot & Church, 1997; Elliot & Harachkiewicz, 1996) has proposed this three dimensional framework of achievement goals.

Mastery-oriented goals. In terms of a focus on learning, it is mastering the task according to self-set standards or self-improvement. It also encompasses developing new skills, improving or developing competence, trying to accomplish something challenging and trying to gain an understanding or insight. Students oriented towards mastery are focused on what he or she learns as well as its application (Braten & Stromso, 2004).

Performance-oriented goals. It represents a focus on demonstrating competence or ability and how ability will be judged relative to others. "This goal is about winning positive judgments of your competence and avoiding negative ones" (Dweck, 1999, p. 15). Students oriented towards performance concentrate more on their performance in assessments by trying to do better than their fellow mates, rather than developing their skills. These students' focus will be on their class ranking or grades. For example, trying to surpass normative performance standards, attempting to best others, using casual comparative standards or striving to be the best in a group or even avoiding judgments of low ability or appearing dumb are examples of performance-oriented goals (Willfield & Eceels, 2002).

Avoidance-oriented goals. It refers to goals in which individuals can be negatively motivated to try to avoid negative possibility, such as failure and to avoid looking incompetent. It represents the withdrawal from activities or avoidance of negative implications and consequence. The focus of students with work avoidance goal orientation is to complete the task at hand with as little work as possible. Hence, failure is avoided, exerting a min minimum of hard work (Dweck, 1999).

Learning Approach. Learning approach is based on Entwistle and Tait's (1995) Approaches to Studying Inventory (ASI). Research involving learning approach focuses on two types – surface processing and deep processing (Dupeyrat& Marine´, 2005.) which describe the qualitative differences in students' processing of information in learning. Deep processors use elaborative processing or critical thinking skills. Students may adopt a deep approach to learning with an intention to understand the researchers' meaning and linking it to their prior knowledge and personal experience (Phan, 2006; Phan, 2007). Students who take a deep approach have the intention of understanding, engaging with, operating in and valuing the subject. They actively seek to understand the material or the subject. They interact vigorously with the content and make use of evidence, inquiry and evaluation. They take a broad view and relate ideas to one another. Most of them are motivated by interest, so they easily relate new ideas to previous knowledge. They also relate concepts to everyday experience. They tend to read and study beyond the course requirement (Clayton, Blumberg &Auld, 2010).

In this study, there are two types of approaches to studying: deep approach and surface. In this study, deep approach will refer to seeking meaning, relating ideas, use of evidence and interest in ideas, while surface approach refers to developed lack of purpose, unrelated memorizing, syllabus bluntness, and fear of failure (Phan, 2006).

Self-efficacy. Self-efficacy is broadly used throughout this dissertation to refer to academic self-efficacy. In this study, self-efficacy refers to the learners' belief in their competency to call upon the required cognitive, motivational, and behavioral resources to perform a learning task (Bandura, 2006)

Implicit Theories of Intelligence. It describes a series of empirically-based studies that investigate how people develop beliefs about themselves (i.e., self-theories) and how these self-theories create their psychological worlds, shaping thoughts, feelings and behaviors. The theories reveal why some students are motivated to work harder, and why others fall into patterns of helplessness and are self-defeating. Dweck's conclusions explore the implications for the concept of self-esteem, suggesting a rethinking of its role in motivation, and the conditions that foster it. In this study, students carry two types of views on ability/intelligence:

Incremental ability. Individuals hold an incremental theory of their intelligence; they tend to orient more towards learning goals and the goal of increasing their ability. That is, when an important personal attribute is seen as a potential that can be cultivated, there is less emphasis on showing it off (or protecting it) and more emphasis on cultivating it through effort. As such, people holding an incremental theory (incremental theorists) may focus on effort, which they can invest in to increase their ability. When faced with failures, these individuals may be more mastery-oriented, looking for ways to improve their ability and performance, such as exerting more effort or engaging in remedial actions (Murphy&Dweck, 2010).

In this study, it refers to the intelligence that is not a fixed trait that students simply possess, but something they can cultivate through learning.

Entity ability. Individuals maintain an entity belief referred to as the fixed belief of intelligence. In step with his view, intelligence is a trait that is decided upon at birth; people may have high abilities in one area and low abilities in another, and there is nothing they can do to change that (Dweck, 1999; Dweck&Legget, 1988). When having an entity view of intelligence， it makes students more likely to look to ability and fixed traits for explanations of intelligence, they may still maintain a view that effort can lead to a small increase in ability Dweck, 1999; Mueller & Dweck, 1998). Therefore, retraining attribution can temporarily shift the focus for the causes of intelligence to become either dominated by effort or ability inferences. Despite the malleability of implicit theories of intelligence, they become stable in grade school and continue to stabilize on to adulthood (Robins & Pals, 2002)

Science achievement. Form four inventory Science midyear examination by Educational Department for the whole district of Pahang was used to measure the Science achievement for this study.

Summary

Chapter one begins with an introduction to the thesis and outlines its objectives. After that, the chapter provides background information about the context of the Malaysia education system. Then, the chapter continues with an introduction to the theories and an explanation of the variables in the study. Finally, it explains the significance and limitations of the study.

In the following chapter, reviews of literature on theoretical framework such as implicit theories of ability, epistemology beliefs about the nature of science, self-efficacy, achievement goal orientations, and learning approaches will be discussed. It also provides an overview of the literature on motivation constructs.

CHAPTER 2

LITERATURE REVIEW

Introduction

The general purpose of the study was to investigate the relations of motivation variables as explanatory factors of science achievement in the Malaysian Context. This chapter provides an overview of the theoretical framework employed for the study. The following section discusses the theoretical foundation for the current study. It divided into two parts consist of several theories and reviews of literature to guide in the study. The first elaborates the important relevant concepts and theories of motivational include theory of social-cognitive model of motivation, theory of attribution, theory of expectancy value, self-determination theory. The following part elaborates theory of motivation variables in this study include epistemological beliefs, implicit theories of intelligence, achievement goal theory, theory of self-efficacy, theory of learning approach and science achievement and motivation. Based on these theories and capitalizing on interaction, the role of mediational relationships in educational psychology along with different procedures of testing mediational relationships was also presented. The discussion consists of elaboration of models in determining the understanding and outline the theoretical framework of the research.

Theoretical Framework

Figure 1.1 displays a theoretical model depicting the relation between students' motivational variables (epistemological beliefs, implicit theories of intelligence, achievement goal, self-efficacy and learning approach) and science achievement to be tested in this study. The model shows that students' goal orientation (master, performance and avoid) and self-efficacy partially mediate the relation between their epistemological beliefs and implicit theories of intelligence, on one side, and learning approach (deep and surface) and science achievement, on the other. The latter variables, in turn, are hypothesized to directly predict students' science achievement.

In line with consistent previous findings documented in the literature (Schunk et al., 2008), students' motivation variables (epistemological beliefs, implicit theories of intelligence, achievement goal, self-efficacy) were expected to lead to the use of learning approach and to predict their science achievement. In addition, researcher included students' science achievement to control its effect on the hypothesized relationships among variables in the model. Using structural equation modelling (SEM), researcher assessed how well this hypothesized model fits the data from a representative sample of form four students in the context of learning science. This study is the first one that simultaneously tested the relational pattern of the abovementioned variables using an SEM.

Researcher believe the present investigation would advance their understanding of secondary student motivation in a number of ways. First, the study would provide a test of the theoretical model combining variables derided from the expectancy-value theory and the achievement goal theory. Second, the study would provide evidence for the adaptive or maladaptive patterns of a performance-approach goal in relation to learning approach. Third, the study would provide evidence of the applicability of motivational constructs based on the theories largely developed in Western outcomes to an Asian culture. This is related to questions whether the variables relations commonly found in North American students could be replicated among a representative sample of form four Malaysian students. This is in line with what has been suggested by achievement goal theorists (e.g., Pintrich, 2003) to expand the applicability of the theory with students in different sociocultural and educational contexts. Finally, while many of the published studies examined the relations of epistemological beliefs, implicit theories of intelligence, achievement goal, self-efficacy, learning approach and achievement, the present study would enhance researchers' understanding of motivation for science achievement among students who are demanded to be bilingual by their societal and educational systems in Malaysian context.

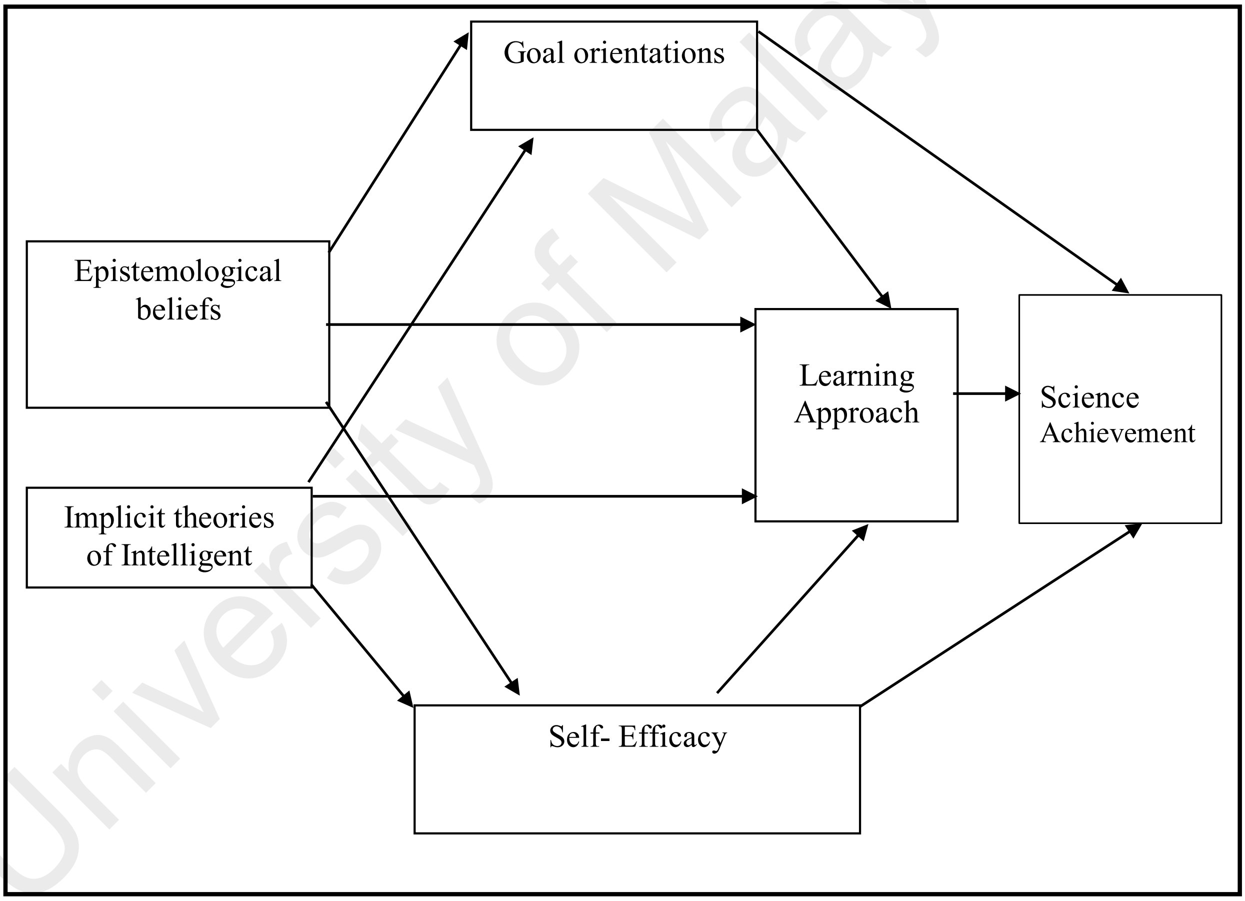

Figure 2.1
A theoretical model depicting the relations between motivational variables and science achievement.

Theory of Motivation

A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated. Most everyone who works or plays with others is, accordingly, concerned with motivation, facing the question of how much motivation those others, or oneself, has for a task, and practitioners of all types face the perennial task of fostering more versus less motivation in those around them. Most theories of motivation reflect these concerns by viewing motivation as a unitary phenomenon, one that varies from very little motivation to act to a great deal of it.

Yet, even brief reflection suggests that motivation is hardly a unitary phenomenon. People have not only different amounts, but also different kinds of motivation. That is, they vary not only in level of motivation, but also in the orientation of that motivation. Orientation of motivation concerns the underlying attitudes and goals that give rise to action—that is, it concerns the why of actions. As an example, a student can be highly motivated to do homework out of curiosity and interest or, alternatively, because he or she wants to procure the approval of a teacher or parent. A student could be motivated to learn a new set of skills because he or she understands their potential utility or value or because learning the skills will yield a good grade and the privileges a good grade affords. In these examples the amount of motivation does not necessarily vary, but the nature and focus of the motivation being evidenced certainly does.

There is credence, as researcher indicated previously, for the study of theoretical and practical approaches that could assist in the building of a better nation. This avenue of inquiry and development is an ambitious undertaking, entailing theoretical visions and proposals for continuing research development. That's a need to consider how educational psychology theories could transform into effective practices for both educators and teachers to implement for effective learning in science achievement. Psychology theory like social cognition (Bandura, 1986) and its related theoretical tenet, personal self-efficacy (Bandura, 1997), is quite effective in its explanatory power to explain human cognition and behaviour. There is extensive research (Bandura, 1997; Pajares & Valiance, 2000; Phan, 2013; Schunk, 1991), to date, to indicate the significance of psychology theories in science achievement in Malaysia context.

Social-Cognitive Model of Motivation. Bandura' (1986, 1997) social cognitive theory has greatly impacted educational psychology in diverse fields such as business, health, medicine, education and international affairs (Pajares, 2001). The emphasis of the social cognitive theory is that social interaction influences learners' cognitive and affective development, which support individual cognition for academic success (Bandura, 1987) Bandura social cognitive theory provides the self-efficacy and metacognition potential factors of learners' academic success in the current study. Bandura's (1987) model of human functioning with self-regulatory factors has been the central role of learning that has been confirmed by educational researchers for over two decades (Usher & Pajares, 2008; Zimmerman, 2002). Bandura's (1987) model explains how humans function. Agency or being an agent in the learning context refers to how students' intentional and proactive actions enable them to control their own academic development through three modes of agency. These three agency modes are: (a) personal, (b) proxy, and (c) collective. In the context of educational psychology, personal agency refers to learner control; proxy agency refers to social modeling; and collective agency refers to collaborative learning. These three modes of agency are closely examined to increase understanding of how they influence students' success.

Bandura's (1987) notion of reciprocal determinism in the context of learning relates to the cognition, behavior, and environment as equal and interdependent factors.

Human behavior is influenced by the environment and behavior impacts the environment; therefore, human behavior is also subject to the behaviorist's internal cognition. Bandura (1987) generalizes two major types of factors that determine human behavior, which are the advance of decision of behavior and result of the decision of behavior. In the context of student learning, reciprocal determinism relates to the internal and external factors related to the students' time, effort, resources, and interactions with others and the outcome of these factors (Bandura, 2002). Bandura's (2006) key component of successful learning is self-efficacy, which refers to learners' confidence in their ability to call upon the necessary metacognitive behaviors to complete a given learning task.

The social-cognitive model of motivation is a conceptual framework originally formulated by Dweck and Legget (1988) to explain the differentiable, yet consistent patterns of academic behavior between two types of students. Much of the research on achievement and motivation in academia began with Weiner's (1985) attribution-based theory of motivation. Wiener found consistent trends in behavior, depending on whether students had internal or external locus of control (Weiner, 2010). The group of students with the lowest achievement tended to attribute failures to stable, internal events, like ability or intelligence , and attribute successes to unstable, external events (e.g., good luck). It was as if these students felt helpless in controlling their academic fate. In contrast, the group of students with the highest achievement would instead attribute both their successes and failures to unstable, internal events such as effort and persistence. In this group of students, success and failure was completely within their control.

Bandura, (1977) explained self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to produce given attainment (Bandura, 1977). There is much research supporting the theory self-efficacy as the cognitive factor that plays an important role in both motivation and performance. As Bandura, 1977 there are many research studies employing the concept of self-efficacy in educational field. A study (Weiner, 2010) have suggested that there was a direct causal relationship between English teachers' perceptions of their self-efficacy and their adoption of motivational strategies. The results also showed that teachers' self-efficacy significantly contributed to the prediction of teachers' motivational teaching behaviours and accounted for more than one third of the variance to teachers' motivational teaching behaviours. Furthermore, it is most interesting to note that teachers' self-efficacy significantly contributed to the prediction of teachers' motivational teaching behaviours as discovered by Weiner (2010). These studies have used self-efficacy as the variable in predicting teacher behaviour and commitment in their daily task.

The social-cognitive model integrates academic goals, either performance - judgment goals or learning-development goals, to strengthen the causal link between attributions and fear of failure (Weiner, 2010). In which students with both low and high achievement are paralyzed from fear that a bad score on a test signifies low personal worth or competence.

Dweck's (1988) social-cognitive model of motivation builds on Weiner' (2010) attribution-based theory of motivation. That is, academic motivation is based on the attributions of failures and successes, and then incorporating the stability of these causes. However, the social-cognitive model goes further by linking the attribution to the subsequent pursuit of academic goals and responses to failures that students face. Specifically, Dweck took the attribution framework and combined it with her earlier research on learned helplessness and a concept known as fear of failure, in which students with both low and high achievement are paralyzed from fear that a bad score on a test signifies low personal worth or competence.

Based on the traditional perspective of motivation, it includes two main categories—extrinsic and intrinsic motivation. Extrinsic motivation occurs when external factors (e.g., parental expectations) stimulate a learner's behavior. Intrinsic motivation occurs when a learner finds motivation for his or her own sake. Intrinsic motivation occurs naturally in a learner's mind; thus it is the core factor that drives a learner's self-efficacy and self-regulation (Ryan & Deci, 1997). In addition to intrinsic motivation, a learner's goals, values, self-efficacy, and self-determination have been studied in the field of motivation research (Pintrich, 2003). Students show different levels of motivation according to their goals and their tendency to approach or avoid goals (Elliot, 2001). Students' pursuit of certain goals is associated with their perceived value.

Ability conceptions' distinctive feature is how students define ability and whether it is changeable or unchangeable (Dweck, 2002). Students adopting a particular conception of ability can greatly impact their perceived competence or self-efficacy beliefs, which then mediates the effects of ability conceptions on motivational patterns and achievement outcomes (Dweck, 2002; Jourden et al., 1991). When students' expectation is to do well at a task, the motivation to put forth effort and persist is often there.

That which plays a central role in intrinsic motivation is then perceived competence (Bandura, 1986; Deci & Ryan, 1985; Harachiewicz & Elliot, 1993). Generally, engagement in an activity for pleasure and enjoyment, or as an end in itself is what follows intrinsic motivation (Deci, 1975; Deci & Ryan, 1985). It is clearly evidenced that intrinsic motivation gives rise to adaptive cognitive, affective, and behavioral consequences. A student's competence or efficacy beliefs fosters the development of his or her intrinsic interest and enjoyment in an activity (Bandura, 1997). Recently, researchers have attempted to link the ability conceptions and intrinsic motivation literatures based on these interrelationships between ability conceptions, perceived competency, and intrinsic motivation, (Jourden et al., 1991).

Classroom literature that is available has indicated that when students possess incremental dispositions they are more intrinsically motivated than those with entity dispositions, and in situations where incremental ability conceptions are emphasized, it is able to encourage intrinsic motivation (Dweck, 1999, 2002)., Two studies from a situational perspective in the physical domain have investigated how ability conceptions affect intrinsic motivation (Jourden et al., 1991). The findings from these two studies were consistent with the classroom research, thereby signifying that individuals in a manipulated incremental environment were more intrinsically motivated as opposed to those in an entity environment.

These studies are consistent with the classroom literature and forms the framework for future research. The suggestion is that subsequent studies use settings that allows opportunities for social comparisons and interactions and avoids using a one-item question to measure participants' intrinsic motivation to explore the effects of situational ability conceptions on students' motivational and behavioural consequences. Researchers should take dispositional ability conceptions into consideration when studying the effect of situational cues, because dispositional ability conceptions play an important role in mediating individuals' motivational patterns and outcomes (Dweck, 1999, 2002). Alternatively, the findings may be misleading as it is unclear whether it is the learning environment, the dispositional ability conceptions, or the interaction of learning situations and dispositional ability conceptions that actually affect individuals' motivation and behaviour.

With the concept that perceived competence is at the heart of intrinsic motivation and regulates the effect of ability conceptions on motivational patterns and outcome, it is plausible that intrinsic motivation may regulate the effects of ability conceptions on motivational patterns and performance. Latest research, however, has either investigated ability conceptions and intrinsic motivation in isolation, or merely compared these two constructs. Consequently, a more complete understanding of achievement behaviours in the physical domains is assured with the presence of a reciprocal perspective that examines how the two variables interact to affect motivational patterns and performance.

In summary, Dweck and Legget (1988) described their social-cognitive model of motivation as the way “personality variables can translate into dynamic motivational processes to produce major patterns of cognition, affect, and behavior” (p. 271). So far, the research on this model has focused mostly on patterns of behavior, largely ignoring the major patterns of either cognition or affect. In the present study, affects such as self -efficacy has been explored as mediator linking the motivational variables to measurements of performance.

Theory of Attribution. Attribution theory which originated with Julian Rotter and Fritz Heider’s work has been further promoted by Wiener over the last thirty years (Weiner, 2010). Attribution theory as a social cognitive theory of motivation, strives to explain how their current and future motivation and success determines an individual’s perceived reasons for past success and failure. (Weiner, 2010). There are four causal attributions that support this theory: ability, effort, task difficulty, and luck. Each is characterized as stable or unstable, internal or external, and controllable or uncontrollable (Weiner, 2010). Causal attributions refer to the perceived reasons for success and failure in the study of motivation for achievement. (Weiner, 2010). For example, causes such as insufficient effort, lack of ability or bad luck may be attributed to a student’s poor grades. When individuals tend to consistently make particular kinds of causal attributions over time, it is referred to as attribution style (Metalsky & Abramson, 1981). For example, habitually giving credit to hard work for success and attributing failure to a lack of effort is a self-enhancing attribution style. In attribution theory, these are two different variables and the preferred way of discussing them is as locus and control rather than locus of control (Weiner, 2000). Attribution style allows for a very concise overview of attribution theory to explain basic ideas about the role of causal attribution in motivation.

Originating with Julian (Weiner, 2010), attribution theory is one of a few cognitive theories of motivation (typically grouped along with goal orientation, expectancy X value theory, and self-efficacy theory) which seeks to explain how an individual's perceived reasons for past success and failure contribute to their current and future motivation and success. The extent to which a person tends to use the same combination of these causes over time is known as attribution style. "Self-enhancing," attribution styles are more motivational than "self-defeating" attribution styles. Natta, Epperson, & Waggoner (1999) explain that it is self-enhancing to attribute the causes of one's successes to internal and stable factors and the causes of one's failures to external and unstable factors. This mode of thinking allows one to incorporate positive outcomes into one's self-concept but simultaneously exclude the integration of negative outcomes. As such, the best attribution style appears to be attributing success to one's abilities and failure to an external, uncontrollable factor such as luck. However, this style turns out to be controversial because, as Covington and Omelich (1979) explain, some people perceive that a lack of natural ability is implied when effort is expended in order to achieve. When a person doubts his or her abilities, he may choose not to expend effort, because that would exhibit to others a lack of real ability.

In early research, achievement motivation was referred to as a person's efforts to strive for task success, persist when facing difficulty, acquire better performance than others, and take pride in practicing excellence. in order to understand the complex interaction of motivational variables and establish the conditions that can heighten individuals' motivation. A vast number of theories on achievement motivation has been established over the last two decades. Research has indicated that it is unlikely that a single theory or set of related constructs can provide a complete explanation, as an individuals' achievement motivation is a complex process involving many factors that interact to affect behavior. (Pintrich, 2003). Studies which combine two or more theories with sets of defining characteristics that differ may allow for a more unabridged picture of a person's achievement motivation (Wigfield & Eccles, 1992).

As intrinsic motivation and competence beliefs are correlational and both interact to affect individuals' achievement motivation and behaviors, measures are identified to create conducive learning environments wherein students will be actively involved in physical activities and assume lifestyles which are physically active.

Conceptions of ability, achievement goals, attributions, self-efficacy, and intrinsic motivation are among the modern motivational theories that have been identified as essential and vital constructs which directly or indirectly affect individuals' achievement motivational patterns and outcomes. The way that individuals judge and interpret ability is one of several common threads that run through these major motivational theories.

Multiple research endeavours have been carried out to understand the cognitive processes and motivational variables which influence students' learning within school settings (Dweck & Elliott, 1983). It is undeniable that there are many factors that affect a student's performance or achievement in school, namely, ability, amount of effort expended, level of task difficulty, in addition to the amount of assistance received from others.

Attribution alludes to individuals' interpretation of the reason for their outcomes (Weiner, 1985, 1986). Over the last 3 decades, attribution theory, which is a dominant theory of motivation, has focused on the process in which people determine the reasons for success and failure within contexts of achievement. (Graham, 1991). In achievement contexts, typically identified as the most important achievement attributions, such as ability, effort, task difficulty and luck, are categorized into three causal dimensions: locus of control, stability, and controllability (Eccles & Wigfield, 2002; Weiner, 1992). The locus of control dimension comprises two poles: internal versus external locus of control. The focus of stability dimension is whether causes change over time or not. Controllability differentiates between causes that are out of a person's control from causes that can be controlled. For example, ability is defined as stable and internal while effort is unstable and an internal cause; moreover, skill/efficacy pertains to causes that can be controlled, whereas factors such as mood, hindrance from others, and luck are alluded to causes that one cannot control.

In Hong et al.'s study (1999), students having incremental views of ability tend to attribute outcomes to effort as compared to those holding entity views when given negative feedback. Strong ability attributions were, however, made by both entity and incremental theorists. The researchers provide the explanation for the inconsistency, that is, entity and incremental theorists might define ability in different ways.

The argument brought forth by Weiner (2010) is that individuals' interpretations of the cause of achievement outcome determine their subsequent strivings for achievement. The motivational consequences of causal ascriptions have been related to the underlying properties of the stability dimension of causality (Weiner, 1992). Relatively stable variables such as lack of ability ascribed for failures, is linked with maladaptive motivational patterns such as expectations of continued failure leading to feelings of hopelessness and performance decrements in future attempts. When one attributes failures to more malleable variables like lack of effort, the individual is then more certain to maintain positive affect toward the task, value effort, and continue to exhibit a positive prognosis for his or her performance after failure. The locus of control dimension is mostly associated with affective reactions. When individuals attribute success to an internal cause they tend to feel pride while possessing a high level of self-esteem. Contrarily, those attributing success to an external cause are likely to increase their gratitude. Failure attributed to an internal cause is related to shame, whereas attributing it to an external cause is related to anger (Eccles & Wigfield, 2002; Graham, 1991; Weiner, 1992).

Researchers have investigated the relations between conceptions of ability and attributions and the reason for this is that beliefs about ability are crucial for attribution theory (Eccles &Wigfield, 2002),. A load of evidence invariably suggests that implicit theories of ability brings about a motivational basis that directs the individual's striving prior to an outcome and sets up a meaning system for the formulations of attributions (Hong, Chiu, Dweck, Lin, & Wan, 1999). In a hypothetical analysis of individuals holding an entity conception of ability, they are more likely to use normative information and explain their failure or success within the context of ability.

Theory of Expectancy-Value. Expectancy-value theory of motivation, is a theory developed and researched by Eccles, Wigfield, and their colleagues. The theory explains value judgments and self-efficacy (i.e., belief in one's abilities) play a central role in motivation. Self-efficacy positively correlated to students' level of motivation and achievement. According to (Pintrich, 2000b) definitions of crucial constructs in the model, including ability beliefs, expectancies for success, task values. These definitions are compared to those of related constructs, including self-efficacy, intrinsic and extrinsic motivation, and interest. Achievement motivation theorists are focusing on people's choice of achievement tasks, vigor in carrying them out, and performance on them (Pintrich & Schunk, 2003). Alexander there are a variety of constructs posited by motivation theorists to explain how motivation influences choice, persistence, and performance. One long-standing perspective on motivation is expectancy–value theory. Theorists in this tradition focusing on that individuals' choice, persistence, and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity (Eccles et al., 1983).

Eccles et al., (1983) proposed an expectancy–value model of achievement performance and choice and studied it initially in the mathematics achievement domain. (Eccles et al., 1983) proposed and measured expectancies for success as student's beliefs about how well they will do on upcoming tasks. Ability beliefs are de- fined as the individual's perception of his or her current competence at a given activity. Ability beliefs thus are distinguished conceptually from expectancies for success, with ability beliefs focused on present ability and expectancies focused on the future. However, empirically these constructs are highly related (Eccles & Wigfield, 2002; Eccles et al., 1983). Bandura (2006) proposed expectancies in his discussion of self-efficacy. He distinguished between efficacy expectations, or the individual's belief that he or she can accomplish a task, and outcome expectancies, or the belief that a given action will lead to a given outcome. He argued that expectancy–value theorists historically have focused on outcome (Pajares et al, 2000).

Bandura argued that expectancy-value theorists historically have concentered on outcome expectations in their models, and stated further that efficacy expectations are more predictive of performance and choice than are outcome expectations. For him, beliefs about one's ability play a dominant role in several motivation theories. In his attribution theory, Weiner (1985) proposed that individuals viewed ability as a relatively stable characteristic over which they had little control. He argued that attributions made to ability and lack of ability have important motivational consequences. Attributing success to ability has positive motivational consequences, whereas attributing failure to lack of ability has negative consequences. Eccles and colleague (1983) also focused on individuals' ability beliefs in his self-worth model, definite that individuals attempt to maintain a positive sense of ability in order to preserve their self-worth. Like Weiner, Covington focused on perceived ability as a relatively stable capacity. However, based on developmental work on student's understanding of the ability construct (Nicholls, 1984), he noted developmental differences in individuals' conceptions of ability.

In their self-determination theory, Deci, Ryan, and their colleagues (Deci et al., 1991; Ryan et al., 2007) included the need for competence as a basic need that individuals have. They also discussed how this need is a major reason why people seek out optimal stimulation and challenging activities. Finally, self-concept researchers often focus on beliefs about how good one is at different activities as a crucial aspect of self-concept. The measures these researchers developed include many items assessing individuals' beliefs about their ability in different areas (Eccles et al., 1983).

Researchers often measure ability-related beliefs in somewhat different ways. One crucial difference among measures is the level of specificity of measurement. Bandura (2006) included that efficacy should be measured specifically because specific measures of beliefs relate more closely to behavior. Pajares & Valiante (2000), comparing self -efficacy with related noted that efficacy most often has been measured at the task-specific level. These measures typically ask individuals about how confident they are they can accomplish the task. However, at times Bandura has measured self-efficacy rather generally. For instance, Bandura (2006) measured individuals' efficacy for different academic subjects and then combined them into an overall measure of academic efficacy.

Self-concept researchers such as Marsh et al.(2004) has not asked the comparative questions, focusing instead on questions about how good the individual thinks she is and how well or poorly she can do different activities. Self-efficacy researchers also tend to focus on individuals' beliefs about how confident they are they can complete different tasks rather than asking them to compare their efficacy to that of others (Bandura 2006; Pajares & Valiante, 2000).

In sum, ability and expectancy beliefs are necessary to the expectancy–value theory of motivation and are present in other major theories as well. The definition of these constructs varies some across theoretical perspectives. Measures of these beliefs also vary across theory, especially with respect to their specificity and exactly what aspects of ability are asked about. A significant implication of these differences is that when researchers choose measures for future work on ability-related beliefs, they should carefully consider how specific they need their measures to be and which aspects of perceived ability they are most interested in measuring. According to Eccles and colleagues (1983), an important task remaining for future research is to examine more closely how similar and different these various measures are.

Turning to the achievement values portion of the model, He defined different components of achievement values: attainment value or importance, intrinsic value, utility value or usefulness of the task, and cost. Building on Battle's (1965) work, Eccles and colleagues argued that attainment value as the importance of doing well on a given task. Intrinsic value is the enjoyment one gains from doing the task. When individuals do tasks that are intrinsically valued, there are important psychological consequences for them, most of which are quite positive (Deci et al., 1991) Utility value or effectiveness refers to how a task fits into an individual's future strategies, for instance, taking a science class to satisfy a requirement for a science degree. Cost refers to how the decision to engage in one activity limits access to other activities, assessments of how much effort will be taken to accomplish the activity, and its emotional cost.

Other motivation researchers have assessed constructs related to the intrinsic and utility value constructs. Interest value is a construct similar to the construct of intrinsic motivation as defined by Deci and his colleagues (Deci et al., 1991) because it concerns doing a task out of interest and enjoyment. This construct also bears some relation to the construct of interest as discussed by researcher such as Alexander (1996). Utility value captures more ''extrinsic'' reasons for engaging in a task, such as performing a task not for its own sake but to reach some desired end state. This construct thus can be tied to the construct of extrinsic motivation (Deci et al., 1991). Although there potentially is some overlap in these constructs, it is important to point out that the values constructs and constructs of intrinsic and extrinsic value and interest come from distinct theoretical perspectives and so have different intellectual roots.

Self-Determination Theory. *S*elf-determination theory (SDT) which is a macro-theory of human motivation, personality development, and well-being, focuses primarily on volitional or self-determined behavior and the social and cultural conditions that stimulate it. Self-determination theory (SDT) also constitutes a wide perspective for studying human motivation and personality.

Human beings are frequently spurred by external factors such as reward systems, grades, evaluations, or the fear of opinions others might have of them. In addition, people are also motivated from within themselves for instance, by interests, curiosity, care or underlying values (Ryan et al.,1998). Although these intrinsic motivations are not necessarily externally rewarded or supported, they can nevertheless, sustain passions, creativity, and maintained efforts. The basis of Self-determination Theory, therefore, is the reciprocity between the extrinsic forces acting on persons and the intrinsic motives and needs vested in human nature.

Studies have been done within families, classrooms, teams, organizations, clinics, and cultures using specific propositions detailed within SDT, on the dynamics of psychological need support and need thwarting (Ryan et al.,1998). Therefore, both broad and behavior-specific implications for understanding practices and structures that enhance versus diminish need satisfaction and the full functioning that follows from it, is contained in the SDT framework (Ryan et al.,1998). The many implications ranging from foundational research on motivational micro-processes to applied clinical trials targeted at population outcomes, are best indicated by the manifold papers listed on this website.

The viewpoint maintained by Ryan & Pintrich (1998). is that wellbeing is not best captured by hedonic conceptions of ‘happiness’ alone. In contrast, the concept of Eudemonia, or wellbeing defined as vital, full functioning, as a complementary approach is also utilized in SDT. Finally, because autonomy is facilitated by reflective awareness, the role of mindfulness in self-regulation and wellness is emphasized in SDT. Self-determination theory as an ‘organismic psychology’ (Ryan , 1995), one of a host of holistic psychological theories including Jean Piaget and Carl Rogers, assumes that people who are active organisms, have intrinsic and greatly extended tendencies toward psychological growth and development.

The phenomenon of intrinsic motivation explicitly indicates this active human nature – the natural tendency showing itself from birth to explore challenges, novelty and opportunities to learn. To take on and attempt to integrate the social practices and values that surround them is also evident in the phenomenon of internalization, or the lifespan propensity of individuals. The growth tendencies underlying intrinsic motivation and internalization although are evolved and therefore ‘natural’, does not imply that they function vigorously under all conditions. Alternatively, these inherent tendencies have need of specific supports and nutriments from one’s social environment. SDT conceptualized these nutriments as basic psychological needs, which are defined as those supports and satisfactions that are vital and essential for psychological growth, integrity, and wellness.

There are three basic psychological needs within SDT, namely those for autonomy, relatedness and competence. People undergo more vitality, self-motivation, and well-being when these three needs are supported and satisfied within a social context. On the contrary, when these basic needs are thwarted or frustrated, it leads to dwindled self-motivation and expanded ill-being; in fact, need thwarting is involved in the etiology of many forms of psychopathology (see Ryan et al. 2007). A set of five mini-theories have contributed to the development and research of SDT, which together comprise the theory's formal framework. Every mini-theory was initially introduced to explain phenomena that emerged from experimental and/or field research on factors affecting human motivation and optimal functioning. Each of these is briefly listed and defined in order of their introduction into SDT.

Moreover, SDT is an organismic contentious approach. It begins with the assumption that people are active organisms possessing evolved tendencies toward growing, mastering surrounding challenges, and incorporating new experiences into a coherent sense of self. However, these natural developmental tendencies do not operate automatically as they require ongoing social nutriments and supports. This means that the social context can either support or thwart the natural tendencies toward active involvement and psychological growth, or it can ignite lack of integration, defense, and fulfillment of need-substitutes.

The nutriments for healthy progress and functioning are detailed by using the concept of basic psychological needs for autonomy, competence, and relatedness within SDT (Ryan & Pintrich, 1998). People will develop and function productively and experience wellness to the level that the needs ongoing are satisfied, but to the stage that they are thwarted, people will more plausibly exhibit ill-being and non-optimal functioning. There are darker facets of human behavior and experience, such as certain types of psychopathology, prejudice, and aggression which are comprehended in terms of reactions to basic needs having been either developmentally or proximally thwarted.

In summary, SDT expresses a meta-theory for framing motivational studies, a formal theory that gives definition to intrinsic and varied extrinsic sources of motivation, and a description of the subsequent roles of intrinsic and types of extrinsic motivation in cognitive and social development and in individual differences. Possibly more importantly, SDT propositions not only focuses on how social and cultural factors facilitate or undermine people's sense of volition and initiative but also on their well-being and the quality of their performance. The fulfilment of a set of basic and universal psychological needs put forward in SDT, such as those for autonomy, competence and relatedness, is considered necessary and essential to vital, healthy human functioning though not taking into account culture or stage of development. Moreover, SDT also suggests that the extent to which any of these three psychological needs is unsupported or thwarted within a social context will have a powerful damaging impact on wellness within such a context.

Theory of Motivational Variables

In this study, epistemological beliefs, implicit of intelligent, self-efficacy, students' achievement goals and learning approaches. The discussion consists of elaboration of models in determining the suitable model for the study.

Theory of Epistemological Beliefs. Epistemology is an area of philosophy concerned with the nature and justification of human knowledge (Baxter Magolda, 1992). A growing area of interest for psychologists and educators is that of personal epistemological development and epistemological beliefs explained how individuals come to know, the theories and beliefs they hold about knowing, and the manner in which such epistemological premises are a part of and an influence on the cognitive processes of thinking and reasoning. Piaget (1970) used the term genetic epistemology to describe his theory of intellectual development, initiating the interest of developmental psychologists in this intersection of philosophy and psychology. These interests were an important step in the growing reaction to the dominance of behaviorism, which had removed knowing altogether from learning (Perry, 1970). Bringing knowing back into the picture was central to emerging theories of moral judgment and development (Perry, 1967). Along parallel lines, Perry's (1970) attempts to understand how students interpreted pluralistic educational experiences had led to a theory of epistemological development in school students.

Psychological research on epistemological development started out in the middle 1950s, and in the years since there were three simultaneous and intersecting lines of research which trim over the six basic issues. Led by the original work of Perry (1970), most research workers in the field have posited models that are to some extent structural, developmental sequences. One group has been mainly enthusiastic about how individuals interpret their educational experience (Baxter Magolda, 1992 & Perry, 1970). Perry pioneered these efforts with an example that was almost totally male; in response, Belenky et al. looked into "women's means of knowing" with an specifically both men and women.

A second group of researchers have been interested in how epistemological assumptions effect thinking and reasoning processes, concentrating on reflective judgment (Kitchener & King, 1983) and skills of argumentation (D. Kuhn, 1993). The theories and models differ somewhat depending on the focus of the inquiry and the populations studied, but there have been some points of convergence about what individuals believe knowledge is and how it is they know.

The third and most recent line of work has considered the strategy that epistemological ideas are a system of beliefs that which may be more or less independent rather than reflecting a coherent developmental framework (Ryan, 1994). These beliefs may influence comprehension and cognition for academic tasks, which work has been the most concerned about achievement.

Nearly all the existing psychological work on epistemological beliefs can be traced to two longitudinal studies by William Perry (1970) that began in the early 1950s. The Perry scheme is a model for understanding how students come to understand knowledge, the ideas they hold about "knowing", and the ways in which knowing is a part of the cognitive processes of thinking and reasoning. This scheme has served as a heuristic for understanding how college students make meaning of their educational experiences and as a platform for multiple lines of research on epistemological beliefs. Perry (1970) proposed that students pass through a predictable sequence of positions of epistemological growth.

Perry's scheme of intellectual and ethical development postulates a continuing, qualitative reorganization of the making of interpretation. Although levels in the scheme are designated as "positions" rather than phases, and Perry makes no claims for this as a formal developmental process, the scheme itself and the natural developmental mechanisms talk about much with other Piagetian-type developmental schemes. The positions may actually symbolize an invariant series of hierarchically include structures. Change is caused through cognitive disequilibrium; individuals interact with the environment and react to new experiences by either assimilating to existing cognitive frameworks or accommodating the platform itself.

Fundamental to the Perry scheme is a student's nine-position progression from dualist to relativist epistemologies. The Perry scheme of epistemic development becomes prescriptive when teaching and curriculum are "optimally designed to invite, encourage, challenge, and support students in such development" (Perry, 1981, p. 107). The scheme have typically been clustered into four sequential categories (Perry, 2011): dualism, multiplicity, relativism, and commitment within relativism. The basic scheme is as follows (see Table 2.1).

1) Dualism. Positions 1 and 2 are characterized by a dualistic, absolutist, right and-wrong view of the world. Authorities are expected to find out the truth and to present it to the learner.

2) Multiplicity. Position 3 represents an adjustment of dualism, with the beginning of the acceptance of variety and uncertainty. Authorities who disagree haven't yet found

the right answer, but real truth to be knowable. By Position 4, dualism is revised again; areas in which there are no absolute answers are outside the realm of authority. An individual as of this position is inclined to assume that all views are similar valid and that all person has the right to his or her own opinion.

3) Relativism. Position 5 is the watershed of the scheme, as individuals make the change from a dualistic view of the world to a view of contextual relativism that will continue, with improvements, through the upper stages. A significant move is in the conception of self as an active maker of interpretation. At Position 6 individuals perceive knowledge as comparative, contingent, and contextual and get started to realize the necessity to choose and affirm one's own commitments.

4）Commitment within relativism. The final positions, 7 through 9, reflect a focus on responsibility, engagement, and the forging of determination within relativism. Individuals make and affirm commitments to principles, careers, human relationships, and personal identity. Developments in the upper positions are identified by Perry as more qualitative than structural, and are not designated by formative change. Although suggested within the scheme, these positions were not commonly found among school students.

Table 2.1

Models of epistemological Development in Late Adolescence and Adulthood

Intellectual and ethical development (Perry)	Women's ways of knowing (Belenky et al.)	Epistemological reflection (Baxter Magolda)	Reflective judgment (King and Kitchener)	Argumentative reasoning (Kuhn)
Positions	*Epistemological perspectives*	*Ways of knowing*	*Reflective judgment stages*	*Epistemological views*
Dualism	Silence Received knowledge	Absolute knowing	Pre-reflective thinking	Absolutists
Multiplicity	Subjective knowledge	Transitional knowing		Multiplists
			Quasi-reflective thinking	
Relativism	Procedural knowledge (a) Connected knowing (b) Separate knowing	Independent knowing		Evaluatists
Commitment within relativism	Constructed knowledge	Contextual knowing	Reflective thinking	

Note. Stages and positions are aligned to indicate similarity across the five models.

Adapted from http://rer.aera.net at Tsinghua University on July 26, 2011

Table 2.2

Components from Existing Models of Epistemological Beliefs and Thinking

Researcher(s)	Nature of knowledge	Nature of knowing
	Core dimensions of epistemological theories	
Perry	*Certainty of knowledge:* Absolute Contextual Relativism	*Source of knowledge:* Authorities <-> Self
Belenky et al.		*Source of knowledge:* Received <-> Constructed Outside the self Self as maker of meaning
Baxter Magolda	*Certainty of knowledge:* Absolute Contextual	*Source of knowledge:* Reliance on authority Self *Justification for knowing:* Received or mastery <-> Evidence judged in context
King & Kitchener	*Certainty of knowledge:* Certain, right/wrong <-> Uncertain, contextual *Simplicity of knowledge:* Simple <-» complex	*Justification for knowing:* Knowledge requires no justification Knowledge is constructed, and judgments are critically reevaluated *Source of knowledge:* Reliance on authority <-» Knower as constructor of meaning
Kuhn	*Certainty of knowledge:* Absolute, right/wrong answers Knowledge evaluated on relative merits	*Justification for knowing:* Acceptance of facts, unexamined expertise Evaluation of expertise *Source of knowledge- Experts:* Experts critically evaluated
Schommer	*Certainty of knowledge:* Absolute Tentative and evolving *Simplicity of knowledge:* Isolated, unambiguous bits Interrelated concepts	*Source of knowledge:* Handed down from authority Derived from reason

Adapted from http://rer.aera.net at Tsinghua University on July 26, 2011

Perry did not execute further research to explore linkages between his conception of epistemological development and student learning, but he did speculate in later work on possible connections among cognitive styles, learning strategies, and development (Perry, 1970). "When students radically revise their notions of knowledge, would they not be likely to change their ways of going about getting it?" (p. 102). Perry hypothesized that changes in students' views of the nature of knowledge and the role of authority will lead to observable changes in types of learning, as expressions of changes in changed methods of learning and cognition.

Since his work, further research on epistemological beliefs and reasoning has refined, extended and adapted Perry’s developmental sequence (Ryan, 1998). Perry's Epistemology has also been extended by Baxter Magolda and co-workers who were looking at student’s intellectual development and in particular the exposure to the research environment. Knefelkamp and Slepitza (1978) saw the Perry Scheme as a general process model providing a descriptive framework for viewing the development of an individual’s reasoning about many aspects of the world. They applied the scheme (with apparent success) to the assumption “that personal epistemology is unidimensional and develops in a fixed progression of stages” has been challenged (Schommer, 1990, p. 498). Nevertheless, Perry’s seminal work continues to function as the primary reference point for the discussion on epistemological growth in the adult learner.

Perry's work came under attack in the late 1970s for the limits of generalizing from an elite male sample to the overall population of university students. Although Perry’s work revealed several aspects of development perspectives, however, it was based only on the perspective of white educated males. Therefore it could not to be applied to students with different educational backgrounds, ages, and gender and life circumstances.

Gilligan (1982), in challenging Kohlberg's (1969) theory of moral development on the foundation a male sample had led to a normative view of a morality of rights void of notions of responsibility and care, provided a broader critique of psychological theories derived from male experience, Beginning with the framework given by Perry, they attempt to understand styles of knowing particular to women.

On this framework, Belenky et al. (1986) were enthusiastic in issues of women as knowers and learners; they were concerned that "nowhere is the structure of using male experience to specify the individuals experience seen more evidently than in models of intellectual development “(p. 7). To overcome this issue, Belenky (1986) interviewed women with different educational backgrounds, ages, and life circumstances.

The model that Belenky et al. (1986) propose provides "a set of epistemological perspectives that women know and view the world" (p. 15). They are not presented as stages, but the authors provide some speculation about developmental pathways. The data were mostly cross-sectional, and the change process can only just be inferred from retrospective accounts. Within the resulting model, in comparison to the implicit visual metaphor in Perry's "views," the positions are sorted out round the metaphor of words. In Table 1, the epistemological perspectives of Belenky et al. are prearranged to coincide with the relevant positions of Perry's model. On the basis of the findings, Belenky classified five main epistemological perspectives: silence, received knowing, subjective knowledge, procedural knowledge, and knowledge construction.

Magolda (1992) developed epistemological reflection model to elaborate the development perspective. The focus of this model was to analyze how students conjecture about the nature, limits, and the certainty of knowledge developed. According to epistemological reflection model, absolute knowing, transition knowing, independent knowing, and contextual knowing are four major patterns (Magolda, 1992). Baxter Magolda (1992) studies that each of these causes to "particular anticipations of the learner, peers, and teacher in learning options, as well concerning a knowledge of how learning should be assessed and exactly educational decisions are created" (p. 29). The definition of epistemology that emerges from these categories is targeted more on the type of learning as located in the university classroom context and less on assumptions about knowledge itself.

Soon after, King et al. (2004) developed reflective judgment model (RJM), that depicted the development of complex reasoning in late adolescents and adults. Further, it also explored how the assumptions people hold are related to the way they make judgments about controversial issues (King et al., 2004). In the beginning stages of this model, individuals see knowledge as absolute; however, as individuals progress through the stages, their beliefs evolve into temporarily uncertain knowledge. In later stages, individuals begin to see multiple perspectives of knowledge and conclude that knowledge is subjective. In the final stage, individuals believe that knowledge is a continuing process of inquiry and only approximates reality (King et al., 2004).

Within Baxter Magolda's model, absolute knowers view knowledge as certain and believe that authorities have all the answers. Transitional knowers find that authorities are not all-knowing and get started to accept the uncertainty of knowledge. Those who are independent knowers question authority as the only source of knowledge and begin to carry their own viewpoints as similar valid. Contextual knowers are capable of constructing a person point of view by judging facts in context. Knowing itself is subjected to evaluation. Knowledge evolves, "continually reconstructed on the based on new evidence and new contexts" (p. 189).

By studying men and women longitudinally, Baxter Magolda could build on past single-sex studies such as those of Perry and Belenky et al. Baxter Magolda hypothesizes that the habits may converge in contextual knowing. Baxter Magolda acknowledges a linked, narrative way as equivalent, and equally intricate, to the objectivist methodology more prevalent to men, but often posited as the "main line of development" in theories such as Perry's.

Baxter Magolda explored a distance the preceding work, attempted to explore gender-related patterns of epistemological development by learning both men and women, and conducted a longitudinal review in order to examine developmental patterns. Her overall results appear regular with those of Belenky et al. in recommending that there could be gender-related patterns in knowing, but that both patterns show up among both genders. How these patterns develop, the amount to which these methods of knowing are socialized, and the affect that schooling takes on are all strategies for even more research.

Baxter Magolda explored potential implications for relating the "patterns of knowing" to diverse learner populations by examining issues of voice, authority, peer relationships, socialization functions, and patterns of subordination and domination in the college setting. The original scope of the study was to study how epistemological assumptions affected interpretations of educational experiences, but this was limited by the fact that epistemology, as it seems to get been described in this research, largely contains student perceptions of learning activities.

For many years researchers studied epistemological beliefs with Perry's uni-dimensionality paradigm as the underlying assumption (Kitchener et al., 1981). Expanding on the task of Perry (1970) and Dewey's (1938) focus on reflective thinking, King and Kitchener have evaluated the epistemic assumptions that underlie reasoning. Kuhn (1991) Extended Perry's conceptualization with ill-structured problems. According to Kuhn (1991), absolutist, multiplist, and evaluativist are three main epistemological views. People with multiplist posture admit other views, while evaluativist recognize the uncertainty of knowledge then compare and explore all views according to their relative situation (Jung, 2011). King and Kitchener argue that reflective judgment is an ultimate outcome and developmental endpoint of reasoning and the capacity to evaluate knowledge claims.

The reflective judgment model display of seven qualitatively different levels that explain how individuals understand and reason about badly organized issues. All throughout each of the reflective judgment stages, the concentrate is on both the individual's conception of the nature of knowledge and the type or procedure of justification for learning. The model was pilot tested and sophisticated, starting in the late 1970s, through both cross-sectional and longitudinal studies. A central contribution of the program is the theoretical elaboration of the structural and epistemological elements of the upper levels of Perry's original scheme. Construction of the upper periods was primarily led by reviews of a broad scoop of work on reflective thinking and ego, social, and epistemological development. The model is especially imperative for its elaboration of the upper levels of Perry's scheme and for the proportions of epistemic cognition. It has been broadly employed by others interested in the construct and could be most ideal for teachers who see reflective judgment as a desirable educational result.

Several researchers investigated young children's epistemological beliefs about intelligence independently from Perry's work (Dweck et al., 1988). Dweck's theory suggested that some children considered that the learning capabilities are fixed at birth and academic assignment are just used to document their intelligence. Therefore, these children have a tendency to exhibit weak behavior/performance when faced with challenging task. In contrast, other children believe that learning abilities are improvable over time and with experience. They also considered that the function of an academic task is to enhance their intelligence. Therefore, these children tend to confront diverse strategies and show persistence in their efforts to learn when faced with hard task.

Thinking about the convinced that occurs in everyday lives, D. Kuhn (1991) pursued the idea of thinking as argumentative reasoning. Kuhn's focus on casual reasoning was an effort to consider how individuals responded to everyday, illstructured issues that lack definitive solutions. Kuhn reports that the epistemological thought evidenced in the interview broadly resembles the forms reported by Perry (1970), Kitchener, King, and others (King et al., 1983; She identifies three categories of epistemological views: absolutist, multiplist, and evaluative. (Which are aligned with Perry's, Belenky et al.'s, and Baxter Magolda's positions, as shown in Table 2.2).

Kuhn examined the relationship between epistemologies and argument skills by topic and found results to be weak but in the expected direction, with subjects in the evaluative category probably showing skills of argument. Three discussion skills were revealed: generation of genuine evidence, generation of alternative theories, and generation of any form of counterargument. A research of the relationship between these individual skills and the overall epistemological category mentioned that those in the evaluative category were more likely than others to use counterargument and different theory generation. Kuhn concluded that "it is mostly of the evaluative epistemology that is related to argumentative skill development" (D. Kuhn, 1991, p. 195). At this level, individuals are most likely to see the value of argument and the necessity for comparing and evaluating alternative claims.

Interested in how epistemological beliefs influence comprehension and educational performance, Schommer (1990) developed a research program that is more quantitative than that of her predecessors and requires a more analytic view of the components of beliefs. She proposed a belief system consisting of five more or less independent dimensions, which she hypothesized as composition, certainty, source of knowledge, and control and speed of knowledge acquisition. (see Table 2.2) The conceptual origins for the first three were in Perry's work, and the latter two in Dweck and Leggett's (1988) research on beliefs about the nature of intelligence and Schoenfeld's (1988) work on beliefs about mathematics. Schommer developed a questionnaire comprising of 63 short statements that characterize epistemological beliefs. Factor research was performed in this and succeeding studies and has typically yielded four factors, which, explained from a naive perspective, are fixed ability, quick learning, simple knowledge, and certain knowledge.

Ryan (1984a) was the first who investigated the implications of epistemological beliefs for instructional psychology. He extended Perry's work to examine how individual differences in epistemological beliefs might influence comprehension and therefore academic performance in school students. Ryan hypothesized that the improvement Perry identified from dualism to relativism, with the activity from a conception of knowledge as discrete facts to a conception of knowledge as interrelated propositions, would be related with changes in information control strategy.

Schommer furthered this investigation of how epistemological beliefs affect academic work. In some studies using her questionnaire on epistemological beliefs, she has documented the relation between beliefs about knowledge, strategy use, and performance. Schommer (1990) acquired suggested and completed a study of college undergraduates. Students were asked to learn a passing of text as though a test, supply a concluding paragraph, rate their degree of confidence in comprehending the material, and complete a mastery test. Belief in quick learning predicted oversimplified conclusions, low test ratings, and overconfidence. Those that believed in certain knowledge were more likely to generate inappropriately absolute conclusions.

Schommer led a few other related studies on epistemological beliefs. Results of a study of junior college and university students confirmed contrasts on all four dimensions. The university students more likely to trust in fixed ability and junior college students more likely to trust in simple knowledge, certain knowledge, and quick learning. A study of epistemological beliefs of high school students indicated that there were no differences between gifted students and others in ninth grade, but that by the end of high school, gifted students were less likely than others to believe in simple knowledge and quick learning (Schommer & Gianna, 1999) Differences in beliefs during high school years were the focus of a cross-sectional study that indicated a linear trend in all epistemological beliefs except fixed ability from freshman to senior year. In the same study, epistemological beliefs also predicted GPA, and gender differences were found in two dimensions, with females less likely to believe in fixed ability or quick learning (Schommer & Gianna, 1999). In a study of adults, education predicted simple and certain knowledge; the more exposure to education, the less likely individuals were to subscribe to these beliefs (Schommer, 1990). Recent focus on the domain independence of beliefs demonstrated that epistemological beliefs are reasonably similar across social science and mathematics (Schommer, 1990)

Schumer's contributions have been in three areas: (a) recommending that epistemological beliefs may be considered a system of dimensions that are relatively independent of one another, (b) initiating an insightful type of the study that suggested measurements, and (c) initiating an important and insightful type of research that links epistemological beliefs to issues of academic classroom learning and performance. At the same time, there are a few conceptual and way of measuring issues that stay unresolved in this model. Conceptually, the theoretical rationale for the four dimensions is somewhat problematic. Two of the factors, simple knowledge and certain knowledge, show up regular with the other epistemological models and theories that reviewed here. Fixed ability, however, seems well beyond the construct of epistemological beliefs, and it is not surprising that while it continues to appear as a factor it does not follow the patterns of other dimensions or appear to be a useful predictor in Schommer's research. This appears to have been interpreted as information that the measurements operate individually; in fact, it can be indicative of having less relationship between fixed ability and the other measurements.

As conceived by Dweck and Leggett (1988), the idea that an individual holds either an entity view or an incremental view of ability is part of one's implicit theory of intelligence. These beliefs about ability can have motivational power, as they lead to either performance or mastery goals. Views of intelligence, however, never have typically been regarded as part of the construct of epistemological beliefs, though they may be indirectly related to learning in that they motivate goal choice and so affect the academic behavior that ensues. It appears to us that fixed ability beliefs concern the type of intelligence as an individual, psychological characteristic of an individual. As such, it is not obviously a dimension about the nature of knowledge as a general epistemological and philosophical question. Although beliefs about the nature of knowledge and the nature of intelligence or ability may be correlated with each other, they are individual constructs, and it appears more useful and theoretically successful to keep them distinct.

Ryan's work was elaborated by Schommer in some of correlational studies that have explored the relation between epistemological beliefs, strategy use, and educational performance. Typically students have completed the 63-item Liker scale questionnaire on epistemological beliefs, then performed a set of tasks to examine understanding comprehension in either reading or statistics. In one study participants also completed a study strategy inventory. Statistical correlations have been found between particular dimensions of epistemological beliefs and performance.

In the initial study (Schommer, 1990), the results were that "belief in quick learning predicted oversimplified conclusions, poor performance on the mastery assessments, and overconfidence in test performance. Belief in certain knowledge predicted inappropriately complete conclusions" (p. 498). It is also plausible that the structure of these academic tasks, over time, shapes epistemological theories, which are then difficult to improve. For example, students who are given multiple-choice tests composed of low-level items will come to see knowledge as a collection of facts and learn to study for tests by using memorization and rehearsal strategies. Moving to a category where higher-level processes are expected may require not only a change in strategy use, but a change in epistemological theories.

The idea of epistemological values was released by Perry (1970) and was sophisticated by Schommer (1990) in her system of five dimensions for epistemological beliefs the follows:

1) Certainty of knowledge (absolute tentative).

2) Structure of knowledge (simple to complex).

3) Source knowledge (passed down by authority to derive by reason).

4) Control of knowledge (potential to learn is fixed at ability to potential to learn can be improved). Sometimes called innate ability.

5) Speed of knowledge acquisition (knowledge is purchased quickly or not-at-all to knowledge is acquired gradually).

The first dimension: "certain knowledge" refers to the belief that knowledge is absolute. Students believe that things are black or white, true or false, right or wrong; it is commonly found that these beliefs are held by students in the first year. At this level, students want the instructor to give them an answer. In addition, they may not be open to exploring or, in some cases, even being exposed to alternative explanations of the world (Schommer, 1989).

The second dimension: "simple knowledge" is the extent to which a person sees knowledge as a group of individual facts or as concepts that are related to each other (Schommer, 1990). For example, two students who are studying for their social studies can follow different methods. One student believes that knowledge is a series of unrelated facts, so he tries to memorize all of the concepts and key terms to prepare for the exam. The other student believes that knowledge consists of interrelated ideas, so he tries to understand the information and concepts and make connection when he studies for the exam. The first student does not even attempt to link ideas together because his beliefs are such that he actively attempts to keep each concept isolated.

The third dimension: “source of knowledge” is the extent to which students believe that knowledge is external and is transferred to persons from an outside authority such as teachers, or instructors (Schommer, 1990). Often a number students of the first year in college hold the belief that their instructors own the key to their learning instead of believing that learning should be a shared experience and require students’ efforts. Hence, students believe that their instructors are responsible for their learning. Those students become passive participants in the learning process because they believe that their instructor’s role is to provide them with all of the important information and the student’s role is to receive it. In this case Schommer, （1990) concluded that students who struggle in the course or perform poorly on exams can always say that the instructor was not a good instructor. On the other hand, when they succeed, they are likely to say that it was because they had a good instructor.

The fourth dimension: “quick learning” concerns beliefs about the speed of learning. Some college students believe that learning happens quickly or not at all, while others believe that learning happens gradually. These beliefs may arise regarding the previous learning experiences.

Students have been given tasks that required little time to complete. In addition, many students believe that if learning is going to happen, it is going to happen immediately or not at all rather than perceiving the learning process as something that is gradual. Students who believe in quick learning find it difficult to persist with a task or to make endeavors to test a different approach when the first doesn’t work. These beliefs sometimes formulate their attitude such as “if I can’t learn this quickly, I can’t learn it at all” (Bromme & Stahl, 2003).

The fifth dimension is “control of knowledge” (innate ability). This dimension refers to the beliefs about the ability of learning (Schommer, 1990). Some students believe that the ability to learn is fixed at birth while others believe that people can learn how to learn and their ability developed. For example, if students have always struggled with any subject matter, they may believe that they "just cannot do or understand this subject" whether they work hard or not. Students who hold this belief will not make much effort to learn because they believe that their success is related to their lack of ability. Students like those also tend to give up when they don’t understand something. Although most students are stronger in some subjects than others, students who believe that they cannot learn a specific discipline show poor persistence and often will avoid enrolling in those courses (Hofer, 1994).

Simple or naïve epistemological beliefs are associated with those who consider knowledge to be absolute, simple, handed down by authority, acquired quickly or not at all and that the ability to learn is fixed at birth. With simple beliefs students are likely to engage in study habits in which they rely on authority to provide clear answers. Such students are likely to be satisfied with the first information they find that they believe provides a suitable answer, and not persist if they do not get information quickly and easily. They are not likely to seek information from multiple sources, or integrate ideas. With more sophisticated epistemological beliefs students are more likely to consult multiple sources, integrate ideas, value different opinions and persist if not successful at first.

Based on the discussion above, it is obvious that the theory of knowledge is said to have its subject matter in the justification of believing. The study of epistemological beliefs was seen as another effective learning factor that influenced how students go about learning. These refer to beliefs individuals have about the nature and acquisition of knowledge. Beliefs about learning and interrelationships between such beliefs and their approaches to learning and learning outcomes have helped teachers to understand the nature of learning in tertiary settings. (Habshah et al., 2013, Chen & Pajeres 2010, Nabeel Abedalaziz ,Chin & Song , 2014, Somuncuoglu & Ali, 1999).

Theory of Achievement Goal. Many psychological researchers have also become interested in students' achievement of goals. Initial goal theory suggests that there are two general goal orientations and, although there are slight theoretical variations between authors in the definition of these labels, they will be referred to here as mastery and performance goals for clarity. A mastery goal orientation reflects an emphasis on learning and understanding, whereas a performance orientation focuses on demonstrating competence in relation to others. Nonetheless, for several years some authors have reported that the effect of performance goals differs according to self-perceptions and research has shown that mastery and performance goals are not necessarily mutually exclusive. In fact, the desire to reach a high level of achievement is not always incompatible with the pursuit of high levels of mastery and performance goals, which can have some positive functions. Meece et al., (1988) proposed aachievement goals classified into mastery goal and performance goal. These two different types depend on whether learning is perceived and esteemed as an end in itself or as a mean to other reason (Meece et al., 1988).

Dweck and colleagues articulated the proposal by expanding the dichotomous goal framework. The authors reported that mastery-performance simply represents a fundamental and simplified conceptual framework Henderson et al., 1990). Therefore, Elliot et al. (1997) did not change the traditional mastery goal but classified performance goals into two dimensions, including approach and avoidance goal (He, 2004). The focus of mastery goal is to develop one's aptitude employing mastery over the task. Similarly, performance- approach shows one’s inclination towards involvement in the task for the sake of performing well to show other, while performance avoidance goals cause to avoid task, so as not to show incompetency to classmates and teachers. Elliot et al. (2005) Conceptually and empirically analyzed, and reported that approach goal is the outperform to illustrate competence over other fellows, whereas the avoidance is to hide incompetence. Therefore, this approach reveals that students’ differences in choosing different goals are correlated to their achievements, which show links to cognitive, motivational, emotional and behavior outputs.

Both mastery and performance goals are the positive motivational factors those swift students to spend their consistent efforts. Overall, achievement motivation inspires and actively engages students in their tasks. However, in case of avoidance goal, opposite results to achievement motivation were observed in most of the studies. Because, an avoidance goal represents an impassive and negative motivational attitude that may impose destructive effects on learning. For this reason, an avoidance goal shows pessimistic aptitude that may result into destructive effects during learning (He, 2004).

Later on, motivational theorists (Elliot et al., 1999; Pintrich, 2000b) proposed a 2 x 2 achievement goal framework that fully integrates the mastery-performance and approach-avoidance distinctions. Crossing these two dimensions yields four types of achievement goal; mastery-approach, mastery-avoidance, performance-approach and performance-avoidance. The focus of mastery-approach and mastery-avoidance is on task-based or interpersonal competence and incompetence, respectively. Similarly, performance-approach focused on normative competence, whereas, performance-avoidance intended on normative incompetence (Wang et al., 2010). Consequently, both mastery-approach and performance-approach has positive contribution towards achievement and consequences. In contrast, mastery-avoidance and performance-avoidance anticipated fewer adaptive motivational pattern (Elliot & McGregor, 2001).

A person may endorse multiple goal perspectives, therefore, looking at the independent effect of each goal may not reveal a complete picture of the person's achievement motivation (Wang et al., 2010). Therefore, Wang et al. (2010) found four clusters of students moderate achievement goals, low achievement goals, high achievement goals and final mastery achievement goals with homogenous characteristics based on their achievement goals. Moreover, goal orientation, self-efficacy and intrinsic interest include in self-motivational beliefs (Kingir et al., 2013; Zimmerman et al., 2000) and act as a mediator that stimulate students self-regulatory behaviors. These motivational beliefs properly implement self-regulatory knowledge and skills by improving student's motivations for learning and by the employment of learning strategies (Torrano Montalvo et al.).

Achievement goal theory has acquired vast approval among researchers, rising as a new direction for reviewing the construct of motivation (Midgley et al., 1998). This theory conceptualized learners' motivation as goal-directed actions employed to complete an authentic learning task (Elliot et al., 1999). The concept of achievement goal usually point students' purpose for doing tasks (Rastegar et al., 2010). In a specific context, achievement goal is a situational explicit orientation reflecting the motive to obtain, buildup, and boost up the capabilities (Harackiewicz et al., 1997).

The traditional achievement goal theory was proposed by Nicholls (1984b) and anticipated that, individuals goal orientation and perceived ability contribute to affective outcomes in a given achievement setting (Wang et al., 2010). Goal orientation is one of the most important construct of this theory, concerned with the motive that students have for engaging in achievement task. With miscellaneous intentions imply that students show their capabilities and success in different ways (Bråten et al., 2004).

As a result, several authors have proposed an expansion of the theory towards a multiple goals perspective model developed by Elliot and M.C. Gregory (2001) which states that there are four types of achievement goals. Mastery-approach goals focus on learning and task mastery, while mastery-avoidance goals focus on the avoidance of not learning or not mastering a task; performance approach goals focus on the attainment of favorable judgments of competence, while performance-avoidance goals focus on the avoidance of unfavorable judgments of competence. Alternatively; certain authors suggest that for some students, the ultimate goal is to invest a minimum of effort. Therefore, they propose a dichotomous achievement goals model comprising mastery (approach) goals, performance (approach) goals and work-avoidance goals. According to this model, students who pursue work-avoidance goals tend to work as little as possible, appreciating easy success and aiming only to reach a passing grade. Measures of work-avoidance show high reliability and research indicates that it can be separated from both mastery and performance -approach goal orientations.

The evolving achievement goal orientation theory (Dweck & Leggett, 1988, Elliot, 2005, 1999; Dweck, 1999; Wolters, 2004) initially consisted of mastery and performance goals orientations, which explain the reasons and purposes why students engage in achievement tasks (Dweck & Leggett, 1988). Learners with a mastery goals orientation exert sufficient effort and perseverance to effectively problem-solve challenging learning tasks, develop new skills and knowledge, and focus on tasks to achieve competence (Elliot, 2005). Learners with a performance goals orientation are motivated to learn by outperforming their peers and often experience anxiety when faced with challenging learning tasks. Goal theorists distinguish between approach and avoidance. Students either have approach goals in which the learner engages in learning tasks or avoidance goals in which learners withdraw from challenging learning activities to avoid negative consequences such as low grades or failure.

Students with similar ability levels who complete the same academic tasks can differ in terms of the goals they set, the effort they put in, and the way they study (Miller, 2010). Educational psychologists have long been interested in the role of motivation to understand these differences in the way students learn and achieve in education settings. Despite its pivotal role in educational psychology, most definitions of motivation have focused less on what motivation does and more on what motivation is. Specifically, motivation can be described as the energy that initiates, sustains and directs behavior towards goal-oriented activities (Schunk, Pintrich, &Meece, 2008).

Conscious goals govern an individual's actions. Standing upon this argument, Locke and Latham (1990) have proposed goal-setting theory, which has been demonstrated as an effective motivational tool for performance enhancement in sports and exercise (Burton, Naylor, & Holliday, 2001; Hall & Kerr, 2001). For individuals who set specific, difficult goals, it led to higher levels of performance than those who set general, easy goals, or no goals. The primary focus of the study of goal setting is on understanding how established goals have an effect on performance in implementing some specified task.

A distinguishing feature of motivation within school contexts is the concept of goal perspective as proposed in contemporary achievement goal theory (e.g., Roberts, 2001). A central idea to the theory is the assumption that goals are set by students for themselves and through these goals students' motivational, affective, cognitive, and behavioral responses in achievement settings are mediated and determined. Two important constructs in this theory are achievement goals and the perceived motivational climate. Viewed from a dispositional perspective, both Nicholls (1989) and Dweck & Leggett (1988) suggest that the two major goals operating in achievement contexts are defined and contrasted as task orientation versus ego orientation. According to Ames (1992) the argument is that what the teacher says and does in the classroom influence students' adoption of a specific goal orientation. From a situational perspective, Ames' suggestion is that environments that emphasize mastery of learning and self-improvement tend to encourage task goal orientations, while climates focusing on social comparisons and demonstration of superior ability tend to induce ego goal orientations.

A goal perspective that involves ego is associated with using norm-referenced criteria for success, where success is evaluated by comparisons with the performance of others. When entering achievement contexts, students who are ego-involved set goals of being superior to others and feel successful only when they obtained superiority over others in performance. It is typical for these individuals to use norm-referenced criteria to examine their success and it is likely for them to exhibit maladaptive achievement-related behavioral patterns such as withdrawing effort and persistence, expressing negative affect when faced with difficulty, shunning challenging tasks, attributing success or failure to ability, and manifesting performance deterioration, especially during periods of low perceived ability. (e.g., Ames, 1992; Dweck, 1999).

Self-referenced criteria for success portrays a task involved goal perspective, where the main focus is learning or mastering a skill, together with improving individual performance. Task involved individuals find satisfaction in self-improvement, acquisition of knowledge, and successfully completing a task. These individuals have the tendency to exhibit adaptive achievement-related behavioral patterns including expending effort and persistence, besides employing learning strategies, displaying positive affect when encountering challenging tasks, choosing challenging tasks while success or failure is attributed to effort (e.g., Ames, 1992; Dweck, 1999)

In the realm of sports and physical activity contemporary goal theories have been applied and tested in achievement contexts. These test results have signified that the rational interrelationships between goals and beliefs broadly applies across the academic, sports (e.g., Duda, 1993), and physical education fields (Duda, 1993). There is consistency between the findings on the two goal perspectives in academic and physical activity settings and theoretical predictions and this indicates that different goals are adopted by individuals when involved in achievement situations. In addition, individuals who have different goal involvement tend to focus on different information and deal with achievement events in different ways (Duda, 1993).

In achievement goal theory, it is presumed that these goal orientations are orthogonal, and that means an individual can be high and/or low in both orientations. Based on the proposed orthogonally of achievement goals, Fox, Goudas, Biddle, Duda, and Armstrong (1994) proposed that, to study achievement goals and the subsequent consequences, a goal profile approach should be employed., Four profiles have been identified in the literature, namely: high ego and high task, high ego and low task, high task and low ego, and low task and low ego. This approach accounts for the high ego/high task and low task/low ego groups (White, 1998). However, the limitation here is that, the criteria used to classify goal profile groups is the somewhat arbitrary scores of central tendency such as median and mean (Standage & Treasure, 2002). Findings in research on achievement goals and motivational patterns from a goal profile approach has signified that individuals high in task and ego goal orientation or high in task and low in ego goal orientation demonstrate greater levels of adaptive motivational patterns in comparison to those low in low task goal orientation (e.g., Standage& Treasure, 2002).

Achievement goal theory explains and predicts students' motivation to learning in achievement situations. The central component of the theory is the role of goals in students' motivation. In recent years, the study of goals has contributed immensely to the field of achievement motivation. A prominent and highly researched area in the study of goals with respect to achievement motivation is achievement goal theory, also known as goal orientation theory (Anderman & Wolters, 2006). Achievement goal theory has been used to explain how students' goals influence their motivation and achievement-related behaviors, and to explain differences in their learning and academic achievement. Achievement goal orientation relates to the reasons and purposes that students engage in achievement tasks (Dweck& Leggett, 1988). There were initially two distinct achievement goal orientation types, which were the mastery goals orientation and performance goals orientation (Elliot and McGregor, 2001). A student with a mastery goals orientation believes that performance improvement and competence is attainable by exerting effort and perseverance. Students with a performance goal orientation believe competence is achieved by outperforming his or her peers to attain normative learning goals.

In recent years, the fact that ego involvement goal perspectives do not always produce maladaptive motivational patterns and outcomes poses a big challenge to the dichotomous achievement goal framework. By way of illustration, numerous studies (Harachiewicz, Barron, & Elliot, 1998) revealed that performance goals effected adaptive motivational patterns (e.g., obtaining better performance). A trichotomous achievement goal perspective was proposed by Elliot and her colleagues (e.g., Elliot & Church, 1997). Both Nicholls' and Dweck's cognitive approach to motivation (e.g., Dweck, 1999; Nicholls, 1989) and McClelland and Atkinson's behavioristic model of motivation are incorporated in this framework to reflect the performance-mastery and the approach-avoidance performance distinctions (Nicholls, 1989). The performance goal construct is categorized into performance approach and performance-avoidance goals in this model. A performance-approach goal relates to acquiring favourable judgments of normative competence, while the focus of a performance-avoidance goal is on the avoidance of unfavourable judgment of normative competence.

In studies where a trichotomous model was employed to the study of achievement goals and motivational patterns, it was revealed that individuals in the performance-avoidance group exhibited levels of maladaptive motivational patterns that are greater(e.g., higher state anxiety and lower competence evaluation) than those in the performance-approach and mastery groups (e.g.,Harachiewicz et al., 1998). The potential in using a trichotomous model is to provide a more thorough picture for understanding the relationships between achievement goals and motivational responses in achievement contexts.

The main goal of individuals in achievement contexts is to demonstrate ability as stated in achievement goal theory (e.g., Nicholls, 1989). Variations in their achievement motivation and behaviors may result from the differences in individuals' ability belief systems (Nicholls, 1989). Recent efforts to better understand students' motivation have provided a context for merging two of the most important motivational constructs: conceptions of ability and achievement goals. Nicholls, 1989) argued that students hold one of two different goal perspectives when entering an achievement setting and at the same time will hold undifferentiated or differentiated conceptions of ability. Two conceptions of ability are embedded within two dimensions of goal orientations. Some students focus mainly on ability and interpersonal comparison to establish superiority over others. These ego-oriented learners will hold a differentiated conception of ability, because they tend to evaluate their ability on the basis of norm referenced information. Others define success as the results of effort and mastery, and self-improvement and learning or mastery of tasks are their major goals. Students with a task-oriented goal will reflect an undifferentiated conception of ability because they believe that effort and ability co-vary, and high effort implies high ability.

When students adopt particular achievement-related goal perspectives, their achievement-related behavioral patterns can be explained and are determined by their conceptions of ability. This is proposed by Dweck and her colleagues (Elliot &Dweck, 1988).. Entity theorists believe that ability is fixed and cannot be changed through effort, thus are more likely to adopt an ego-oriented goal perspective. Their focus is on interpersonal competition and trying to demonstrate superiority in ability by performing better than others. In addition, entity theorists are more likely to focus on "looking athletic" rather than on improving competencies in physical activity settings. On the contrary, incremental theorists hold the view that ability is pliable and can be changed through effort, therefore, will be inclined to adopt a task-oriented goal perspective. In consequence, incremental theorists will more likely emphasize learning or mastering a skill, seeking every opportunity to improve competencies. Their self-esteem will not be hurt by failure because failure is considered as the necessary step in the learning process.

Even though some disputes about whether conceptions of ability or goal orientations are more fundamental to understanding motivation are evident (Dweck, 1999; Hong et al., 1999; Nicholls, 1989), the majority of findings in research have demonstrated that there is an association between an incremental or undifferentiated conception of ability and a task-involved goal perspective. The view and belief of these individuals are that ability is changeable through effort and that success is derived from the effort exerted. Their focus is on task-mastery and self-improvement. On the contrary, an entity or a differentiated conception of ability is related to an ego-involved goal perspective, whereby individuals assess their ability based on norm-referenced information and attempt to display superiority in ability by outperforming others (e.g., Elliot &Dweck, 1988).

An increasingly popular framework for research topic is a trichotomous achievement goal model, Cury, Da Fonseca, Rufo, and Sarrazin (2002) investigated the relationship between implicit theories of ability and mastery, performance-approach, and performance-avoidance goals in order to evaluate and expand the trichotomous achievement goal model. The findings illustrated that both the performance-approach and the performance-avoidance goals were positively associated with entity theories of sport ability, though negatively related to incremental theories of sport ability. The mastery goal was positively related to incremental theories of sport ability. These findings were in consistency with the previous work, indicating that children who lean towards incremental ability conceptions are more inclined to adopt mastery goals. Contrarily, those who possess entity ability conceptions tend to be ego oriented (gaining favourable judgments or avoiding unfavourable judgments).

Many psychological and motivational theories have been used to explain motivation and to predict behavior in achievement situations. One such theory is the achievement goal theory, which has been one of the most influential theories of motivation in educational research for the last 25 years (Senko, Hulleman, &Harackiewicz, 2011). According to Elliot (2005), the foundational idea of achievement goals emerged from unpublished and published papers that focused on achievement motivation. Two primary types of goals emerged: 1) learning goals or mastery goals, which focus on seeking to develop skills by learning or mastering tasks; and 2) performance goals, which focus instead on demonstrating one's competence by outperforming others. Ames and Archer (1988) and Pintrich (2000a) showed that students' achievement goals are related to their study behaviors, which in turn are related to their achievement. Thus, achievement goal theory explains and predicts the relations among goals, strategies, and achievement.

In summary, a series of studies showed that theories of intelligence experimentally induced will influence students' tendency to persevere in the face of failure. Like normally developing student, student with mental disorders were more likely to prefer challenging activities and report high levels of interest-enjoyment when the task was presented as one which is improvable. It suggests that although student with difficulties are pessimistic about improving their intellectual capacities, if a new task is introduced in a way that highlights the possibility of self-improvement (incremental theory), then they will pursue the challenge in an adaptive manner (strong perseverance, enjoy, and important interest). These results are very interesting. Indeed, highlighting an incremental theory had a positive motivational effect on behavior in achievement situations. In addition, all these results also may open up several interesting perspectives for the treatment of learning disabilities. The results should lead to plan programmes of cognitive therapy in order to modify beliefs that underlie maladjusted achievement behaviors of student in scholastic failure. There is extensive research, to date, to indicate the significance of implicit theories of intelligent in Malaysia context.

Theory of Self-efficacy. Bandura's (1997) social cognitive theory defined self-efficacy as people's judgments of their capabilities to organize and carry out courses of action required to attain designated types of Performances. Thus, self-efficacy beliefs determine the way students think, feel, motivate and conduct themselves.

Albert Bandura who is the undisputed architect of the "theory of self-efficacy" and lead researcher in this field, argues that self-efficacy is subjective in nature, in that while people may have a high degree of talent or skill, however, may not see themselves as having the ability to apply their capabilities consistently across a variety of situations (Bandura, 1997). The expert further explains that self-efficacy beliefs influence a multitude of diverse factors such as decisions people make, the amount of effort put forth, their perseverance and resilience when faced with adversity, their inclination to think in self-hindering or self-aiding ways besides the level of stress and depression they undergo in responding to difficulties.

Self-efficacy is regarded as a vital aspect of human performance, learning disposition, and problem Solving and motivation. Studies have revealed that students' self-efficacy about their capabilities to cognitively process academic material can affect motivation and learning. Students who believe they will encounter much difficulty in understanding material will tend to have a low sense of self-efficacy for learning it;

contrarily, those who feel capable of the ability to handle the information demands should feel more efficacious.

The self-efficacy theory is based on understanding the link between a person's beliefs and his Willingness to participate in behaviors essential to successfully complete a task. As a social learning theory, the self-efficacy theory besides propounding a primarily comprehensive understanding of the learning process also provides specific perceptions that educators can use to propel students towards specific skills development. As a self-regulation theory, self-efficacy relies on the supposition that motivated learners are more certain to achieve success than less motivated learners and that goal setting is of utmost importance in the attempt to increase learning.

Bandura's (1977) broad theory of the person propounds that human achievements depend on the reciprocal interactions of the person's behavior, personal factors (or self), and environmental conditions. Self-efficacy which is a notion based on this theory, is one of the personal factors and is defined as "the conviction that one can successfully execute the behavior required to produce the outcomes" (p. 79). Bandura's original definition has not met with any significant challenges, so the field of self-efficacy research is fairly united in terms of how the concept is defined. Self-efficacy leads to specific behaviours and motivations that encourage or discourage effective performance so self-efficacy beliefs should be relevant for understanding academic outcomes.

The theory thus addresses such notions by emphasizing on the learner's beliefs of self-regulation. Basically, the idea of self-efficacy is about an individual's beliefs and actions as clearly seen in Bandura's definition of the construct: "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Self-efficacy is complete in its scope as it actually addresses cognitive, affective and behavioral processes of the learner. It aims to explain the process that learners experience as they encounter new challenges by accounting for judgments, evaluations and appraisals made by the learner.

According to Bandura, (1997) learners evaluate the ability or skill required to face a given challenge and whether they have the ability to meet the said challenge successfully within the given context. Bandura defines this as identifying outcome expectancies and efficacy expectancies. This means, “I must believe that I possess the skills (efficacy expectancies) and that I can successfully employ those skills (outcome expectancies)”. Only knowing or having ability is not sufficient; an individual must also maintain the belief that he or she is able to implement the skill in a given situation. The learner’s evaluation of his or her ability to face the challenge successfully will determine not only the amount of effort given to the task assigned but also the willingness to persevere. Motivation, control, affective and physiological states and the self-regulation of thought make up the components of efficacy beliefs.

According to Suksunai et al., (2011) the concept of perceived self-efficacy has proven to be one of the most important variables in regards to work commitment. There are several reasons for its predictive success. For one thing, its relevance as a predictor increases as a function of domain or task specificity, but self-efficacy does not only refer to one’s capabilities with demands of task and goal. Also, the cognitive construct of self-efficacy applied as similar level of construct as task value and appeared to be good predictor of commitment in Shore (2002) research findings of motivation regarding exercise.

As outlined by Bandura (1993), students with high academic self-efficacy regard problems as challenges that can overcome instead of threats and set goals to meet such challenges; are unwavering to the academic goals they set; have a task-diagnostic orientation and this supplies useful feedback to improve performance, and not a self-diagnostic orientation, which fortifies the student’s low expectation about what he or she can achieve. Self-efficacy also regard failures as a result of insufficient effort or knowledge, not as a lack of aptitude; and double their efforts in cases of failure to achieve the goals they have set. This emphasizes the reciprocal or cyclical relationships among the environment, self, and behaviors as propounded by Bandura's (1977) social-cognitive theory. Environmental interventions may enhance self-efficacy, leading the student to choose more challenging tasks, which then generates more opportunity for practical feedback and can lead to improved self-efficacy and better outcomes.

Bandura, (1977) also explained self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to produce given attainment. There is much research supporting the theory self-efficacy as the cognitive factor that plays an important role in both motivation and performance. As Bandura, (1977) there are many research studies employing the concept of self-efficacy in educational field. A study (Wei, 2012) have suggested that there was a direct causal relationship between English teachers' perceptions of their self-efficacy and their adoption of motivational strategies. The results also showed that teachers' self-efficacy significantly contributed to the prediction of teachers' motivational teaching behaviours and accounted for more than one third of the variance to teachers' motivational teaching behaviours. Furthermore, it is most interesting to note that teachers' self-efficacy significantly contributed to the prediction of teachers' motivational teaching behaviours as discovered by Wei (2012). These studies have used self-efficacy as the variable in predicting teacher behaviour and commitment in their daily task.

Cervone and Peake (1986) introduced perceived self-efficacy by having individuals rate their efficacy from a purportedly randomly selected high number and lowered their self-efficacy from a low arbitrary starting number. Higher instated perceived self-efficacy resulted in individuals persevering longer on difficult and unsolvable problems before they quit. The biasing anchoring influence had no effect on performance motivation when perceived self-efficacy was controlled as shown in mediational analyses .Therefore, the degree to which it changed efficacy beliefs entirely arbitrated the effect of the external anchoring influence on performance motivation.

The predictive superiority of perceived self-efficacy is replicated in other domains of functioning. People's beliefs in their efficacy have an independent effect on their performance attainments, whereas their level of anxiety bears little or no relationship to their performances on stressful academic tasks (Meece & Hoyle, 1988; Pajares & Valiante, 2000) after the influence of perceived self-efficacy is removed. Beliefs of personal efficacy similarly predict willingness to perform threatening activities, but anticipatory anxiety makes no independent contribution. Numerous experiments in which people receive veridical feedback concerning their performance, have been conducted but their efficacy beliefs are altered by false normative comparison. Fallacious feedback becomes a form of precursory influence. Litt (1988) used an intra-individual design to this end. After going through a test for pain tolerance on a cold-pressor test, individuals were persuaded into believing that they were either at a high (90th) or at a low (37th) percentile rank in pain tolerance compared with an ostensibly normative group, irrespective of their real performance. The bogus normative information generated differential levels of perceived self-efficacy, which were then accompanied by corresponding changes in pain tolerance. Greater changes in perceived self-efficacy simultaneously paralleled with larger changes in pain tolerance.

The bogus normative feedback was in contrast to that provided originally in the second phase of the intra individual design,. Those persuaded to believe that they had lost their comparative superiority had their perceived self-efficacy lowered, while those who were led to believe that they had supposedly obtained comparative superiority increased their belief in their capability to tolerate pain. Subsequently, their level of pain tolerance changed in the direction of their efficacy beliefs.

According to Multon, Brown, & Lent, (1991) beliefs of personal efficacy responsible for human functioning the aspect of causality is a pivotal question in any theory of the cognitive regulation of motivation and action. A variety of methodologies and analytic procedures have been extensively investigated on this issue. Nine large-scale meta-analyses were conducted across diverse spheres of functioning. These spheres which include work-related performances in both laboratory and academic achievement and persistence (Multon, Brown, & Lent, 1991), only controlled investigations in which efficacy beliefs were modified experimentally and observed collective efficacy in group functionality.

This extensive framework of research incorporates a wide range of methodological and analytical approaches. These approaches which included inter individual experimental designs comparing groups raised to differential levels of perceived efficacy also did not exclude intra individual designs where the same individuals are steadily raised to higher perceived self-efficacy; various methods of self-efficacy development based on enactive, vicarious, precursory, and somatic and affective sources of efficacy-relevant information; and varied fields of functioning and impact of self-efficacy on different response systems comprising cognitive, affective, and behavioural expressions. Multiple controls for other prospective contributors to performance were made used of and distinctive populations of differing ages and socio demographic characteristics in different cultural settings were involved.

Both micro level and macro level longitudinal analyses were used to examine functional relations with different methods. In addition, different formats and domain-related scales have been used to measure efficacy beliefs so that resulting relations have not been unique to a specific instrument. The resulting evidence derived from these meta-analyses unwaveringly shows that efficacy beliefs generate significantly to the level of motivation and performance. Besides anticipating behavioral functioning between individuals at different levels of perceived self-efficacy, it also anticipates changes in functioning in individuals at different levels of efficacy through time and even variation within the same individual in the tasks performed and those shunned or attempted but failed. Evidence that divergent procedures results in convergent outcomes adds to the explanatory and predictive generality of the self-efficacy determinant.

As a predictor of subsequent performance, perceived self-efficacy overruled past performance, making this phenomenon involving alleged change from high to low normative standing particularly interesting. False normative comparison has been replicated in markedly different domains of functioning, being instated by the regulatory role of perceived self-efficacy. By suggesting that they were of higher or lower standing compared with pseudo peer norms, irrespective of their actual performance.

Students with illusorily raised perceived efficacy set higher goals for themselves in addition to using more efficient problem-solving strategies thereby achieving higher intellectual performances than did students of equal cognitive ability who were persuaded to believe that they lacked such capabilities. Besides verifying the functional relation of perceived self-efficacy to behaviour, the research also confirms the well-known impact of efficacy belief on aspiration and strategic thinking (Wood & Bandura, 1989).

Jacobs together with his colleagues (Jacobs, Prentice-Dunn, & Rogers, 1984) in the same way, illustrated that efficacy beliefs raised by fictitious normative comparison heightened perseverant motivation in difficult problem solving. In studies where efficacy beliefs were modified by false information about a competitor's strength, higher deceptive beliefs of physical strength led to individuals displaying more physical stamina in the course of a competition (Weinberg, Gould, Yukelson, & Jackson, 1981). Failure in a succeeding competition propelled those whose perceived self-efficacy was arbitrarily raised to even greater physical effort, while, in contrast, failure further impeded the performance of those whose efficacy beliefs had been weakened. Beliefs of physical efficacy deceptively heightened in females and deceptively weakened in males eliminated large pre-existing gender differences in physical stamina.

Self-efficacy in its intuitive appeal has contributed greatly to the notable popularity and success of this theory. Bandura justifies this phenomenon and argued that as a learner's self-efficacy increases, the learner becomes more motivated, focused and successful. The successful application of the theory is based on one's Understanding of four sources of self-efficacy: enactive mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states.

Enactive mastery experiences (also known as "performance accomplishments") are Psychological states whereby a learner organizes his or her own set of beliefs about ability from a range of sources. This is the most pivotal of the four sources of self-efficacy as it provides a substantial amount of feedback for the learner while recognizing and identifying many of the components that lead to high levels of self-efficacy. A few important aspects of this source include context specific beliefs about success, failure and performance. It takes into account the relevance and importance of goals and selective self-monitoring; recognizing that each learner brings his or her own background, self-concepts, self-knowledge and personality to the learning experience cue. Being aware of the latter enables educators to take measures toward knowing and understanding the learner.

Failure or success in the past will likely influence one's belief that one will succeed or fail at a given task. It is worthy to note that performance in itself is insufficient. Learners cognitively evaluate success in terms of the assistance they received, unique circumstances and their own Evaluation of patterns of success and failure. Failures can impede efficacious beliefs if they are not handled appropriately by the educator. A range of ways to overcome the negative influences of failures on self-efficacy is provided in the theory. One of the ways is to persuade the learners to believe that they are succeeding which supports selective self-monitoring and this occurs when the learner's beliefs of personal self-efficacy are noted and remembered over non-efficacious beliefs.

According to Prussia & Kinicki (1996), efficacy beliefs when inculcated deceptively, operate determinatively, not only at the collective level but also at the individual level. Group members who were given fallacious information that they performed better or worse than a fictitious norm amended belief in their collective capabilities (Prussia & Kinicki, 1996). The effect of this bogus information on groups' aspirations and performance attainments was moderated completely through the changes it generated in perceived collective efficacy.

It is typical of epiphenomena lists and behaviour analysts to single out studies where perceived self-efficacy is modified by enactive methods of influence because there is a behaviour to hold on to. Subsequently, they argue that perceived self-efficacy only mirrors a prior performance. Based on evidence from countless studies demonstrating that perceived self-efficacy contributes independently to subsequent performance after controlling for prior performance and indices of ability, this claim has long lost its credibility.

Educators should focus on reminding them of their successes rather than confuse selective self-monitoring with lying to students about their progress. Another way to overcome the negative Influence of failures by convincing learners of the difficulty of a task and providing realistic goals is to offer achievement approaches which serves as an effort to explain the importance of perseverance. In the same way, successes that come too easily create expectations of achieving results with ease; therefore, they are not beneficial because the learner is easily discouraged when problems and difficulty arise. This can be overcome when the educator shows comparison with others who are also struggling with the given task. This is a form of vicarious experience.

People assess their abilities by comparing themselves to individuals that they trust; for Example, understanding this aspect of the phenomenon will direct educators to use the success of other participants to convince the learner of the possibility of success; thus, modelling success is an effective means of promoting self-efficacy. Positive vicarious experiences can be promoted through techniques such as imagery which, more specifically, includes using visualization techniques or filming the learner performing various steps of a desired skill. The educator in reviewing these and pointing out each specific success will hence encourage positive vicarious experience.

Verbal persuasion is one of the sources of self-efficacy and its practice further supports efficacious beliefs. Words such as “good job” or “nice work” to the learner, do not qualify as verbal persuasion. Rather, statements from the educator which gives specific feedback and encouragement to the learner include: “good, you are holding the paddle properly” or “your forward stroke is well executed because you are keeping the paddle vertical and pulling the boat forward rather than pushing the water with the paddle.”

Another source of self-efficacy is knowing the influence of physiological and affective states. A discouraged, frustrated or dejected learner who will then be distracted, is less likely to succeed. The educator can then attempt to explain this by capitalizing on the novelty of the experience, remaining cheerful and optimistic, applying humor and fondly recalling past successes.

Self-efficacy, in explaining that human behavior is related to motivation, self-regulation, success and the accomplishment of tasks, guides instructional practice. Instructors are encouraged to emphasize on task-specific and sequential student achievements, with the hope to generalize from mastery of tasks to broader and more complex results. Although such results may be specific to a particular course, instructors may also be keen on the transfer of learning into actions useful for daily living in the lives of the participants. For instance, challenges overcome during outdoor education may help students to take more calculated risks, make more effective plans, be more productive workers in a team, or become finer decision makers both in their personal, as well as, professional lives.

Researchers on self-efficacy have actively pursued the idea of self-efficacy generalizing from a specific task to a broader and complex set of outcomes. Wise (2000) conducted a study that gives an excellent example of how task-specific self-efficacy can transfer to similar tasks. Wise tested participants' abilities to transfer task-specific self-efficacy across settings. Following severe spinal cord injuries, participants were involved in rehabilitation. They had to learn several activities of daily-living skills related to their disability. A six-lesson curriculum that made use of a weight-training program was designed by Wise to help them to develop these skills. In the course of the program, verbal persuasions were provided that supported the participants' beliefs about their own abilities to transfer lifting weights to completing domestic daily tasks. For the experimental group, messages designed to facilitate transfer of the self-efficacy from the weight room to the activities of daily living that participants needed in their home environments were added. For example, Wise (2000) reminded a participant who was curling an 8-pound dumbbell that the dumbbell weighed the same as a gallon of milk. Enforcing these enactive mastery experiences helped to facilitate the generalization of self-efficacy more for those in the experimental group than for those in the control group.

Countless experiments by Schunk in which perceived efficacy is developed in children who are noticeably lacking in mathematical ability by self-directed instruction (Schunk, 1982) verifies the unique contribution of self-efficacy and in those with severe reading deficiencies by training in verbal self-guidance (Schunk & Rice, 1993). Variance in performance after controlling for level of skill development and performance attainment in self-instruction is accounted for by children's beliefs in their efficacy. Children's perceived efficacy both to modulate their activities of learning and to master academic subjects, increases academic aspirations and final grades without depending on their initial grades in the subject matter or on the academic aspirations held by the parents for their children in path analyses in other studies (Zimmerman, Bandura, & Martinez-Pons, 1992).

An experimental test of the role of perceived self-efficacy and goals in the development of creative proficiency was conducted by Locke and his colleagues (Locke, Frederick, Lee, & Bobko, 1984). In path analysis, after applying multiple controls, perceived group efficacy foretold creative performance both directly and by mediation through its impact on goal setting. Training in creativity and use of brainstorming strategies, pre-existing creative ability, and post training creative performance in the prediction of subsequent levels of creative performance are some of these controls.

Prussia and Kinicki (1996) carried out experiments to examine how perceived collective efficacy operates in concert with other socio cognitive determinants of the quality of group problem solving. Videotaped instruction in brainstorming strategies either in a lecture format or by observing a group modelling the same strategies behaviourally and cognitively was given to groups. Participants obtained precise feedback about their own performance attainments, but prearranged comparative feedback led them to believe that their group performed either above or below the normative productivity standard. Subsequent success by the group in embracing the strategic processes and producing novel solutions was measured.

The impact of performance feedback on group performance worked completely through its effects on affective reactions and perceived collective efficacy. Group productivity was enhanced through group dissatisfaction with substandard performance combined with a strong sense of collective efficacy. The effects of the positive and negative fallacious feedback on the goals the groups set for themselves which partly mediated the advantages of instructive modelling on group effectiveness, was also totally arbitrated by perceived collective efficacy. The distinctive contribution of collective efficacy to group productivity stayed constant after controlling for prior group performance.

Generalized self-efficacy was founded upon the performance accomplishments which occurred during individual learning encounters between the instructor and the student. Positive efficacy and outcome expectations may not have occurred and may not have generalized to the home environment if successful performance accomplishments during these individual lessons and encounters had been absent. With successful performance accomplishments, repeated short-term successes may naturally lead to long-term results and these results may be enhanced through specific verbal messages aimed towards generalizing self-efficacy (Wise, 2000). Essentially, the key to effectiveness lies in the store of successful, individual lessons and the instructor's capability to frame such encounters in ways that lead to efficacious, transferable beliefs of learners.

Path analyses of determinants of athletic performance in different phases of tournament matches revealed the crucial role of perceived self-efficacy under challenging conditions (Kane, Marks, Zaccaro, & Blair, 1996). During opening wrestling tournaments, contestants having less secure self-efficacy triumphed over weaker contestants due to differential ability. Wrestling ability which was measured by athletic level and prior performance record in contests, envisaged competitive performance directly together with the mediated effect of self-efficacy belief and personal goals. On the contrary, when there were pressure-packed overtime matches, with more evenly matched contestants, perceived self-efficacy emerged as the sole determinant of overtime performance.

The subsequent percentage change in their grueling performance was also assessed relative to their base line performance level. The participants' higher perceived self-efficacy and greater discontent with just matching their past performance, resulted in their higher performance output. The subject of past performance and the determinative function of perceived self-efficacy can, undeniably, be approached experimentally instead of patria ting out variances statistically. In an intra-individual experimental design with sequential micro analytic comparison of the relative predictiveness of prior performance and perceived efficacy, this experimental strategy was used (Bandura & Adams, 1977). Handling tasks for serious snake phobic were hierarchically arranged in terms of severity of threat, namely, touching a snake, holding it, letting it loose and retrieving it as it slithered around, and tolerating the snake crawling on their laps. The phobic received guided mastery treatment until they were able to perform the uppermost handling task they failed in pre-test assessment, where-upon they rated their perceived self-efficacy for all the subsequent handling tasks they had never performed. Their handling behaviour was then examined.

An unexaggerated estimate of the regulatory function of perceived self-efficacy because of statistical over control is provided for in studies that apply performance controls. Behaviour is not a reason for behaviour. The degree of commonality of their determinants are simply reflections of correlations between initial and succeeding behaviour. The performances will be highly correlated if the determinants are homogeneous across time. Performance is not an absolute yardstick of ability (Bandura, 1990; Sternberg & Kolligian, 1990); it is heavily pervaded with many motivational and self-regulatory determinants.

Past performance thus becomes a composite indicator incorporating the set of unmeasured socio cognitive factors functioning at the time. Perceived self-efficacy is a vital component of that galaxy of unmeasured determinants of performance. Thus, by beliefs of personal efficacy affects past performance in itself. Being auto correlated, efficacy beliefs thus affect both prior and later performance. Some of the effects of efficacy beliefs on future performance are removed when unadjusted past performance scores are used. Therefore, in ideal terms, control for performance should use the residual after patriating out the prior self-efficacy contribution to variance in performance (Wood & Bandura, 1989).

The domain has surpassed the simple-minded view that self-efficacy beliefs are merely reflectors of performance to analyses of the distinctive contribution of efficacy beliefs in multi-dimensional causal structures. The relation of past performance to subsequent performance is enormously, if not entirely, mediated through efficacy beliefs, goals and aspirations, outcome expectations, and other socio cognitive determinants in these structural analyses (Bandura, 1997).

When people are arbitrarily led to believe that they can control aversive events, they exhibit lower autonomic arousal and less performance impairment than do those who believe that they are deficient in personal control, although they are subjected to similarly painful events (Glass, Singer, Leonard, Krantz, & Cummings, 1973). This is also true for stress reactions to clinical pain. False physiological feedback that patients were effective relaxers introduced beliefs in their efficacy to cope with their oral surgery (Litt, Nye,& Shafer, 1993). In reducing self-rated anxiety as well as anxiety reactions and behavioral agitation during surgery, as rated by the oral surgeon and dental assistant, self-efficacy enhancement surpassed relaxation and sedation drugs. The more their efficacy beliefs were increased by the preparatory ministrations, the lower the anxious agitation was. This was irrespective of the type of ameliorative treatment the patients received.

Based on the discussion above, self-efficacy theory offers several specific explanations of how our beliefs about our ability to complete a task influence the effort we put in and ultimately our level of success. Therefore, it is useful in the guiding of educational design and instructional practice. To apply self-efficacy theory to instructional design and teaching outdoor skills, one needs to first pinpoint the specific desired outcomes before considering how to instill the beliefs within students that they can accomplish these outcomes. When teaching outdoor skills, structures should indicate a clear and realistic picture of desired outcomes by assisting each student to obtain an understanding of how goals can be set for her or his own individual success. Once realistic, individualized goals are established, an educator can utilize Bandura's four sources of self-efficacy to support skill accusation, as outlined within the brief review of the theory provided above. Language that assists the students in making connections between the tasks in which they are succeeding and similar tasks that they will undertake in their daily lives can then be used to support the transfer of the skills.

Theory of Learning Approach. Learning concepts also has different definitions. However, the most popular definition of learning is: The process is a relatively stable change in behavior or potential behavior, as a result of experience and it cannot be a temporary state of the body, such as those caused by illness, fatigue or drugs. These are greatly related to both students' ideas and conceptions of learning and perceptions of their teaching–learning context, and refer to how students' methodologies of learning relate to their learning intentions (motives) and their methods.

Students approach their learning in different ways, operating in response to a series of motivations, internal and external to themselves. The concept of deep and surface learning grew out of the research of Marton and Säljö in 1976. The terms describe the way students tackle their learning. Learners may use deep or surface strategies, or a combination of both throughout their studies. Course and assessment designs and teaching methods all play an important role in fostering deep and surface approach.

Students who deploy a surface approach tend, on the contrary, to conceive of learning as reproducing knowledge, to be motivated and to use measures focusing on the reproduction of those materials. Students using "surface-level processing" may focus on the substance of information and emphasize rote learning and memorization techniques. The goal of studying for a test or exam is to avoid failure instead of grasping key concepts.

A key notion in deep learning is that students take different approaches to learning, with the outcomes of learning closely associated with the chosen approaches (Ramsden, 2003). The commitment to understand the material which is reflected in using various strategies such as reading widely, combining a variety of resources, discussing ideas with others, reflecting on how individual pieces of information relate to larger constructs or patterns, and applying knowledge in real world situations (Biggs, 1995). Also characteristic of deep learning is integrating and synthesizing information with prior learning in ways that become part of one's thinking and approaching new phenomena and efforts to see things from different perspectives (Ramsden, 2003). As Ramsden (2003) put it, "Deep learning is learning that takes root in our apparatus of understanding, in the embedded meanings that define us and that we use to define the world" (p. 70).

Students who employ a deep approach to learning tend to take or perceive of learning as transforming information, to be intrinsically motivated and to use strategies focused on the meaning of the material to be learned. The reason deep learning is important is because students who use such an approach tend to earn higher grades, and retain, integrate and transfer information at higher rates (Ramsden, 2003) Additionally, deep learning is associated with an enjoyable learning experience while the surface approach tends to be less satisfying (Ramsden, 2003).

Surface and deep approaches to learning are not unalterable behaviors, though they may be influenced by personal characteristics such as ability. But using one or the other approach is also affected in part by the learning task itself and the conditions under which the task is performed (Ramsden, 2003). Thus, students may use both surface and deep approaches at different points in their studies. Although students may adopt different approaches in different situations, the general tendency is to adopt a particular approach and stick with it (Ramsden, 2003).

Previous Academic Exposure in Motivational Variables

The study employed motivational variables as its theoretical framework to develop the motivation model. It include include epistemological beliefs, implicit theories of intelligence, achievement goal theory, theory of self-efficacy and theory of learning approaches to support further specifically on in predicting science achievement. The discussion consists of elaboration of each motivation variable models in determining the understanding and outline the theoretical framework of the research.

Epistemological Beliefs. The most recent body of work on epistemological beliefs has been the exploration of the linkages between these beliefs and motivation, learning, cognition, and educational performance (Hofer, 1994; Ryan, 1984b; Schommer, 1993b; Schommer et al., 1992; Schutz et al., 1993). Perry (1981) had speculated on the connection, recommending that revisions in student notions of knowledge would be more likely to lead to changes in studying strategies, caused by changes in learning and cognition. As researched earlier, Ryan (1984b) initiated empirical work in this area, hypothesizing a change in information handling strategies that would come about as a result of the movement from dualism to relativism, and identifying a correlation between epistemological level and comprehension, as assessed by Bloom's taxonomy (Bloom et al., 1956).

According to Schommer et al.(1992 , 1990), "belief in quick learning predicted oversimplified conclusions, poor performance on the mastery assessments, and overconfidence in test performance. Belief in certain knowledge predicted inappropriately complete conclusions" (p. 498). It is also plausible that the structure of these academic tasks, over time, shapes epistemological theories, which are then difficult to improve. For example, students who are given multiple-choice tests composed of low-level items will come to see knowledge as a collection of facts and learn to study for tests by using memorization and rehearsal strategies. Moving to a category where higher-level processes are expected may require not only a change in strategy use, but a change in epistemological theories.

Epistemological beliefs have critical educational implications towards thinking, learning, and problem solving. Generally, students came across with new information in the class room and may proceed the learning practice quite differently depending upon how they view knowledge (Burr et al., 2002). The epistemological beliefs influence students reasoning, use of knowledge strategies, and their cognitive information processing (Hammer et al., 2002). Therefore it may be concluded that student's beliefs are the essential components that considerate their learning, strongly influencing and mediating the development of learning and its outcome (Hofer, 2001; Muis, 2007, 2008).

The influence of epistemological beliefs on both learning process was also investigated in numerous studies (Schommer, 1994a). The study of Schraw et al. (1995) revealed that belief in simple knowledge is associated with study strategies and comprehension of complex text, whereas, belief in simple and certainty of knowledge both are interrelated with students performance (Schraw et al., 1995). Similarly, author noticed that beliefs in quick learning predict students related to their performance. Hofer (2001) Further explored the combined impact of epistemological beliefs on thinking, learning, and performance. Findings were supporting the previous studies. In the same line, few more studies were conducted to further elaborate impact of beliefs on test comprehension and meta-comprehension and conceptual change (Mason, 2003).

These beliefs are congruent with Schommer (1990) quick learning and low-level beliefs from source of knowledge and simplicity of knowledge dimensions (Hofer et al., 1997). In contrast to empirical beliefs, rational problem solvers usually exploit supplementary control and so they are more successful as compare to their empirical counterparts.

Similar to Schommer (1994b) classification, educators also have dichotomized the types of beliefs, appropriate and inappropriate beliefs. These two types of beliefs are based on how students' beliefs influence learning and their learning outcomes. Appropriate beliefs are positively correlated with learning outcomes such as academic achievement, understanding of mathematical concepts and also associated with effective study strategies and problem solving, as contradictory to inappropriate beliefs (Schoenfeld, 1988, 1989). Such person accumulates, discover, or construct knowledge in the course of some activity having a purpose.

Further, based on mixture of personal epistemology research, Muis (2004) also identified system of beliefs. For instance, nature of knowledge, justifications of knowledge, sources of knowledge, and acquisition of knowledge. Within this mixture, students' epistemological beliefs influenced students cognition and motivation, which anticipated her future work connecting personal epistemology and self-regulated learning (SRL) (Muis, 2004). The author further characterized beliefs into two main categories availing and non-availing beliefs. Availing beliefs are positively correlated to both quality learning and achievement, while non-availing beliefs do not affect in a positive way. Therefore, non-availing beliefs are generally inadequate to mathematics learning and achievement. Other researchers also proposed that students at all level grasp non-availing beliefs. For example, students believe that knowledge is reflexively supplied by some authority, educators and text book writer. Therefore, Mason (2003) recommended that instructor should offer interventions to enhance students availing beliefs, and also planned instruction, tasks, and their evaluation in placement with such availing beliefs.

Several researchers also investigated the influence of epistemological beliefs about knowledge and learning on educational process (Schommer- Aikins et al., 2005;

Schommer-Aikins et al., 2003; Schommer-Aikins et al., 2002; Schommer, 1990, 1993b). For example, students who believes in quick learning have a tendency to construct overgeneralized conclusions, acquire poor results, and became overconfidence on test (Schommer, 1990, 1993b). Similarly, students who believe certainty of knowledge probably generate absolute conclusions (Schommer, 1990), whereas, students holding uncertain believes admit multiple perspectives and willingly revise their thinking (Schommer-Aikins et al., 2002). In addition, strong believers in quick and fixed beliefs do not employ study strategies and are expected to believe that mistakes expose their inadequacy (Schommer- Aikins et al., 2005). Consequently, these students feel trouble and are more likely to hang up in facing difficult problems, because strong believers in fixed ability are anticipated to believe that mistake expose their inadequacy. As a result, they may feel more probable hang up in the face of difficulty (Schommer, 1998).

For many years research has been conducted as if epistemological beliefs were domain general which means they can apply across all domains (Kitchener et al., 1981; Magolda, 1992; Perry, 1970; Schommer, 1990). Although, Muis et al. (2006) supported both domain-general and domain specific views of epistemological beliefs.Since, epistemological beliefs vary with respect to domain. Therefore, reseacher suggested that domain must considered when developing contextually dependent studies involving personal epistemology.

Domain-specificity is a key factor in the study of students' epistemological beliefs (Hofer et al., 1997; Muis, 2004; Muis et al., 2006). By domain-specificity of epistemological beliefs mean that they can be applicable to specific academic domains such as mathematics, history, and social sciences(Schommer-Aikins et al., 2013). Students' perceptions differ along with diverse domains. For instance, beliefs about mathematics usually involve perceived level of personal abilities, while beliefs about social studies referred to the level to which the contents are appealing (Schommer, 1990;

Stodolsky et al., 1991). Further, the study of Stodolsky, Salk, and Glaessner (1991) also supported the existence of domain-specific beliefs about knowledge. Author noticed that students possess different attitude towards mathematics versus social science and, also they have different concepts of learning for both of these domain. Findings revealed that students believe that they need some support to explicitly solve science. Whereas, regarding to social studies, these students believe that they can learn by themselves if proper material is provided.

Piaget's (1950) term in describing the genetic epistemological theory of rational transformation is applied. The main objective of the research of Piaget was epistemological. Therefore, by choosing psychology as the genetic origin of evolution of the human species, the review is based on his findings and theories which are related to identification and the study of many categories like metacognition and epistemological beliefs. So, basically it is a philosophical discussion of cognition, but the study of psychology as well. Interaction with the philosophy of psychology, evolutionary psychology is a turning point in history. This link was an important step in response to behaviourist' view of learning and is considered to a distinct category of knowledge.

Parallel to this development, Perry's efforts in understanding how individuals interpret experiences are diverse and plural. Leading from the development of epistemological theories by Hofer and Pintrich's (1997) study of epistemology, which started from the mid-1950s, they are classified into three main groups: First, examining the impact of epistemological beliefs on learning experiences have been interpreted .Perry plans a chain of opportunities to draw the process of transition from one level to the other that will be upgraded, Therefore it is postulated that the person in the world can be changed with passage of situation. Pixie in the evolution of Harvard graduates showed that epistemological beliefs assume that students entering university are based on simplicity, certainty and authority in education abroad. However, most students in their final years of study had stratified complex knowledge-based temporal reasoning.

Epistemological beliefs of almost all activities in the field of psychology can be studied for the first time in two William Perry (1945-1970) studies were considered. 13 students selected as sample during an interview with them on this issue suggested that what you want for your outstanding and impressive achievement were discussed. Based on these interviews, the ethics and wisdom of Perry's plan were established. The project consisting of the sequence is not a position with which the process of transition from one level to another will be upgraded It is obvious that the person who filed his worldview is changed by passing situations. Perry’s thinking as a transformation of the way people interpret the world around them, describes the change.

Several researchers investigated young children’s epistemological beliefs about intelligence independently from Perry’s work (Dweck et al., 1988). Dweck’s theory suggested that some children considered that the learning capabilities are fixed at birth and academic assignment are just used to document their intelligence. Therefore, these children have a tendency to exhibit weak behavior/performance when faced with challenging task. In contrast, other children believe that learning abilities are improvable over time and with experience. They also considered that the function of an academic task is to enhance their intelligence. Therefore, these children tend to confront diverse strategies and show persistence in their efforts to learn when faced with hard task.

Hrgnhan and Olson (1997) argue that learning is one of the most important issues in psychology today, and yet one of the most difficult concepts to define. Due to the importance and complexity of learning the concept should have a different definition However, the most popular definition of learning is: The process is a relatively stable change in behaviour or potential behaviour, result of experience and it cannot be a temporary state of the body, such as those caused by illness, fatigue or drugs is attributed by Pdydmy. These are strongly related to both students' ideas and conceptions of learning and perceptions of their teaching–learning context, and refer to how students go about learning, to their learning intentions (motives) and their methods (strategies) (Biggs, 1995). This construct plays a central role as a process between the input (e.g. teaching context, student factors) and the output (e.g. quality of cognitive learning outcomes). (Biggs, 1995) Researchers have identified two contrasting and theoretically opposed learning approaches: deep and surface (Entwistle& Tait, 1995). Students who deploy a deep approach to learning tend to conceive of learning as transforming information, to be intrinsically motivated and to use strategies focusing on the meaning of the material to be learned. Students who deploy a surface approach tend, on the contrary, to conceive of learning as reproducing knowledge, to be extrinsically motivated and to use strategies focusing on the reproduction of those materials.

There is a crucial aspect which has not yet been thoroughly considered in research on epistemic beliefs: It is not yet clarified how strictly epistemic beliefs are related to domains. Doubts about the transferability of the dimensions of epistemic beliefs across various domains led to further critical questions (Greene, Miler, Crowson, Duke& Akey, 2004): Is it plausible to conceptualise epistemic beliefs as a general basic construct? Are epistemic beliefs intrinsically related to domain-specific features (like knowledge)? Can they plausibly be separated from assumptions about one's own and other people's learning processes in their respective fields? Are epistemic beliefs in nature context-bound and thus situated? Is knowledge about knowledge situated? It is plausible to confirm these assumptions – thus leading to most interesting inter-individual differences in epistemic beliefs.

Most recent research (DeBacker & Schraw, 1995; Greene et al., 2004) argued that priority of future research should be given to investigations of epistemic beliefs across a number of different domains of practice in order to test these assumptions. The educational relevance of such research can easily be shown by analysing how differences in epistemic beliefs influence employees' practices of using learning opportunities, e.g. e-learning applications. In this context, learning can be understood as a process of making sense of the world.

Piaget (1966) developed the ideas of assimilation and accommodation. Both assimilation (using knowledge for solving the situation) and accommodation (configuration of new knowledge) can be considered as learning processes. Work-life provides opportunities for assimilation as well as for accommodation through involving people both in routines and in challenging new tasks (Billett, 2009). The origin of such an approach is the constructivist idea of learning which manifests the importance of subjectivity. As previous experiences, prejudices, and beliefs influence learning and knowledge, it becomes clear that learning, knowledge, and consciousness are individual entities forming a subjective model of the world – which makes sense for the subject. Thus, subjectivity as the autonomy of an individual's thoughts, views, and assumptions can be seen as the epitome of a person's dispositions and capabilities.

Epistemic beliefs are considered as a general construct of assumptions about the nature of knowledge and knowing. There is a crucial aspect which has not yet been thoroughly considered in research on epistemic beliefs: It is not yet clarified how strictly epistemic beliefs are related to domains. Doubts about the transferability of the dimensions of epistemic beliefs across various domains led to further critical questions (Greene, Miler, Crowson , Duke & Akey, 2004): Is it plausible to conceptualise epistemic beliefs as a general basic construct? Are epistemic beliefs intrinsically related to domain-specific features (like knowledge)? Can they plausibly be separated from assumptions about one's own and other people's learning processes in their respective fields? Are epistemic beliefs in nature context-bound and thus situated? Is knowledge about knowledge situated? It is plausible to confirm these assumptions – thus leading to most interesting inter-individual differences in epistemic beliefs.

According to Brendan and Samantha (2013) there is an uneasy relationship between many college students and science. In some cases, this uneasiness is a result of perceived conflict between science and their personal views. The field of epistemology studies the nature of human knowledge, which has the potential to impact students' views on science. They conducted a pilot study in order to quantify the relationship between college students' epistemological views and their socio-cultural views of science. 37 undergraduate students (both science majors and non-majors) completed both the Epistemic Beliefs Inventory (EBI) and the Thinking about Science survey Instrument (TSSI). The EBI is designed to measure students' views on five factors of knowledge, while the TSSI measures nine dimensions of scientific beliefs. They found a significant positive correlation between an innate ability to learn and a belief in quick learning. Most students believed that knowledge is authoritative and were somewhat neutral, that knowledge is certain, that most knowledge is simple and dependent on innate ability. Students also tended to disagree that knowledge is obtained quickly .They also found a positive correlation between a belief in an omniscient authority and certain knowledge; however this correlation was not significant. They also found these same students had a negative attitude towards science in general. This paper provides evidence that there is a relationship between students' epistemological views and how they perceive the scientific enterprise.

In recent years, a few researches in Malaysia have studied entity ability in epistemological beliefs about science. For example the study by NabeelAbedalaziz et al. (2013) investigated the epistemological beliefs about science held by Malaysian students through gender, socio-economic status, and problem solving ability. Data analysis revealed that, students tended to hold more sophisticated beliefs about science. The results of the factor analysis obtained from the current study supported the multidimensional theory proposed by Schommer (1990). The result showed that the Malaysian students' epistemological beliefs about science generally had fairly sophisticated beliefs about nature of knowledge and knowing. For each dimension (i.e., justification, development, certainty, source) students obtained a mean value that was higher than the mid-point of the five - point scale. Participants generally tended to believe that knowledge can change in time and science is an evolving and changing subject, knowledge is not certain and knowledge is not constructed only by authority (e.g., teachers, books). Moreover, new arrangements made in the Malaysian science curriculum should focus on students' attitude toward Science and learning approaches.

In the Malaysian context too, Hashash et al. (2013) had investigated the students' beliefs about the nature of knowledge or epistemological beliefs, and the relation of these beliefs on their learning approaches. Students chosen as samples of the study were from both public and private higher institutions of learning in Malaysia. Results from students of higher institutions of learning both public and private showed that senior students are not adopting the deep learning approach when they should be doing so. This is an indication for a critical examination of several factors by the administration of higher learning institutions such as the constraints they are facing as mentioned earlier (methods of instruction by lecturers, assessment and examination procedures). The growing number of private higher learning institutions in the country provides the avenue for students who do not get placed in public higher institutions. An interesting ethnic related factor established from this research is that the Chinese students tend to use the surface learning approach compared to students of other ethnic groups. The Malay students comprising the majority of the samples of this study were found to adopt more of the deep approach compared to other students. However, as had been pointed out earlier, the adoption of the surface approach by the Chinese in the cultural context is a strategy used which probably fits very well into the assessment of the knowledge disciplines in the higher learning institutions in Malaysia.

Several results in the Malaysian context also revealed that the participants generally had highly naive beliefs about nature of knowledge and knowing. For instance, a research by Wan Ismail et al.(2011) showed that there is a weak and negative correlation between students' academic performance based on their Cumulative Grade Point Average (CGPA) and their deep approach learning. The study shows that the more inclined the students towards adopting the deep learning approach, the higher is their CGPA. Findings established from this study also reveal that there is a high and significantly positive correlation between the various epistemological beliefs of students and their inclinations towards adopting the surface learning approach. Students with less complex epistemological beliefs were found to be more inclined using the surface learning approach where the ability to learn is fixed at birth.

Indeed researchers like Chen & Pajeres (2010) provide support that science ability can be improved and was directly related to sophisticated beliefs about the nature of scientific knowledge, while holding the view that science ability is a fixed trait that was directly related to naïve views about the nature of scientific knowledge. More sophisticated epistemological beliefs in turn are directly related to science achievement and goal orientations, whereas naïve views about the nature of scientific knowledge are directly related to performance goal orientations, and decreased science achievement.

The field of epistemology studies the nature of human knowledge, which has the potential to impact students' views on science, has been worked by Challan and Flower (2013). They explored a pilot study in order to quantify the relationship between college students' epistemological views and their socio-cultural views of science. Undergraduate students (both science majors and non-majors) completed both the Epistemic Beliefs Inventory (EBI) and the Thinking about Science survey Instrument (TSSI). The EBI is designed to measure students' views on five factors of knowledge, while the TSSI measures nine dimensions of scientific beliefs. They found a significant positive correlation between an innate ability to learn. Results from the EBI show most students believed that neutral knowledge is dependent on innate ability. There was a positive correlation between an innate ability to learn. Thus, students who believed that intellectual talent was predetermined had innate ability to gain knowledge.

Educational researchers have entertained the idea that epistemological beliefs may provide a partial explanation for such phenomenon as why some students integrate information and others do not, why some students have flexible criteria for monitoring and others do not (Kitchener & King 1983; Yussen, 1985), and why some students oversimplify information and others do not (Spiro, Vispoel, Schmitz, Samarapungavan, & Boerger, 1987). Previous research suggests that there may be more than one facet to epistemological beliefs. The notions of structure, certainty, and source can be derived from Perry's work (1968) in that he found many students enter college with the belief that knowledge is simple, certain, and handed down by authority. As they encounter complex and tentative information in higher education, they eventually come to believe most knowledge is complex, tentative, and reasoned out.

Factor analysis of Schommer's Epistemological Beliefs Questionnaire highlighted five dimensions on which beliefs about learning and knowing vary. One of the dimensions for the current study includes innate ability (beliefs about capacity for learning; Brownlee et al., 2001). Schommer (1993) also suggested that a learner may simultaneously hold competing beliefs and thoughts, and that these might be represented along interdependent continua. Results of the study show that participants' beliefs that learning ability is innate (Innate Ability) became significantly and more sophisticated with the intervention. Changes toward more sophisticated beliefs approached significance on the scales ability to learn is Innate. These results suggest that at the belief level, the group was less likely to believe learning is based on innate ability.

Chai et al. (2010), surveyed 445 South China college students on their epistemological beliefs and conceptions of the nature of science. Their results indicate that among the undergraduates, a majority of the students are equivocal about whether knowledge is fixed or tentative, and whether ability is innate or acquired. These results seem generally comparable to the results reported by researchers in Asia using the same questionnaire designed by Chan and Elliott (2004) except for the subscales on Certainty of Knowledge. Chan's research on Hong Kong preservice teachers indicate that they are not inclined to rely on authority and that they see knowledge as uncertain (Chan & Elliott, 2004; Chan, 2008).

Elder (1999) noticed that elementary grade students also hold beliefs about the nature of scientific knowledge, and he asserted that it is appropriate to ask elementary school students about their epistemological beliefs. In her study, Elder examined the fifth-grade students' epistemological beliefs (i.e., authority, certainty, developing, and reasoning) in science and the relation of such beliefs to science learning by using a 30-item questionnaire and interviews. She mentioned that elementary-aged students appear to rely on specific constructs like the changing nature of knowledge and purpose of science when trying to comprehend a larger field of epistemological beliefs and that they may initially understand the nature of scientific knowledge in a very situated, topic-dependent manner. Her study also demonstrated that fifth-grade students' beliefs were modestly related to their science learning.

In contrast, Kaplan and Midgley (1999) found a positive relation between performance-approach goal orientation and surface approaches to learning. Students with higher levels of self-efficacy consider difficult tasks as challenges to be mastered. They establish challenging goals, put their effort forth to accomplish them, and use a variety of strategies. On the other hand, students with lower levels of self-efficacy tend to give up easily in the face of difficulty and avoid being involved in the task.

In general, a review of related literature has revealed that students' epistemological beliefs have been linked to a variety of learning outcomes, including academic achievement. Research on epistemological beliefs also documented that students' epistemological beliefs relate to their learning approaches and motivation. However, most of the existing research has concentrated on older students (college and high school), and few researchers have attempted to investigate such interrelations by using young learners. Although epistemological beliefs have been the subject of extensive research for many years in Asian countries, less has been done in non-Asian countries. Malaysia, in this respect, has a special position. Thus, the main purpose of the present study is to address these gaps and present a working model explaining the relations among epistemological beliefs, goal orientation, learning strategies, and achievement. This present study extends research in this area by identifying the relations among elementary school students' epistemological beliefs, learning approaches, motivation, and achievement in a different cultural context.

Recent research evidence has highlighted the relationship between future goals and various motivational, cognitive and performance measures. Apart from this theoretical framework, other research studies have also attempted to amalgamate different theories pertaining to the success of academic performance. In particular, the work involved in study processing and epistemological beliefs, has established findings that indicate the interrelatedness between these constructs and how, in-turn, they combine to affect academic performance directly and indirectly.

Rasoul, Yaghoob and Somayeh (2013) investigated the relationship between epistemological beliefs and self-regulatory (cognitive-metacognitive) learning strategies with high school student's academic achievement. The sample comprised of 268 female students who were selected by cluster sampling. The results of multiple regressions showed that academic achievement can be predicted by dimensions of epistemological beliefs and motivational strategies. The result showed that 25.2% of the variation related to academic achievement of students. When the "Knowledge stability" is added to the model, the amount of R2 increased to 0.335. Accordingly, the contribution of variables "elaboration", "acquisition speed" and "organization" in prediction of "academic achievement" are respectively .06, .03 and .018 percent. Variables "knowledge structure", "inherent ability for learning", " rehearsal" and "critical thinking" had no role in predicting academic achievement. It showed that how individuals resolve competing knowledge claims and evaluate new information, and make fundamental decisions that affect their own and others' lives (King et al., 1994; Kuhn, 1991).

Educational experiences can facilitate development of epistemology, however, a limited study is available about the connection between approaches and sorts of instruction and epistemology (Hofer, 2001). Fewer studies are found from the study of a belief system, which are about instructional implications because the process of belief acquisition and belief change is unclear (Hofer, 2001).

Schommer (1990) Suggested that students should provide the fact that knowledge is integrated and more than one right answer exists. In addition, instructors should provide conceptual understanding of the concepts instead of just teaching facts, challenging tasks that take time, and create test questions that have several possible answers (Schommer, 1993b). More attention about the role of instruction is required (Perry, 1970).

Epistemological beliefs are one of the most critical components of understanding students learning because they deeply influencing and mediating the learning process and the learning outcome. These epistemological beliefs are like an invisible hand, deeply hiding behind an individual's behavioral expression, cognitive processes and emotional experience (DeBacker et al., 2006; Hofer, 2001; Muis, 2004, 2007; Schommer- Aikins et al., 2005; Tang, 2010). Educational psychologists are interested in the effects that students' epistemologies have on cognition, affect, and ultimately student achievement and learning (Stockton, 2010), because they effects on how individuals comprehend, monitor their comprehension, solve problems, and persist in the face of challenging tasks.

In a school setting, students often solve well-defined problems but after their graduation they will face ill-defined real-world problems. The experience of solving well-defined problems does not help students to solve ill-defined problems (Schraw et al., 1995). Personal epistemological assumptions help all individuals to reach solutions. Their personal epistemology affects the processes used to reach a solution as well as the legitimacy of the solution when they solve ill-defined problems (Schraw et al., 1995). Also, it influence students' behavior and processing of information (Garner et al., 1994).

Epistemology can be applied not only to school learning but also to life-long learning in and out of school (Hofer, 2001). It allow us to understand how individuals resolve competing knowledge claims and evaluate new information, and make fundamental decisions that affect their own and others' lives(King et al., 1994; Kuhn, 1991).

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Verschaffel et al. (1999) Recommended teachers to implement more constructivist-oriented classroom environment. In addition to student's beliefs, teacher's beliefs also affect the learning process. Pajares (1992) emphasized that a teacher's beliefs ultimately impacts how he teach. Teachers should respect students' assumptions about knowledge regardless of the students' epistemology level and give appropriate feedback to foster the learning process (Hofer, 2001).

Hofer et al. (1997) examined models ranging from developmental model (Perry, 1970) to multi-dimensional model (Schommer, 1990). Epistemological theories include dimensions of both developmental model and Schommer's belief model. Hofer et al. (1997) acknowledged the Schommer (1990) work of theoretical developments and also her contribution of formulating a questionnaire for measuring personal epistemology. Authors argued that fixed ability beliefs concern the nature of intelligence as a personal, psychological trait of an individual and should, therefore, be considered a separate construct from epistemological beliefs. Hofer and Pintrich pointed out whether or not epistemological beliefs can be measured via questionnaire. These general epistemological beliefs dimensions provided a framework for analyzing student beliefs during any learning episode and may be applied to domain-specific investigations. Authors proposed that individuals' beliefs about knowledge and knowing can be organized into personal theories, as structures of interrelated propositions that are interconnected and coherent (Hofer, 2001). Researchers further argued that personal epistemology should be restricted to dimensions concerning the nature of knowledge and the process of knowing, and that each dimension can be expressed as a continuum (Hofer, 2001). In addition, authors also suggested a general framework for epistemological beliefs in which nature of knowledge includes certainty of knowledge and simplicity of knowledge, while nature of knowing includes sources of knowledge and justification of knowledge.

In other hand, epistemological resources are the another important perspectives about epistemology, highlighted by Hammer et al. (2002). These resources are more fine-grained than a theory and more context-specific than any of the available models. Therefore, Bråten et al. (2005) suggested that epistemological beliefs should be included in models of self-regulated learning. Based on these findings, researchers have sought to integrate a multidimensional model of epistemological beliefs with other cognitive and affective models of learning (Hofer, 2004; Hofer et al., 1997; Muis, 2007; Schommer-Aikins, 2004). Similar suggestions were also projected by Schommer (1998). In summary, in this study , researcher linked these beliefs with motivational factors (Schommer, 1990; Schommer et al., 1992). Students who hold more availing epistemological beliefs are more likely to adopt a mastery goal orientation to learning and engage in material more deeply (Schutz et al., 1993). The study of Hofer (1999) also showed that students' beliefs were related to cognitive, motivational, and achievement factors. There is a positively correlation between beliefs and with intrinsic motivation, self-efficacy, and self-regulation, as well as with course grades.

Achievement Goal. The term goal has a long history in the study of motivation (Anderman & Wolters, 2006). In general, a goal serves as a concrete point of reference for directing our actions in fulfilling our needs (Shah & Kruglanski, 2000), while motivation initiates, directs and sustains behaviour towards goal-oriented activities (Schunk et al., 2008). In recent years, the study of goals has contributed immensely to the field of achievement motivation. A prominent and highly researched area in the study of goals with respect to achievement motivation is achievement goal theory, also known as goal orientation theory (Anderman & Wolters, 2006). Achievement goal theory has been used to explain how students' goals influence their motivation and achievement-related behaviours, and to explain differences in their learning and academic achievement (Ames, 1992; Dweck, 1986; Dweck & Leggett, 1988; Midgley et al., 1998; Pintrich, 2000). A number of researchers have investigated the role of goal orientations in achievement motivation (e.g Habibah Elias et al. (2010) ; Anderman & Wolters, 2006; Dweck & Leggett, 1988; Elliot & Harackiewicz, 1996; Harackiewicz, Barron, & Elliot, 1998; Meece, Blumenfeld, & Hoyle, 1988; Meece& Miller, 2001; Pintrich, 2000a, 2000b).

In a study of Habibah Elias et.al (2010) the strong relationship between flow and learning goals suggests that students with mastery and performance goals tend to become engaged in their learning. According to Habibah Alias ET. Al, students who pursue mastery goals want to acquire new skills, improve their competence, increase knowledge and understanding through putting efforts during learning. Those who adopt performance goals prefer to get favourable judgments towards one's competence, wanting to show that they have good ability and avoid signs of failure as well as outdo other students. In view of the significant role of both mastery and performance goals on academic achievement in school, this study proposes that students with high mastery and high performance goals will have high flow in their learning activities.

For example, Meece et.al (1988) used structural equation modelling to validate a goal model for conceptualizing the influence of individual and situational variables on students engagement in science activities. Task-mastery goals were related to higher active cognitive engagement, while the goals which were concerned with social recognition were related to a lower level of active cognitive engagement. It was also found that these goals were related to the differences in students' intrinsic motivation and attitudes towards learning.

Goal theory originally consisted of two main goal types: learning goals and performance goals (Dweck, 1986; Dweck Leggett, 1988). These two types of goals have also been described as mastery goals and performance goals (Ames & Archer, 1988), task-involved goals and ego-involved goals (e.g., Nicholls, Cobb, Wood, Yackel, &Patashnick, 1990) and task-focused goals and ability-focused goals (Maehr&Midgley, 1991). Learning goals are associated with the development of competence and task mastery through directed effort and persistence. Students who adopt learning goals are intrinsically motivated, persist in the face of difficulty, and seek challenging tasks (Ames, 1992; Dweck, 1986).

In contrast, performance goals are associated with demonstrating one's ability and competence to others. Students who adopt performance goals tend to be more extrinsically motivated, persist minimally in the face of difficulty and avoid challenging tasks (Ames, 1992; Dweck, 1986; Nicholls, 1984). Research on achievement goal theory suggests that mastery goals produce more adaptive cognitive and affective outcomes, and performance goals produce less adaptive outcomes (Dweck, 1999; Kaplan, Gheen, & Midgley, 2002; Kaplan & Midgley, 1999; Karabenick & Collins-Eaglin , 1997; Tapola & Niemivirta, 2008). For example, Kaplan and Midgely (1999) built on 'goal theory' analysis of adaptive behaviour by examining the relationships among task and ego goals, perception of school emphasis on task and ego goals, and the indices of well-being and disruptive behaviour. The results indicated that task goals and perception of school as emphasizing task goals were related to positive psychological well-being, while ego goals and perception of school as emphasizing ego goals were related to negative psychological well-being. The results implied that tasks goals are associated with positive feeling about oneself, and facilitate learning, while ego goals are associated with negative feelings, and disrupt learning.

Furthermore, in contrast with Chan and Lai (2006), and Liem et al.'s (2008), Simon et al. (2004) used principal component analysis (PCA) with varimax rotation to reduce the dimensionality of the factors used in the study. It is a strength of this study compared to Chan and Lai (2006) and Liem et al. (2008) which did not use any procedure to identify the dimensionality of the factors used. However, the method and the type of rotation used in the study can be questioned. PCA does not account for errors in doing the procedure and varimax rotation is one of the orthogonal rotations where the factors are assumed to be uncorrelated. That study, however, used many variables and tested the relation among them and assumed correlations among them.

The theory of achievement goals explains why various levels of success in individuals with the similar competence and level of intelligence develops out of the different features of motivation and goals that they set so as to be successful. This theory was investigated to demonstrate how the achievement level of students may be different with the same intelligence and ability capacity. The achievement goal orientations have been comprehensively examined by some educational scientists in the area of educational psychology (Akın, A., 2006) and they described it a combinatorial design of beliefs, characteristics, and influences that produce purposes of behaviour.

According to the achievement goal theory, students differ from each other with regard to their achievement behaviours. These different aspects of students are related to distinctive emotional, motivational, cognitive, and behavioural outcomes. Individuals are influenced by the beliefs about themselves which have an effect on how they perform a task or what they really do. If a person considers that some characteristics such as intelligence can be developed, they gear up for to improve it and this stimulates them to do much better at school. (Elliot & Mc Gregor, 2001)

According to Midgley and Urdan (2001) investigated the relation individual achievement targets, apprehensions of the schoolroom aim pattern and states of the utilization of personal handicapping ways among the students. As a conclusion of their research, students who were lower in 682 Science motivation of university students:

achievement goals as a predictor task aims handicapped and avoidance goals more than the students who were lower in avoidance goals and higher in task aims. There was a little effect of performance goals level from the point of the link between handicapping and task aims.

A research performed by Kaplan and Maehr (1999), about the achievement goals, is possible to act in enabling the psychological well-being of students. Positive psychological well-being was in relationship with task aims and apprehension of the school as stressing task aims. Moreover, adverse psychological well-being was related to ego aims and apprehension the school as stressing ego aims. According to Pajares and others (2000), task aims were in negative relationship with science apprehension. Avoidance goals were in positive relationship with science apprehension. Researchers detected a significant relationship between task aims and performance goals in the science field.

Improving all science literacy of the students is the purpose of science instruction, so it is indispensable to encourage students to comprehend important science notions, to identify the significance of science and improvement in technology, to comprehend the disposition of science, and to voluntarily maintain their education of science at school. Therefore, student cognition and the affective components of cognition should be addressed together by researches in science teaching and learning. Inside of the effective factors, motivation is crucial since motivation of students plays a crucial role in their notional conversion processes. In that vein, students' motivation plays another important role in critical thinking and learning strategies of students.

On the other hand, according to Napier and Riley (1985), motivation has significant effect on science learning achievement. Together with environmental and social contribution, both ability and ambition are essential in learning. Current views of learning refer to the significance of the idea that both cognition, motivation and will of students are fundamental elements on account of prosperous achievement and learning. Students' motivation becomes obvious in their effective participation in the process of learning, eager approach of difficult learning tasks, and dense diligence sacrifices along the utilization of strategies in active learning, permanency in accomplishing problem solving and learning considering difficulties. Considerably motivated individuals who are more concerned about own process of learning and results, demonstrate larger progress, more advanced levels of mastery, and attempt higher reassurance and positive effect than inadequate motivated students . Literature review shows that many examinations about science motivation were fulfilled. Accordingly, Glynn and others (2011) investigated the students' motivation to study science. Findings suggest that the motivation elements - self-determination, self-efficacy, motivation of intrinsic, motivation of career and motivation of grade play a significant role in individuals' science achievement.

Meese and Jones (1996) researched gender differences in mid-school individuals' self-confidence, motivation goals, and ways of learning in science lessons. Their study showed a few gender differences. Male students reported more confidence in their science capabilities compared to female students. Stake (2006) examined the dimension of social stimulations that conducts the relationship of position and motivation of science and self-reliance. The results shared that stimulation from parents, instructors from school, and friends were each unconnected variables of science motivation. Another study of Bryan and others (2011) examined the motivation of 14– 16 year old learners to learn science. According to the findings, the intrinsic motivation, self-efficacy, self-determination, and achievement of the students were in relationship. The investigation claims that teachers of science had better use social patterns and tasks of collaborative-learning to facilitate motivation, achievement and interest of students' in science lessons.

Elliot and colleagues updated Dweck's dichotomous goal framework with a dichotomous framework by dividing performance goals into approach and avoidance dimensions, creating three independent goals: mastery, performance-approach, and performance-avoidance goals (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Mastery goals focus on task mastery of the subject, and developing knowledge and skills in the area. Performance-approach goals focus on one's ability to outperform others, and displaying one's competence in the subject. Students with performance-approach goals seek to look competent and receive favourable judgements from others. Performance-avoidance goals, on the other hand, are associated with a fear of failure, and the need to avoid looking incompetent compared to others. Individuals who hold performance goals tend to focus on their appearance relative to others, whereas individuals with learning goals tend to focus on improving their knowledge and skills.

More recently, motivational theorists have posited a more comprehensive form of goal orientation, a 2 x 2 goal framework whereby mastery goals are divided into mastery-approach and mastery-avoidance goals, and are added to the two types of performance goals (i.e., performance-approach and performance-avoidance) forming four independent goal orientations (Elliot & McGregor, 2001). Mastery-approach goals in a 2 x 2 framework, which are synonymous with mastery goals or learning goals in the earlier dichotomous and dichotomous frameworks, focus on learning and mastery of the subject, and increasing knowledge and competence through effort. Mastery-approach goals are the most favourable goal type for promoting and maintaining students' interest in academic activities (Harackiewicz, Barron, Pintrich, Eliiot, & Thrash 2002; Midgley, Kaplan, & Middleton, 2001; Schunk& Zimmerman, 2008). Mastery-avoidance goals, in contrast, emerge from the need to avoid failure and misunderstanding in teach (Elliot & Murayama, 2008). An example of a statement reflecting mastery-avoidance goals is "I worry that I may not learn all that I possibly could in this class" (Elliot & McGregor, 2001, p. 504). Mastery-avoidance goals have been a relatively recent addition to the theory and are the least understood type of goal, with the 2 x 2 framework seldom tested or validated (Chan & Lai, 2006).

Empirical studies to date have not provided a clear link between mastery-avoidance goals and indicators of performance, and an avoidance component of mastery-based goals is more difficult to envision than the avoidance component of performance-based goals. Ciani and Sheldon (2010) argued that mastery-avoidance goals have received less scrutiny because of their ambiguity and counter-intuitive nature, and the possibility that high scores for this goal might indicate participants' misinterpretation of items rather than actual avoidance goals. Hence, the dichotomous goal framework was adopted for the present study.

Goal orientation frameworks have been used to understand the role of goals in several academic disciplines. Evidence suggests that measurement of domain-specific goals may be more fruitful for understanding students' goals in those domains. For example, Shively (2009) who measured both general and mathematical goal orientations found that students were more learning and performance-oriented in academics in general compared to mathematics. Furthermore, many studies have used domain-specific items to represent goals in mathematics (Jones, Wilkins, Long, & Wang, 2012; Levpuscek&Zupancic, 2008; Ryan, Ryan, Arbuthnot, & Samuels, 2007; Seo&Taherbhai, 2009; Stipek et al., 1998). The goal orientation instruments used in these studies were written in relation to a mathematics context, and gave the researchers a better understanding of participants' goals and the underlying reasons they had for adopting goals in mathematics in particular, as opposed to general academic goals. Examples of items used to measure mastery, performance-approach, and performance-avoidance goals in the mathematical domain include: ''I like math work. I will learn from it even if I make a lot of mistakes.''; "I would feel really good if

I were the only one who could answer the teachers' questions in math class"; and "One reason I would not participate in math class is to avoid looking stupid.'' (Seo&Taherbhai, 2009, p.196).

Studies have also highlighted that students' adoption of goals differs across studies in mathematics education (Levpuscek&Zupancic, 2008; Seo&Tahaerbhai, 2009; Shivley, 2009; Summers, 2006). For example, Levpuscek and Zupancic (2008) found that a sample of Slovenian eighth-grade students, and Jones et al. (2012) found that a sample of American ninth-grade students, were predominantly mastery-oriented towards mathematics learning.

Moreover, Seo and Tahaerbhai (2009), who used goal orientation items from Medley et al. (1998) to test a dichotomous framework in the mathematical domain for a sample of Korean elementary students found that participants' reported a greater performance-avoidance orientation towards mathematics learning than mastery and performance-approach orientations. Summers (2006) also tested a dichotomous goal framework for a sample of sixth-grade mathematics students in the US, and found that students were task-oriented towards learning in general, but that they were performance-approach-oriented towards values or Cohen's(1992) f2 values for the endogenous (dependent) variables were not reported, which are important for understanding the amount of variance explained from the endogenous variables (e.g., achievement variable). Thus, it is not possible to judge the explanatory power of the model along with the significant relationships demonstrated in the model.

Exploratory factor analysis (EFA) which accounts for the measurement error while measuring the factors, a rotation (e.g., an oblique rotation) that assumes the correlation among the factors, could have been a better choice for Simons et al. Further, the effects size values were not provided to explain the percentage of variance in the achievement predicted from other independent variables. This was a limitation of the study. Vrugt and Oort (2008) also used path analysis to investigate the relationships among achievement goals, learning strategies and achievement for Dutch students enrolled in a psychology course. The relationships were tested between group of students who were more effective and less effective at self-regulation. In both of the groups it was found that mastery and performance-approach goals were positively related to deep-processing strategies . In both the groups, performance-approach goals were also positively related to surface-processing strategies. However, in the more effective group, performance-avoidance goals were not related to either deep or surface cognitive strategies whereas in the less effective group, performance-avoidance goals were negatively related to deep strategies , and were not related to surface strategies. Although surface-processing strategies in both the groups showed a negative effect on examination scores , surprisingly, deep processing strategies did not show any effect on examination scores.

In the another study, similar to that of Chan and Lai (2006) , Liem et al. (2008) studied the impact of dichotomous goals and learning strategies on English achievement for Year 9 students in Singapore. They found that mastery goals were positively related to both deep and surface-learning strategies. Performance-approach goals were positively related to deep-learning strategies, whereas performance-avoidance goals were positively related to surface-learning strategies. The results also indicated that deep learning had a direct positive relation and surface learning had a direct negative relation with English achievement

Similar to Chan and Lai (2006), this study in general showed the relation among goals, strategies and achievement but some differences appeared as far as the relations demonstrated in the model. For example, Liem et al. (2008) found that performance-approach goals were positively related to deep-learning strategies, but this relation was non-significant in Chan and Lai's (2006) study. This difference could be because these two studies tested the variables in different academic contexts. For example, the academic context in Liem et al. (2006) was English language learning in Hong Kong while Chan and Lai (2006) focused on academics in general. From the methodological point of view, this study also had a large sample size for conducting a SEM study. The model explained 44% of the variance (i.e., equivalent of .78 of Cohen's f2) in English language achievement by goal orientations and learning strategies variables. According to Cohen (1992) a value of f2 greater than .35 produces large effect size. The study also tested alternative models to identify the limitations of the original model and to increase the fit of the model used. However, the authors did not conduct a principal component analysis (PCA) or an exploratory factor analysis (EFA) procedure, which would have been important to test the dimensionality of the variables and extract the exact number of factors that accounted for the maximum number of the variance from the variables of the study.

Simons et al. (2004) also used path analysis to investigate the role of goals, study strategies, and achievement for Belgium students in a nursing program. For these students, mastery goals (referred to as task goals in the article) were positively related to deep processing, excitement, persistence and regular studying, and negatively related to surface level processing. Approach ego (performance-approach) and avoidance ego (performance-avoidance) goals were positively related to surface-level processing However, both performance-approach and performance-avoidance goals were negatively related to deep learning strategies. The results also indicated that deep-level processing , persistence, and regular studying were positively related to students' performance, whereas surface level processing was negatively related to performance .

Some of the Vrugt and Oort's results in general differed from the Simons et al. (2004) study. For instance, Simons et al. (2004) showed that only mastery goals were related to deep-processing strategies, which in turn were related to achievement. However, in Vrugt and Oort's (2008) study, both mastery and performance-approach goals were positively related to deep-processing strategies, but no relationship between deep-processing strategies and examination scores was identified. The differences could be attributable to the fact that Simon et al.'s (2004) was on nursing students while Vrugt and Oort's (2008) was on psychology students and the items were measured in the psychology domain.

Finally, in this category, Al-Emadi (2001) tested the relationships among goal orientation, study strategies, and achievement for 424 United Arab Emirates high school students who were enrolled in various introductory courses in different faculties, including humanities, social sciences, science, engineering, law and economics. The students completed questionnaires designed to measure dichotomous goal orientations (mastery, performance-approach and performance-avoidance) and specific learning strategies (deep processing, surface-processing). Mastery goals were positively related to deep processing , and surface processing ; performance-approach goals were positively related to surface processing but were not related to deep processing ; performance-avoidance goals were positively related to surface processing , but were not related to deep processing . When surface processing strategies were positively related to achievement, deep processing strategies were not significantly related to the achievement. The study in general highlighted the importance of achievement goal theory and how goals are related to study strategies and subsequent achievement. However, Al-Emadi indicated the importance of doing further investigation of the psychometric proprieties of the same measures with non-western samples.

Additionally, similar to Simon et al. (2004), the authors used a PCA, but with an oblique rotation to measure the dimensionality of the variables. However, an EFA which accounts for measurement error would have been a better methodology to investigate the dimensionality. The author further reported the effect size for the achievement variable for the study, which was essential to judge the amount of variance explain by the model. Taken together, all the studies showed that mastery goals were positively related to deep learning strategies, while three studies (Al-Emadi, 2001; Chan & Lai, 2006; Simons et al., 2004) showed that mastery goals were negatively related to surface learning strategies. Only Liem et al. (2008) showed that performance-approach goals were positively related to deep learning strategies, while all the studies except Liem et al. (2008) and Al-Emadi (2001) showed that performance-approach goals were positively related to surface learning strategies. However, while four studies (Al-Emadi, 2001; Chan & Lai, 2006; Liem et al., 2008; Simons et al., 2004) showed performance-avoidance goals positively related to surface learning strategies, no studies showed that they related to deep learning strategies. Furthermore, three studies (Al-Emadi, 2001;Liem et al., 2008; Simons et al., 2004) out of five showed that deep learning strategies were positively related to achievement, and three (Liem et al., 2008; Simons et al., 2004; Vrugt&Oort, 2008) out of five showed that surface learning strategies were negatively related to achievement.

Above all, along with the direct relations demonstrated in the above-mentioned studies, the SEM and path models in these studies pictorially represented that there could be some indirect relations among goals, strategies, and achievement. For instance, Simon et al. (2004) indicated the positive relation between mastery goals and deep learning strategies, which in turn indicated that there also existed a positive relation between mastery goals and achievement. Thus, in Simon et al.'s (2004) study, mastery goals could be related to achievement, mediated through deep learning strategies. In general, by testing specific mediation pathways in the models described in the five studies, the researchers could have identified the mediating role of deep and surface processing strategies in the relationship between dichotomous goals and achievement. constructive role in meaning making

Despite the common and contrasting relations demonstrated by the above-mentioned five studies, there were limitations common to all of these studies. First, in all of the above mentioned studies it was found that several causal claims were made as SEM and path analysis techniques were used to analyse the data and demonstrate the relations among the variables. In the past, SEM technique has been named as causal modelling, and theoretically uses the concept of cause-and-effect to build theoretical models. However, it is not wise to use causal claims in reporting the results as SEM and path analysis are non-experimental designs which cannot practically prove causal statements. One of the potential limitations common to all of these studies is that they do not report testing of the convergent and discriminant validity of the measurement instruments. The convergent validity is essential to identify the extent to which two measures of the same construct correlates with each other, while discriminant validity of measurement instrument is essential to judge if a construct does not correlate with measures of another construct. Moreover, all of these researchers mentioned the use of self-reported questionnaire to measure various goals and strategies but used Likert-scales to measure the variables. One of the disadvantages of Likert-scales in social science research is that it makes the respondents choose from fixed responses from the scale, but the researchers treat them as interval scales. By taking the limitations of the above-mentioned studies into account, and developing a model similar to the models in the above-mentioned studies it would extend the achievement goals theory research base, which would in turn have more accurate, reliable and valid information on the relationships among goals, strategies and achievement.

Having introduced the achievement goal theory and what the theory explains and predicts, it is important to explore the antecedents of goals or what possibly predicts achievement goals. Thus, in the next section, I will define and explain 'Implicit theories of intelligence', one of the major components of Dweck's (1986; Dweck & Leggett, 1988) motivation model and an antecedent to achievement goals. It is believed that by understanding students' perception of their intelligence and abilities, educators can much better understand how students adopt and retain goals in academic settings (Hsieh, Cho, Liu, & Schallert, 2008).

Goal orientation theory is a significant area in educational research. Goal orientation theorists define achievement goals as the reason why one engages in an achievement task. In an academic situation, students' orientation to mastery and performance approach is crucial for achieving the intended learning objectives. Students oriented towards mastery are focused on what he or she learns as well as its application. Students oriented towards performance concentrate more on their performance in assessments by trying to do better than their fellow mates, rather than developing their skills, *per se*. These students' focus will be on their class ranking or grades. These two types of goal orientations have been the major focus in achievement motivation researches in the past.

Recently, it has been argued that students adopt one of four principal goal orientations. In addition to the older achievement and mastery orientations, two recent additions are performance avoidance goal orientation (academic alienation) and work avoidance goal orientation. Students with performance avoidance goal orientation hide themselves trying not to get involved in any activity. They do this either because of their inability to perform a particular task or due to hesitation. The focus of students with work avoidance goal orientation is to complete the task at hand with as little work as possible. Here, failure is avoided, exerting a minimum of hard work.

When students are believed to have certain goals towards learning, these are referred to as achievement goals. Achievement goals are the types of outcomes students pursue in learning environments (Dweck, 1989). Mastery goals orient students to a focus on learning and mastery of content, and have been linked to adaptive outcomes such as strong self-efficacy and excellent achievement. Students with mastery goals will seek challenging tasks. When faced with failure, they respond with solution-oriented instructions, as well as sustained or increased positive effect and sustained or improved performance.

The concept of achievement goals generally stands for a comprehensive semantic system of situations or contexts which have cognitive, emotional, behavioural outcomes and learners use them to interpret their performances (Dweck & Legget, 1988; Duperyat and Marine 1988).

According to the goal orientation theory, achievement goals are defined as the terminal point towards which one's efforts are directed (Barkur, 2013). To see the correlation between academic achievement goal orientation and the performance of Malaysian students, a study was held in an Indian medical school. The results showed a strong positive correlation between performance approach, performance avoidance and work avoidance orientations. Of the four goal orientations, only the mean scores in work avoidance orientation differed for low performers and high performers. According to Barkur (2013), work avoidance type of goal orientation among the low performers group may account for their lower performance compared with the high performers group. This indicates that academic achievement goal orientation may play a role in the performance of undergraduate medical students.

In a recent Malaysian context study, Ong (2014) identified the goal orientation of adult students in the Malaysian context. The findings of this study showed that mastery goal orientation registered the highest mean among the adult students. Therefore, the adult students were found to have adopted mastery goal orientation in their learning process. According to Ong, it is recommended that deep learning methods such as flexible learning and problem based learning can be used to encourage students to take greater responsibilities for their learning outcomes. In short, high levels of mastery goal orientation indicate that students are willing to grow and develop new skills and competencies by exhibiting achievement related behaviour and perform better in academic activities. Students who adopt mastery goal orientation may apply motivational, cognitive and deep learning strategies towards their lifelong learning over time.

Elliot & Church (1997) have proposed a three dimensional framework of achievement goals. According to this view, the students with performance-approach goals assume the activity they do to achieve a goal and demonstrate themselves to others in a competition. Moreover, these students tend to emphasize demonstrating their skills in comparison with others. Further, those who adopt performance-avoidance goals concentrate on avoiding lack of skills in comparison with peers and classmates and their attention is on avoiding failure. Finally, the outcome of such a goal setting is feeling inefficient and those who adopt mastery goals insist on elaborating their skills, learning, and mastery.

In the Malaysian context too, researchers like Habibah Elias et al, (2010) found the significant role of both mastery and performance goals on academic achievement in schools. Students with high mastery and high performance goals will have high flow in their learning activities Students who pursue mastery goals want to acquire new skills, improve their competence, increase knowledge and understanding through putting efforts during learning. Students with performance goals prefer to get favourable judgments towards one's competence and always show their high ability to avoid failure.

According to Pintrich (1999), in terms of the use of dichotomies, goal theory has traditionally viewed mastery and performance goals in opposition to one another.

However, the empirical results from correlational studies with survey data have found that mastery and performance goals may be negatively correlated, uncorrelated, or even positively correlated. Among the variables which may be considered are those that focus on: a) Mastery goals, which focus on understanding of content and its concepts and content, and also its application to tasks such as academic alienation, work avoidance, learning, task-involved, mastery goals, and approach and avoidance performance goals. b) Performance relative to others such as performance, relative ability, ego-involved. c) Outcomes such as interest, self-regulation, goals, attributions, self-efficacy, levels of cognitive engagement, affect, persistence and choice behaviours. For Pintrich, achievement goals refer to the purposes or reasons an individual is pursuing an achievement task, most often operationalized in terms of academic learning tasks.

Students' achievement goal orientations and learning strategy used are context-specific traits rather than general traits. Ames and Archer (1988) argued that (a) situational demands are the initiating factors that shape students' individual perceptions which, in turn, form adoption of different goal orientations and (b) goal orientations finally lead into variance in students' use of learning strategies. These arguments are critical because they illustrate the dynamic interplay between social, motivational, and cognitive factors that influence learning behaviour (Somuncuoglu & Yildirm, 1999).

Phan (2007) pointed out that the body of literature has also documented empirical links between the adoption of mastery and performance goals and the ways students cognitively engage in their academic tasks. Cognitive engagement has commonly been conceptualized as deep and surface learning strategies. Deep learning is characterized by such strategies as elaborating ideas, thinking critically, and linking as well as integrating one concept with another. In comparison, surface learning is characterized by such strategies as memorization and reproduction of the learning materials (Biggs, 1995). Accumulating evidence in the achievement goal literature has established a consistent pattern that a mastery goal would facilitate the use of deep learning strategies (Elliot & McGregor, 2001).

However, the early achievement goal theory or the ‘‘normative’’ goal theory (Schunk, 1991) witnessed inconsistent patterns with regard to the relation between a performance goal and the two types of learning strategies. To address this inconsistency, Elliot (1999) reviewed the conceptualizations of the performance goal that had underpinned studies in the early literature. Concurrently, he explored a possibility of incorporating approach and avoidance valences of motivation derived from the classic achievement motivation literature into the achievement goal theory. He argued that the inconsistency found on the relational patterns between the performance goal and external variables were primarily influenced by the lack of agreement among researchers with respect to the operationalization of the performance goal construct. Measures of the performance goal in the early literature varied between studies, with some formed entirely by positively-valence items (or an approach motive), and others made up by both positively-and negatively-valence (or an avoidance motive) items, and thus tapping the amalgam of approach and avoidance forms of the performance goal. It was therefore not surprising why the early studies failed to show a clear pattern between the performance goal and various achievement process- or outcome-related variables. This reconceptualization has led to the bifurcation of performance goal into its approach and avoidance forms. Together with mastery goal, performance-approach and performance-avoidance goals makes up the ‘‘dichotomous’’ model of achievement goals (Elliot& Church, 1997).

More recent studies underpinned by this model have established a clear positive relation between a performance-avoidance goal and a more superficial level of learning strategies (Elliot & McGregor, 1997, 1999). In line with the above theoretical and empirical considerations, we predicted that a mastery goal would be positively associated with the use of deep learning strategies, whereas a performance-avoidance goal would be positively related to the use of surface learning strategies.

According to Dweck and Leggett (1988) performance goals encourage students to focus on scoring better than others or avoiding the appearance of incompetence. Students with performance goals strive to demonstrate ability and avoid negative judgments of competence... They evade challenges and obstacles, and prefer simple tasks where success is guaranteed. When confronted with challenging tasks, they may withdraw due to the risk of failure, demonstrate negative effect, make negative ability attributions, and report decreased interest in the task. Research suggests that goal orientations may exist independently of each other, allowing students to adopt multiple goals simultaneously, such as an orientation towards mastery of information as well as striving to perform well on a test. Students may adopt only one goal, or both goals with one being a primary goal and the other being a secondary goal.

According to Dowson and McInerney (2001), goal orientation is conceptualized as different ways an individual may adopt in pursuing goals and competence in achievement situations. It is a motivational orientation which can influence their learning behaviour overtime. Educational research has described goal orientation as individuals' disposition on how they oriented themselves in responding to task difficulty (Elliott & Dweck, 1988; VandeWalle, 1997).It is believed that these goals will foster their response patterns to specific tasks (Dweck&Leggett, 1988). Past researchers (e.g.Elliot, 1999; Elliot&Church, 1997; and Walle, 1997) have used a dichotomous framework in their study where they divide goal orientation into three different dimensions, namely mastery, performance-approach and performance-avoidance goal orientation.

Some studies investigated students' goal orientation on learning strategies as a study to identify the goal orientation of adult students in the Malaysian context. The findings of this study shows that mastery goal orientation registered the highest mean among the adult students. Therefore, the adult students were found to have adopted mastery goal orientation in their learning process. There were no significant differences in the mean scores of mastery goal orientation among gender, age group and years of experience of the respondents. In addition, this study also attempts to offer higher education in situations to understand the students' learning strategies by knowing their goal orientation. It provides information on how deep learning strategies can be integrated with mastery goal orientation so that they are in line to produce better learning outcomes. It is recommended in this study that deep learning methods such as flexible learning and problem-based learning can be used to encourage students to take greater responsibilities for their learning outcomes. In this respect, they will be able to interact with the facilitator on the course material in a more practical and analytical manner. In terms of future research, this study provides validated measures of goal orientation which can be used by future researchers in a similar research setting.

Goal theories research on motivation and interest in children's achievement and its contribution to education has been long undertaken and has been a matter of interest to many researchers from Ames (1992), Dweck (1999) to Pintrich (2000b). From here, several different approaches have emerged. For instance, Bandura (1997) and Schunk (1990) have shown that specific, proximal, and somewhat challenging goals promote aspects of self-efficacy and improved performance.

The association of performance goals (like ego-involved goals) and mastery goals (like task-focused goals) with both performance and task choice has been acknowledged by Ames (1992). An important advance in this area is the distinction between performance-approach and performance-avoid goals (Elliott & Church 1997, Midgley et al.1998). According to Wilfield and Eceels (2002), this distinction arose in part because of some inconsistent evidence about the effects of performance goals on various outcomes.

As the name implies, performance-approach goals involves engagement in achievement tasks for performance reasons, whereas performance-avoid goals concerns disengagement in order not to appear stupid. Generally, performance-approach goals appear to have more positive consequences on motivation and achievement than do performance-avoid goals. However, there is some disagreement among goal theories about the positive consequences of performance-approach goals (Midgley et al. 2001). This distinction is quite similar to the distinction originally made by Atkinson (1964) between the approach and avoidance components of need-achievement motivation.

Researchers like Ford (1992) and Wentzel (1991) adopted a more complex perspective on goals and motivation, than on mastery versus performance criteria of success. Wentzel demonstrated that both social and academic goals relate to adolescents' school performance and behaviour. Wentzel (1991) found that the goals related to school achievement include seeing oneself as successful, dependable, wanting to learn new things, and wanting to get things done. Higher-achieving students have higher levels of both social responsibility and achievement goals than lower-achieving students (Wentzel 1993, 1994).

Similarly, Wentzel (1994) documented the association among middle school children's prosaically goals of helping others, academic prosaically goals such as sharing learning with classmates, peer social responsibility goals such as following through on promises made to peers, and academic social responsibility goals such as following the teacher's instructions. Prosocial goals (particularly academic prosocial goals) related positively to peer acceptance. Interestingly, academic responsibility goals related negatively to peer acceptance but positively to acceptance by teachers. Further, positive prosocial and academic goals related positively to prosocial behaviours (as rated by teachers) and negatively to irresponsible behaviours. Finally, the pursuit of positive social goals was facilitated by perceived support from teachers and peers.

Many literature contained mixed results relative to how achievement goal orientation influences academic success. Dupeyrat and Mariné (2005) found a positive relationship between achievement goals to academic success. Vermetten, Lodewijks, and Vermunt's (2001) results indicated that effort and outcome exist together to achieve academic success. Elliot and Dweck (1988) argued that performance-approach students were competitive and feel most successful when they can outperform their peers. Archer (1994) asserted that students with performance-orientation employ effort to learn in the short-term to avoid incompetency, which does not contribute to their long-term academic success. Elliot and McGregor (1999) posited that performance-goals were positively related to academic success while performance-avoidance was negatively related to academic success. Their study results indicated that mastery and performance approach goals were positively related to academic success and performance-avoidance and work-avoidance were related to poor academic performance. These findings suggested that both mastery-approach and performance-approach goals are associated with learners' academic success Sins, van Joolingen, Savelsbergh, and van Hout-Wolters's (2008) study used 60 pre-college asynchronous students to test their model consisting of achievement goal orientation, self-efficacy, cognitive processing, and performance on a computer task. Log-file findings suggested that the mastery-approach goal significantly influenced achievement, which mediated students' deep cognitive processes. Their results indicated that there was no relationship between performance-avoidance to achievement or between surface processing to achievement.

Lau, Liem, and Nie's (2008) results demonstrated that students with a mastery-approach goal orientation strived to attain knowledge and skills, while mastery-avoidance learners avoided misunderstanding and forgetting material that could lead to a sense of incompetence. Conversely, performance-approach learners strived to outperform their peers and performance-avoidance learners avoided demonstrations of incompetence.

Evidently, the mastery and performance approach-avoidance aspect greatly influence academic success.

Midgley, Kaplan, and Middleton (2001) opined that students may have a combination of mastery and performance-approach goals, which may be either positively or negatively related. Therefore, these authors recommended researchers to address how these goals combine to increase motivation and achievement. The combination of mastery and performance-approach goals may present challenges relative to the identification of achievement goal orientation as a predictor of asynchronous learners' academic success. The combination of achievement goal orientations is examined in more detail below and in subsequent sections.

Several researchers' (Coutinho & Neuman, 2008; Harackiewicz, Barron, Pintrich, Elliot, Thrash, 2001; Linnenbrink & Pintrich, 2000, 2001) findings indicated that students adopt multiple goal orientations used independently of one another, which is dependent upon the learning task. Middleton and Midgley's (1997) study demonstrated that performance goal learners put effort into study to obtain short-term success or to avoid failure. These authors noted that learners with work-avoidance exerted minimal effort to get a job done to avoid failure and avoid difficult tasks. These results suggested that students with performance goals did not avoid challenging learning tasks to avoid feelings of incompetence; instead they avoided challenging tasks to avoid negative consequences such as repeating a course.

Goal orientations comprised of an integrated type of beliefs, which are able to direct towards diverse engaging, approaching, and responding to achieve certain goals (Ames, 1992). The idea of goal orientations usually indicates the motive for doing goals or tasks (Bråten et al., 2004; Rastegar et al., 2010). These goals are the forms of different outcomes for which students pursue their learning environment (Coutinho, 2007; Dweck et al., 1989).

Usually, there are three types of goal orientations, including mastery, performance and avoidance. Mastery goal orientation also labeled as task or learning goal orientation. Across these different labels, basic construct is same with minor theoretical differences attached to them. However, in mastery goal orientations focus of the students is on mastery of the subject matter. Whereas, performance goal orientations often known as ability or ego orientation, where students are provoked to show their performance as compared to the other students (Ames, 1992; Anderman et al., 1994; Dweck et al., 1988; Nicholls, 1984a; Pintrich et al., 1996; Urdan et al., 1995). The nature of both mastery goal and performance goal is different from each other. Due to dissimilar nature, both these beliefs influence outcomes differently. In contrast, avoidance goal basically mediate students to quit from learning so as to avoid illuminating their incapability in front of others. Detail of the influence of mastery goal performance goal and performance goal is provided in the proceeding section.

Master goal orientation has a strong correlation with positive motivational beliefs such as, high level of self-efficacy, more adaptive characteristics and perceived competence (Ames, 1992). As it is highly correlated to optimistic self-efficacy beliefs, therefore thoughts of anxiety became diminished (Pintrich et al., 1996).

Generally, master goal orientation is also linked to a wide range of academic outputs, such as use of self-regulatory strategies (cognitive), self-efficacy and achievement (Ames, 1992; Patrick et al., 1999; Pintrich et al., 1992). In addition, Pintrich et al. (1996) also reported a significant connection between mastery goal and quality of students' cognitive engagement and cognitive processes, respectively. These results were well supported by several others researchers (Graham et al., 1991; Nolen, 1988; Pintrich et al., 1990). It was revealed that mastery orientated students prefer cognitive strategies including, organizational strategies and elaboration. Both of these cognitive strategies show deep level of cognitive processing. Therefore, these students more able to utilize self-regulatory strategies and memory recall. As a result, these students show better text comprehension.

Gender difference is also important while considering mastery goal orientation. It was surprisingly observed that females are more mastery oriented as compared to male (Meece et al., 1993; Nolen, 1988), whereas, Ryan et al. (1997) rejected this gender differences in his study. Several researchers interrelated this to school subjects. Students' goal orientations can be functioned differently due to different subjects (Stodolsky et al., 1991). Regarding to the subject English, Anderman et al. (1997) revealed that females are more mastery goal-oriented as compared to male, whereas, Patrick et al. (1999) observed no dissimilarity in goal orientation for the mathematics subject.

Performance goal orientation is concerned with institutional grades and other rewards instead of interest in that subject or any intrinsic value(Ames, 1992; Dweck et al., 1988). Performance orientated students have less adaptive motivational beliefs such as lesser awareness of competence and self-efficacy (Ames, 1992; Dweck et al., 1988; Nolen, 1988; Pintrich et al., 1992). Pintrich et al. (1992) proposed that performance goal orientation linked with low level of cognitive engagement which directs students towards surface processing strategies like rehearsal, instead of using deeper self-regulatory strategies. Beside this, performance goal orientation can produce negative cognitive and motivational processes associated with negative performance outputs (Pintrich et al., 1996). Therefore, Midgley and his co-authors further classified performance goal orientations as extrinsic and relative ability goal orientations (Anderman et al., 1994; Midgley et al., 1996).

Extrinsic goal orientated students seek rewards including school grade, praise from parents and teachers. Other main reason may be to avoid the external sanctions such as punishment or penalty. While in relative ability goal orientation, social comparison is the main driving force, students do not want to perform less than other and compete with others to be the best (Anderman et al., 1994; Midgley et al., 1996).

Avoidance goal oriented students emphasize on avoiding lack of skills as compare to their peers and class fellows (Rastegar et al., 2010). Since, the goal setting of these students is to avoid failure. Therefore, they realize incompetency as compared to others (Elliot, 1996). As a result, avoidance goal oriented students show negative outcomes. Due to these, students show slight interest during task engagement (Elliot, 1996), hesitated to look for help during schoolwork(Middleton et al., 1997), reduced intrinsic motivation (Elliot et al., 1997), and low achievement (Winne et al., 2004).

There are some inconsistencies in the literature regarding to goal orientations. The study of Wolters et al. (1996) demonstrated that mastery goal orientation is interrelated with achievement, however, few researchers reported a null relationship between these two variables (Elliot et al., 1997; Skaalvik, 1997). Beside this, there are few conflicts concerned with the association of performance goal and academic achievement. The study of Middleton et al. (1997) and Elliot et al. (1997) revealed that performance goal oriented students tend to orient themselves to do well, hence they show better performance. On the other hand, few more studies rejected this relationship (Butler, 1993; Button et al., 1996; Coutinho, 2007).

Similarly, conflicts in relationship between avoidance goal orientation and achievement were observed. In several studies, a negative relationship between avoidance goal orientation and achievement was reported (Elliot et al., 2001; Skaalvik, 1997). However, some others researchers claimed a null relationship between them (Elliot et al., 1997; Kingir et al., 2013).

There is a possibility that interest in goal orientations may led more than one goal may be simultaneously operative and may exist separately from each other. Accordingly, it allows students to engage in multiple goals concurrently (Meece et al., 1993). There is one more possibility that student may adopt one task, or can adopt both goals simultaneously, with being primary and secondary goal, respectively (Coutinho, 2007). Researchers anticipated that these students may probable score high or low on each type of goal (Ames, 1992; Meece et al., 1993) . Their combined impact may differ from the individual effects (Fox et al., 1994; Wentzel, 1992), because cognitive and self-regulatory processes depend partly on the joint and interactive effects of goals more precisely than on single goals (Suárez Riveiro et al., 2001). Cultural environment is also very important while considering academic motivation because in western countries it may operate in different ways as compared to Asian contexts (Ho et al., 2008).

In summary, the goal orientation provides a viable framework to study. Goal orientations are defined as "a set of behavioral intentions that determine how students approach and engage in learning activities" (Meece & Jones, 1996). Goal orientations can further be described as a set of beliefs students have concerning their goals that explain why the goal is important to them (Meece et al., 1988).

Learning Approach. There are previous studies that supported and opposed the relationship between learning approach to academic success (Bajraktarevic, Hall, & Fullick, 2003; Felder & Silverman, 1988; Felder & Soloman, 1997; Franklin, 2006; Gardner, 1995; Honey and Mumford, 1982; Kolb, 1984).

Duff's (2004) Revised Approaches to Studying Inventory (RASI) is a three-factor instrument used in the current study, which consists of the deep, surface, and approaches to learning. Deep processors use elaborative processing and critical thinking skills and seek full understanding of what is learned. Surface processors learn by developing repetitive or rote memory to recall facts. Strategic processors are organized and approach learning using strategies such as reviewing past exams to study for exams (Duff, 2004).

The learning strategies are examined in more detail to increase understanding about how they influence asynchronous learners' academic success.

Ramsden (2003) cited inappropriate assessment procedures as the reason for learners' adoption of surface processing and that varying assessment questions may not elicit the intended deep processing approach. Entwistle and Tait's (1995) findings suggested a relationship between students' learning approaches to learning and assessment preferences. Entwistle, Entwistle and Tait (1995) opined that multiple choice assessments or emphasis on factual answers elicited surface processing, while essay formatted questions elicited a deep processing approach. Students who reported they were surface learners preferred supportive teaching and assessment procedures. Deep processors preferred intellectually challenging assessment procedures that allowed them to demonstrate their understanding (Entwistle & Tait, 1995). These findings indicated that educators need to use tests that elicit the intended surface or deep processing response as learners will utilize the learning strategy that best fits the learning task.

Students with a deep learning and mastery-approach search for enhanced understanding and meaning, intrinsic motivation, and integration or holistic learning they can transfer to other learning experiences. Conversely, students with a surface or performance-approach do not search for deep meaning or understanding, further connections, and extrinsic motivation beyond a grade or outperforming peers (Biggs, 1995). For example, learners employ a surface approach for learning tasks that require low-level cognitive strategies such as the acquisition and recitation of facts and details.

Entwistle and Tait's (1988) study examined the differences between surface and deep processors. They found that surface processors use a lower level of cognitive processing. Surface processing was used to repeat the problem without interpretation and repeat information and ideas or concepts without individual input. Surface processors also proposed solutions to problems without support. Surface processors generally asked irrelevant questions and proposed several solutions without specifying the best solution. Conversely, deep processors used higher cognitive processing associated with higher learning and critical thinking skills. They utilized a high level of cognitive processing and connected facts to effectively interpret, judge, or propose solutions. Deep processors also proposed new elements and used hypotheses or quotes to support new information. They also proposed more than one solution and considered advantages and disadvantages associated with the situation and solution. Finally, deep processors supported their judgments with justifications and addressed problems and solutions using a global perspective (1988).

Offir, Lev, and Bezalel's (2007) findings indicated that deep processing contributed to higher cognitive processing. Conversely, lower cognitive surface processing (e.g., understanding and reciting information) did not foster higher learning and critical thinking skills. The authors recommended the cultivation of deep learning processing in asynchronous learning by providing students with higher-order questions to increase understanding and evaluation of information. Their findings suggested that learners used deep processing to tackle high cognitive learning tasks and used surface processing for lower cognitive learning activities. For example, learners may employ deep processing for essay type examinations or surface learning for multiple choice questions that require rote memorization (Entwistle & Tait, 1995). Learners generally are predisposed to be either deep or surface processors, but adapt their learning strategies to execute the required learning strategy required of the assessment or learning task (Offir, Lev, & Bezalel, 2007). This notion of adapting learning strategies to form an integrative learning process is well supported in the literature, which is further examined.

Several researchers agree that learners adopt an integrative learning process that enables them to use appropriate learning strategies required of the learning activity or examination (Coutinho & Neuman, 2008). A reasonable assumption is that students may perform better on examinations when the learning approach used in coursework and examinations are aligned, such as surface approach coursework with surface approach oriented examinations. Congruency between the coursework and type of examination may be a critical factor that affects test performance across different academic disciplines and teaching approaches, which directly or indirectly influences learners' academic success. However, all approaches to learning are adaptive (Offir, Lev, & Bezalel, 2007) and academic success requires higher-order and critical thinking skills, which is addressed next.

To cultivate learners' higher-order thinking and critical thinking skills, Bloom's taxonomy's cognitive domain is often used in asynchronous learning. Bloom's cognitive domain consists of basic knowledge, comprehension, application, analysis, to evaluation levels in which the last three levels are associated with higher-order skills. Critical thinking refers to students' ability to answer convergent and divergent questions. Convergent questions relate to the first three levels while divergent questions relate to Blooms last three levels.

Kindsvatter, Wilen, and Ishler's (1992) four levels of questioning parallels Bloom's taxonomy levels in which learners: (a) reproduce information, (b) understand and organize information, (c) cite reasons or causes, and (d) respond originally and creatively to problems.

The following supporting and opposing literature relative to how learners' use of cognitive processing and study strategies influence academic success are examined next. Vermunt et al (2001) meta-analysis investigated how students employ cognitive processing strategies required in deep, stepwise (surface), and concrete processing. Their analyses indicated that deep processing learning activities consisted of a combination of relating, structuring, and critical processing. Further findings suggested that stepwise processing required analyses and memorization and concrete processing requires application in learning activities. Vermuntet al (2001) used the term learning style as an overarching concept to signify the interdependent relationship between cognitive and affective processing of information, metacognitive regulation of learning, learning conceptions, and learning orientations. He identified four learning styles or patterns, which were undirected, reproductive-directed, meaning-directed, and application-directed, where the last two learning patterns are associated with higher-order thinking (Vermunt et al, 2001). These learning styles or patterns may have important implications for academic success in both traditional and non-traditional learning environments.

Literature contains mixed perspectives about how learning strategies influence academic performance. Vermunt et al (2001) study findings using 795 participants indicated high correlations between learning style and academic performance with slightly different results across domains in domestic and foreign countries. Meyers et al (2006) noted that some students did not experience the interrelationships between learning conceptions and learning motives and learning processes, which is known as cognitive dissonance.

Beishuizen, Stoutjesdijk, and Van Putten's (1994) findings demonstrated that psychology learners performing a computer task combined deep processing, self-regulation, and external regulation with surface processing to achieve the highest scores on the learning task. Conversely, they found that students who combined external regulation with deep processing, self-regulation, and surface processing performed poorly. Vermunt et al (2001) findings indicated that low performing psychology students experienced dissonance due to the lack of differentiation in their learning strategies, conceptions, and orientations. Beishuizen and Stoutjesdijk's (1999) findings suggested a relationship between learning style to achievement in their study that compared asynchronous psychology learners with deep processing and surface processing. These findings indicated that deep processors had higher achievements and scored higher on knowledge test questions compared to surface processors.

Busato, Prins, Elshout, and Hamaker's (1998) findings examined how undirected learning, meaning-directed learning, and reproductive and application-directed learning influence academic success. They found that undirected (disorganized) learning was negatively correlated to academic success, meaning-directed (deep processing) was positively correlated to successful learning, and reproductive and application-directed learning had no relation to academic success. However, cultural differences influenced both teaching practices and learning structures. Marton et al (1996) noted that Chinese students examined phenomena holistically and did not experience memorizing and understanding opposite poles, which influenced their academic outcomes.

Graff (2003) opined that there is a diverse number of learning strategies represented in the online learning environment. Course developers have the daunting task of designing online courses that match diverse learners' cognitive style. The majority of asynchronous learners are older and highly motivated. These learners strive to achieve academic success, enjoy the convenience, and expect a high quality instructional design. However, learners who are unprepared for the online learning environment, or need spontaneous and hands-on learning experiences may need classroom instruction to achieve academic success. The selection of the appropriate learning environment to maximize academic success is dependent upon the learner's individual learning needs and learning style.

Clayton, Blumberg, and Auld (2010) surveyed 132 postsecondary traditional students to examine how achievement goals, self-efficacy, and learning strategies influenced their choice of online, hybrid, or traditional learning environment. The survey solicited the reasons for students' learning environment preference and their motivation orientation and learning strategies. Their findings indicated that a majority of students preferred the classroom learning environment which they believed best met their learning style and engaged them in the learning process. Discriminate analyses found a significant difference in the motivational beliefs and learning strategies. The students had a mastery-goal orientation associated with exerting sufficient effort in learning for academic success. Their results also suggested students who preferred online or hybrid learning environments were confident they could achieve academic success in these non-traditional learning environments. It is logical that students in a traditional learning setting would prefer the same learning environment in which they are enrolled.

Students gravitate to the learning environment that best meets individual learning needs (Yang, Tsai, Kim, Cho &Laffey (2006). Therefore, the high percentage of traditional students' preference for the traditional learning setting merely suggested that students prefer the same setting in which they are enrolled. The 3% of students' essays stating they preferred online learning environments while in a traditional course will eventually gravitate to an online learning environment (Yang, Tsai, Kim, Cho &Laffey (2006). Therefore, most online students would prefer the same environment they are enrolled in unless they believe they would be more successful in a traditional learning environment (Yang, Tsai, Kim, Cho &Laffey (2006). Further, the essay formatted assessment elicits deep metacognitive skills associated with mastery-approach orientation. If a multiple-choice assessment was administered, the students would have utilized a surface-approach, which is associated with minimal metacognitive skills (Coutinho&Neuman, 2008; Entwistle& Tait, 1995). Therefore, the essay formatted exam may account for the high percentage of traditional students with a mastery-approach versus attributing this finding to the learning environment.

The Rose et al. (2001) study investigated whether the difficulty level of a college exam affected the students' study strategies (self-regulated metacognition) and performance. The findings suggested that students who were informed they would be completing an essay-type exam employed deep-processing cognitive processing. When students were informed they would have multiple choice tests, they utilized surface cognitive processing associated with rote memorization. However, when the students were instructed to be prepared to answer both deep-processing and surface-processing type test questions, they adapted and aligned their study and learning strategies to the anticipated dual test formats (Entwistle& Tait, 1995). The confirmed findings revealed students perform better when they are informed of the level of cognitive processing needed to guide their study and choice of learning strategies. Generality of these findings to similar populations is tentative due to the short test, controlled environment, and use of a self-report instrument. However, adequately preparing students for studying for future tests may have important implications for assessing student performance in both traditional and non-traditional settings. Test anxiety and test format may also influence test performance, which are examined next as test performance is indirectly related to GPA and academic success.

Vermunt et al (2001) findings suggested students' learning strategies, conceptions, and orientation relative to variance in examination performance ranged from 25-50% across different subject areas. Vermunt's four learning styles (i.e., undirected, reproductive, meaning, and application-directed) explained that students in their first few years of higher education generally did not exhibit high levels of critical, analytical, or concrete processing strategies. However, his findings suggested that asynchronous learners generally utilized more meaning-directed (deep processing) strategies compared to their classroom counterparts across all subject areas. The findings also suggested that asynchronous learners scored higher than classroom learners on tests. These test areas included the relating and structuring process strategies in all types of exams such as factual knowledge, insight questions, multiple choice, application questions, and open-ended questions. However, this study also revealed a negative correlation between reproductive-directive and in some analysis sections of the tests. Asynchronous learners were found to have positive correlations between learning orientation, certificates, and exam participation. Application-directed asynchronous learners scored highly relative to study pace, but negatively on examination participation. Classroom students with an application-directed learning style showed a low relationship to examination results.

Students perform differently in learning environments. They study differently or they use different learning approaches. Learning strategies can be defined as learner's behaviour that influence their learning process or the activities they "use to best approach new information and improve their learning" (Liu, 2009, p. 313). These behaviours and activities can be either adaptive or maladaptive, depending on the student's beliefs about the nature of their ability (e.g., Pacheva, 1998; Tapola & Niemivirta, 2008).

Learning approach is based on Entwistle and Tait's (1995) Approaches to Studying Inventory (ASI). Research involving learning approach has focused on two types – surface processing and deep processing (Dupeyrat & Marine´, 2005.) which described the qualitative differences in students' processing of information in learning. Deep processors use elaborative processing or critical thinking skills. Students may adopt a deep approach to learning with an intention to understand the authors' meaning and linking it to their prior knowledge and personal experience (Phan, 2006; Phan, 2007). Students who take a deep approach have the intention of understanding, engaging with, operating in and valuing the subject. They actively seek to understand the material or the subject. They interact vigorously with the content and make use of evidence, inquiry and evaluation. They take a broad view and relate ideas to one another. Most of them are motivated by interest, so they easily relate new ideas to previous knowledge. They also relate concepts to everyday experience. They tend to read and study beyond the course requirement.

Learning behaviour or learning strategies also play a prominent role as a mediator in predicting academic achievement with respect to goal orientation (Diseth, 2011; Diseth & Kobbeltvedt, 2010; Elliot , McGregor, & Gable, 1999; Blackwell, Trzesniewski, & Dweck, 2007). For example, Elliot et al. (1999) found that persistence and effort mediated the relationship performance-approach goals and exam performance, whereas disorganisation mediated the relationship between performance-avoidance goals. Learning involves a combination of cognitive, affective, and metacognitive activities (Vermunt, 2001). Studies have used different definitions and classifications of learning strategies (Pintrich , 2000; Somuncuoglu & Yildirim, 1999; Weinstein & Meyer, 1991). However, the most common of these strategies are classified into cognitive and metacognitive learning strategies (Somuncuoglu & Yildirim, 1999).

Cognitive strategies such as rehearsal, elaboration, and organisation are plans for co-ordinating "cognitive resources, such as attention and long-term memory to help reach a learning goal" (Weinstein & Meyer, 1991, p.17). Metacognitive strategies include planning, monitoring, and regulation of the learning process. The majority of studies have focused on cognitive strategies with respect to student motivation (Vermunt, 2001). Furthermore, cognitive strategies are also classified into deep processing and surface processing (Somuncuoglu & Yildirim, 1999). Deep processing includes strategies such as elaboration and organisation, whereas surface processing includes rehearsal, memorisation and rote learning. Moreover, deep processing involves the use of strategies that commonly enhance learning, particularly when students spend more time studying and developing their understanding of a subject's content.

Ramsden (2003) highlighted the advantages of deep-processing strategies over surface-processing strategies. He mentioned that deep-processing approaches are "associated with a sense of involvement, challenge and achievement, together with feelings of personal fulfilment and pleasure" (Ramsden, 2003, p.57). In contrast, he added that when students adopt surface-processing strategies, they may just focus on passing the examinations and pleasing teachers and parents, rather than understanding the important concepts and applying knowledge to the real world. Subsequently, students who rely on this approach are more disorganised in their studies, easily giving up in challenging situations, and are more likely to fail in examinations as they spend less and less time studying. Hence, to be successful in school, students are expected to use more deep-learning strategies than surface learning as they progress through grades. However, students learn different subjects at different levels of education and use mixed approaches for learning, at the same time using various approaches that are effective for them in building their capacity to be successful in educational settings. In summary, learning involves processing information deeply and shallowly, which in turn influences learning outcomes in various academic disciplines. However, research suggests that deep-processing strategies in general are more beneficial to students than surface-processing strategies (Liem, Lau, &Nie, 2008).

Deep processors seek full understanding of what is learned, surface processors develop and use repetitive or rote memorization to recall facts, strategic learners use all available materials to study for future exams, while disorganized learners lack structure and organization in their learning (Entwistle & Tait, 1995). Duff's (2004) abbreviated Revised Approaches to Studying Inventory (RASI) was used in the current study, which retains the deep, surface, and strategic approaches, but excludes the disorganized approach. This brief overview provides the foundation for the background, statement of the problem, and the purpose and nature of this study.

In contrast, students may also adopt a surface learning approach where the main emphasis is on studying merely for the intention of reproducing information without any further analysis. Surface processors develop repetitive or rote memorization to recall facts. According to this theoretical framework, strategic processors use all available resources for studying. Students who take a surface approach tend not to have the primary intention of becoming interested in and of understanding the subject, but rather their motivation tends to be that of jumping through the necessary hoops in order to acquire the mark, or the grade, or the qualification. When asked, staff deplore this approach but they frequently acknowledge that the majority of their students tend to take this approach.

Students who take a surface approach, will try to learn in order to repeat what they have learned. They are going to memorise information needed for assessments and make use of rote learning. They always take a narrow view and concentrate on detail and fail to distinguish principles from examples. They tend to stick closely to the course requirements and are motivated by fear of failure.

The education system has imposed a lot of pressure on students to prepare for the external examinations held during their final year at secondary school. The competitive nature of the educational system and the pressure on exam preparation can affect how students learn in academic settings. For instance, Chan and Lai (2006) found that students who compete to outperform each other were more likely to use surface-level learning strategies, and less likely to use deep-level learning strategies. In addition, competitive learning in a high-stakes testing environment has also been criticised for its link to high anxiety levels, selfishness, the promotion of cheating, and interference with the problem solving ability (Johnson & Johnson, 1992).

Somuncuoglu and Ali Yildrim, (1999) with research on students enrolled in an undergraduate educational psychology course, indicated overall use of surface cognitive, deep cognitive, and metacognitive strategies; the responses of the students indicate that although they used the surface and metacognitive strategies to a similar extent, deep cognitive strategy used was more dominant than the other two strategies. That might suggest that because the participants were university students, they had an awareness of the importance of meaningful processing and considerably developed thinking skills to use superficial cognitive processes to a lesser degree than deeper cognitive processes; however, they still did not have the same level of awareness about cognition. Regarding the relationship between achievement goal orientations and the use of three types of learning strategies, mastery orientation predicts the use of more deep cognitive and metacognitive strategies.

Given these concerns, researchers like Law et.al (2008), investigated Hong Kong Chinese elementary school children's beliefs about learning and examined their relations with self-regulated learning strategies and text comprehension. Factor analysis indicated two contrasting factors of constructivist and reproductive beliefs about learning. High achievers outperformed low achievers on beliefs, strategy and comprehension scores. Multiple regression indicated that constructivist beliefs contributed to text comprehension over and above the effects of grade and strategy. Results showed that constructivist and reproductive beliefs could be identified among school-aged children, and whether older children and high achievers held constructivist beliefs more commonly than younger children and low achievers. Findings indicate that younger children, like high school and college students, also vary in their beliefs about learning.

Based on the discussion above, it is obvious that, learning approach is anchored in the philosophical concept and the didactic method of teaching and learning strategies. This manifests the learning objectives and their orientation that include furthering knowledge, repetition and reconstruction, application, understanding, observation from a different perspective and shaping thought (Dart, Burnett, Purdie, Boulton-Lewis, & et al, 2000). It is a among the most important motivation factors. It plays an important role in levels of motivation of the student to learning.

Implicit Theories of Intelligence. Implicit theories of intelligence refers to the beliefs people have about the nature of their intelligence and abilities. Dweck's motivational model (Dweck, 1986; Dweck& Leggett, 1988) describes two theories people can hold about the fundamental nature of their intellectual ability: an entity theory (also sometimes referred to as a fixed mind-set), and an incremental theory (or growth mind-set) – collectively known as implicit theories of intelligence or lay theories (Dweck, 1986; Murphy &Dweck, 2010). People who view their intellectual ability as fixed and stable have an entity theory of intelligence, whereas people who view their intellectual ability as malleable and changeable have an incremental theory of intelligence.

Implicit Theories of Intelligence has emerged these days as an important line of research inquiry in education; they function as the attribution benchmarks for explaining the principles of intelligence, capability, and personal worth (Dweck, 1999; Dweck & Legget, 1988). Students' belief predicts academic achievement simply in addition to elements such as preceding achievement (Dweck& Leggett, 1988; Bandura, 1997). Students fall along a continuum when explaining the nature of intelligence. On one side, students believe that intelligence is an entity within them that cannot be changed. This is also referred to as the constant or entity belief of intelligence. In line with this view, intelligence is a trait that is decided upon at birth; human beings can also have high abilities in one area and low abilities in another, and there is nothing they can do to change that (Dweck, 1999; Dweck&Legget, 1988).

Following this concept, the life pursuit then is to find those areas in life that they were born to succeed in and avoid the ones where they would ultimately fail. For example, some students may believe that they have a natural talent for art, were not born to understand science, and would not consider science for possible careers. Many researches have shown that implicit theories of ability have influenced students' academic motivation and achievement.

On the other side of the continuum, intelligence is no longer an indication of competence, but of current understanding and effort. Students on this end of the spectrum believe intelligence to be malleable and something which can be changed by means of constructing and growing capacity (Dweck, 1999; Dweck & Legget, 1988). This view is called the incremental or malleable belief of intelligence. Students with a malleable perception will interpret an excessive rating on a test intended to show that they have acquired the right knowledge based and featured on an acceptable amount of ability. Therefore, low test rating endorses a lack of knowledge and a lack of capability to be triumphant.

Implicit theories can also be domain specific. Thus, some students may believe that their science abilities are a relatively stable entity while simultaneously believing that their abilities in social studies are increasable (Stipek, Givvin & Kazemi, 2001). As Bandura (1997) observed, "Conceptions of ability should not be viewed as monolithic traits that govern the whole of life. The same person may view ability differently in different domains of functioning.

Furthermore, these two implicit theories of intelligence are related to different motivational and behavioural pattern. For instance, Pacheva (1998) found that students who predominantly hold the view that intelligence is malleable demonstrate adaptive attribution patterns, whereas students who predominantly hold an entity view of intelligence demonstrate more maladaptive attribution patterns in their studies. In other words, students who have incremental views report more adaptive cognitive strategies and behavioural outcomes than students who have entity views

(Dweck et al. 1995; Howell & Buro, 2008). Additionally, students with an incremental theory or growth mind-set who view intelligence as something that can be developed with hard work, attribute their success to effort and persistence (Dweck & Leggett, 1988). When success and failure are attributed to effort, incremental theorists persist not only in the face of difficulty but also in the pursuit of additional success (Perry, 2011). In contrast, students who hold an entity belief or fixed mind-set believe that their intelligence is stable and cannot be changed over the time, despite their effort and hard work.

Moreover, they attribute their failures to personal inadequacy such as their knowledge in the subject, memory, problem-solving ability, and intelligence as a whole. The belief about the control of knowledge acquisition can be derived from Dweck's research (see Dweck & Leggett, 1988). She has studied the influence of students' beliefs about a single dimension, the nature of intelligence. She has found that some students have a predominant belief that intelligence is a fixed entity, whereas others believe it is incremental, that is, it can be improved. Students with a fixed entity theory of intelligence perceive the goal of an academic task is to document their intelligence.

Students with an incremental theory of intelligence perceive academic tasks as an opportunity to improve their intelligence. When engaged in an easy task, these two types of students will perform similarly. When confronted with a difficult task, students with the entity theory will interpret the situation as a negative documentation of their intelligence. They will display "helpless" behaviour. That is, they will engage in negative self-talk, such as "I'm failing," perseverate on the same strategy, and finally cease to Schommer Students' Beliefs – 3 try. Students with an incremental theory, on the other hand, will perceive the difficulty of the task as a challenge. They will engage in positive self-talk, such as "I have to try harder and longer," and use alternative study strategies. This is what Dweck calls an achievement motivation pattern. She has established these patterns of behaviour through empirical research by manipulating beliefs to influence goal selection; by manipulating goals to influence response to difficult tasks and by manipulating task difficulty to influence goal selection .

The implicit theories of intelligence are the foundation of the social -cognitive model of motivation; they serve as the attribution benchmarks for explaining the foundations of intelligence, ability, and personal worth (Dweck, 1999; Dweck & Legget, 1988). Students fall along a continuum when explaining the nature of intelligence. On one end, students believe that intelligence is an entity within them that cannot change. This is also referred to as the fixed or entity belief of intelligence. According to this view, intelligence is a trait that is decided upon at birth; people may have high abilities in one area and low abilities in another, and there is nothing they can do to change that (Dweck, 1999; Dweck & Legget, 1988). Tests of intelligence and abilities become measures of stable internal qualities of the individual. An examination of science is not a test of current conceptual understanding, but of innate science talent. When following this philosophy, the life pursuit then becomes finding those areas in life that they were born to succeed in and avoid the ones where they would ultimately fail. For example, some students may believe that they have a natural talent for art, were not born to understand science, and would not consider science for possible careers.

Relating this attitude back to theories of attribution, students with incremental beliefs attribute internal, unstable causes to academia, causes that are personally controllable. These ideas were illustrated in a study conducted by In Hong, Chiu, Dweck, Lin, and Win (1999). In this study, participants self-reported their attitudes about the change in ability of intelligence; that is, they reported the degree to which they supported an entity or incremental view of intelligence. After this, they were given an exam and immediately were provided with a fabricated output of their results. The result indicated low performance compared to another confederate participant. In a follow -up questionnaire, the participants provided explanations for their poor performance. Participants that ascribed to the entity view in the implicit theories scale gave fixed - ability and low intelligence justifications for their low performance, whereas, incremental theorists alluded to low effort to explain their poor performance.

Even though students can explicitly state these beliefs in a routine questionnaire, the theories of intelligence are implicit, because students are unaware of the impact these beliefs have in driving attitudes and behaviour in academia; this idea will be described in further detail below. Also, entity or incremental theories of intelligence can be implicitly primed by reading short passages that endorse intelligence and abilities as either fixed or malleable traits (Hong, et al., 1999; Murphy & Dweck, 2010).

The mechanism of priming implicit theories of intelligence is effective because students, whether they have an entity or incremental perspective , view intelligence as a combination of both effort and ability and not as an all-or -none dichotomy. Mueller and Dweck (1997, as cited in Dweck, 1999) asked college students to fill in values for the equation, "Intelligence = _____% effort + _____% ability." Students with an incremental perspective placed more emphasis on effort, roughly 65%, whereas students with an entity perspective placed 65% weight on ability. While having an entity view of intelligence makes students more likely to look to ability and fixed traits for explanations of intelligence, they may still maintain a view that effort can lead to a small increase in ability (Dweck &Legget, 1988; Dweck, 1999).

Therefore, retraining attribution can temporarily shift the focus for the causes of intelligence to become either dominated by effort or ability inferences. Despite the malleability of implicit theories of intelligence, they become stable in grade school and continue to stabilize on to adulthood (Stipek et al, 2001; Robins & Pals, 2002).

According to Dweck et al (1995), an entity view of ability does not promote taking active charge of learning. An incremental view of ability, on the other hand, promotes active engagement in regulating students' own motivation and learning.

Ommundsen & Lund (2005) found that students with an incremental view of ability in a physical education course were more likely to change strategies when confronted with obstacles, redoubled their efforts when they encountered difficulties, and used deeper processing than did their entity theory peers.

According to Dweck and her colleagues, those who espouse an incremental view of ability not only do more to manage their learning and motivation, but also are much more willing to find and address deficiencies in their learning (Hong et al., 1999). The researchers found that entity theory students who performed poorly on a task were significantly less likely than the incremental theory students to take a remedial course to address deficiencies and improve future performance. Thus, as Dweck (1988) argued, students who believe that ability can be acquired put forth the effort to make it happen. When they believe, on the other hand, that ability is something people either have or do not have, they do far less to ensure their success.

Although there have been many studies addressing the link between implicit theories of ability and self-regulation, no studies have been done addressing whether implicit theories of ability are related to self-efficacy for self-regulation. Some students adopt what is called the entity view of ability whereas others espouse an incremental view. Relating this attitude back to theories of attribution, students with incremental beliefs attribute internal, unstable causes to academia, causes that are personally controllable. These ideas were illustrated in a study conducted by In Hong et al (1999).

Compared to students with an incremental view, students with an entity view are more inclined to believe that abilities are characteristics or traits that a person possesses to varying degrees and that these abilities are a relatively static entity. In contrast, students who hold an incremental view of ability are more likely than their entity theory peers to believe that abilities are an increasable and controllable quality. In this study, participants self-reported their attitudes about the change in ability of intelligence; that is, they reported the degree to which they supported incremental view of intelligence or not. Entity or incremental theories of intelligence can be implicitly primed by reading short passages that endorse intelligence and abilities as either fixed or malleable traits (Murphy & Dweck, 2010).

The mechanism of priming implicit theories of intelligence is effective because students, whether they have an entity or incremental perspective, view intelligence as a combination of both effort and ability and not as an all-or -none dichotomy. While having an entity view of intelligence makes students more likely to look to ability and fixed traits for explanations of intelligence, they may still maintain a view that effort can lead to a small increase in ability (Dweck & Legget, 1988; Dweck, 1999). Therefore, retraining attribution can temporarily shift the focus for the causes of intelligence to become either dominated by effort or ability inferences.

According to Dweck (1999), “students’ implicit theories appear to go beyond the impact of self-efficacy” (p. 75). Bandura (1997) also suggested that “viewing ability as an inherent capacity lowers perceived self-efficacy, retards skill development, and diminishes interest in the activity” (p. 119). Other researchers have also provided some empirical support for these contentions (Bråten & Stromso, 2004; Robins & Pals, 2002). This proposition, however, needs more empirical evidence, because the studies that Dweck cited to support this claim deal with sporting activities and with organizational management within business. Furthermore, one study Dweck cited within the academic domain used a global measure of self-efficacy on high-achieving college students in a Norwegian university. To date, no empirical support examining this claim has been conducted with middle school science students.

Some students adopt what is called the entity view of ability whereas others espouse an incremental view. Relating this attitude back to theories of attribution, students with incremental beliefs attribute internal, unstable causes to academia, causes that are personally controllable. These ideas were illustrated in a study conducted by In Hong et al (1999).

In summary, the mechanism of priming implicit theories of intelligence is effective because students, whether they have an entity or incremental perspective, view intelligence as a combination of both effort and ability and not as an all-or -none dichotomy. It plays an important role in levels of motivation in science learning.

Self-Efficacy. Self-efficacy is one the major construct in Bandura's social-cognitive theory. Researchers describe self-efficacy as, student's perceptions about their capabilities to master new skills, usually in a specific academic domain like mathematics (Nasiriyan et al., 2011; Pajares et al., 1994). In addition, expectancy-value theory proposed that student' passion to learn depends on expectations for achievement and the value attributed to task (Nasiriyan et al., 2011). After that, achievement goal theory came out as a prominent framework intended for explaining individuals' achievement status, their experience, and also their reaction in competent situation (class room and working environments) (Van Yperen et al., 2009).

Self-efficacy and metacognition are two long standing and most investigated constructs across educational, psychological, and organizational domains for several decades. Bandura (1997) combined metacognition and self-efficacy to form the term self-regulatory efficacy to denote an interdependent relationship between the two components. Self-regulatory efficacy emerged as a key component of the growing globalization of knowledge and changing educational systems. The current study examines self-efficacy and metacognition separately since there are different perspectives in literature for both of these potential predictors of academic success. The following supporting and opposing literature is examined to increase understanding of the saliency of self-efficacy as a predictor of asynchronous learners' academic success.

Literature is replete with studies that support self-efficacy as a strong indicator of academic success across learning environments and academic areas and levels (Pajares et al, 2000). Bandura's (1997) social cognitive theory emphasized how learners make choices, exert effort, persist in challenging tasks, and pursue rewards associated with successful outcomes and avoid recriminations associated with unsuccessful task outcomes.

Self-efficacy is an influential component associated with causal attributions, self-concept, optimism, achievement goal orientation, help-seeking, test anxiety, and value expectancy (Usher & Pajares, 2008). Bandura (1997) and Schunk and Pajares (2005) noted that self-efficacious students monitor their work more frequently, employ ample effort, utilize effective self-regulatory strategies, persist with tenacity to complete tasks, and are better problem-solvers than equally capable peers with low self-efficacy.

Learners' self-efficacy operates in orchestration with goal systems that increase motivation and performance by increasing effort and persistence (Bandura, 1997). Self-efficacious learners draw upon four sources with mastery experience as the most powerful source. Students with strong self-efficacy draw upon their mastery experiences to achieve novel learning tasks resulting in modifications and generality to other learning tasks for academic success (Bandura, 1997). Bandura's other three learning sources consist of vicarious learning from mastery models, verbal and social persuasions such as evaluative feedback from experts, and emotional and physiological states such as anxiety, mood, and stress attributed to failure (Bandura 1997).

Learners with high self-efficacy tend to be the most satisfied with their learning and experience a greater degree of achievement (Shell & Husman, 2008). Shell and

Husman (2008) explained that strong self-efficacy is also linked to learners' allocation of time, environment, and effort regulation, which relates to the level of engagement.

Bandura (2006) opined that students with strong self-efficacy exert sufficient effort and persistence to problem-solve complex learning tasks. They explained that students with a weak self-efficacy expend wasted efforts due to the fear of evaluation, self-doubt, and ineffective problem solving and cognitive strategies, which impede successful learning. Low self-efficacy results in the avoidance of learning tasks outside the learners' competence, which precludes necessary behaviors for mastery learning for academic success (Bandura, 1997; Coutinho & Neuman, 2008; Puzziferro, 2008; Shell &Husman, 2008). Therefore, learners with a strong self-efficacy are more successful compared to learners with equal ability and a low level of self-efficacy (Shell & Husman, 2008).

The basis of Bandura' social cognitive theory (Bandura, 1986, 1997) is that human beings are self-organizing, proactive, self-reflecting, and self-regulating agents. They function as a result of a dynamic interplay between personal, behavioral, and environmental influences. Due to the beliefs people have about themselves, they are able to exercise control over their thoughts, feelings, and actions. Self-efficacy beliefs at the very core of social cognitive theory, comprise the key factor of human agency. The term self-efficacy is a multidimensional construct that varies in generality, strength, and difficulty (Bandura, 1986) and it refers to a person's belief in his or her capabilities to successfully complete a specific task and achieve certain outcomes. It is distinguished from perceived ability, perceived competency, and other self-related constructs such as self-concept of ability, self-worth, and self-esteem as an important construct within social cognitive theory. (Bandura, 1997). Generally, research work on self-efficacy refers to it as a situational specific type of confidence (Bandura, 1986), even though self-efficacy (self-confidence) and perceived competency (perceived ability) are at times used interchangeably.

The theory in self-efficacy beliefs (Bandura, 1986) is that it affects an individual's motivation, affect, achievement-related behavior, and performance. Academic domains research (e.g., Pajares, 1996; Schunk, 1991) has portrayed that individuals possessing high self-efficacy are more likely to choose challenging tasks, expend effort, and persevere longer in comparison to those with low levels of self-efficacy. Besides being found to be positively related to cognitive engagement in a task, self-efficacy will influence academic achievement directly and indirectly through the mediator variables—effort, persistence, and perseverance.

The concept of perceived self-efficacy has proven to be one of the most important variables in regards to work commitment (Suksunai et al., 2011). There are several reasons for its predictive success. For one thing, its relevance as a predictor increases as a function of domain or task specificity, but self-efficacy does not only refer to one's capabilities with demands of task and goal. Also, the cognitive construct of self-efficacy applied as similar level of construct as task value and appeared to be good predictor of commitment in Shore (2002) research findings of motivation regarding exercise.

In the detailed analysis of the dynamic aspects of self-efficacy, Gündüz (2012) found that positive attitude will lead to the lower burnout and higher self-efficacy belief. In this study, he also revealed that there is a negative relationship between self-efficacy and emotional exhaustion. This finding paralleled with several studies done as discussed and analysed by C. G. Brown (2012). In his systematic-review of the 12 articles pertaining to the relationship between self-efficacy and burnout in teacher study, Brown has examined that the majority of the correlations between self-efficacy and emotional exhaustion indicate a negative relationship teacher's level of emotional exhaustion and their level of self-efficacy.

Another interesting finding pertaining to teachers' perception of social emotional learning Perry, 2011 revealed that self-efficacy is one of the outcome variables that had the most powerful impact. It is also shown that perceived stress related to students' behaviour was negatively associated with sense of teaching efficacy. This finding is significantly important to this study as a comparison of self-efficacy in term of predicting teachers' commitment towards their extra task.

Numerous studies have been conducted on the subject of self-efficacy in sports and physical activity settings with ample evidence available to support that self-efficacy is a significant predictor of performance accomplishments (e.g., Schunk, 1991). The focus by researchers on the effect of various treatment methods for increasing an individual's self-efficacy beliefs, demonstrates that efficacy beliefs in sports and physical activity settings can be enhanced (e.g., Lirgg, George, Chase, & Ferguson, 1996). A few studies have shown that incremental conceptions of ability can promote self-efficacy (Jourden et al., 1991).

Jourden and colleagues (1991) did a notable study by examining the influence of conceptions of ability on self-efficacy in a pursuit-rotary task. In this study, the conceptions of ability among college students were manipulated by allocating participants to one of two experimental groups. Participants, in an inherent ability condition, were led to believe that learning the pursuit-rotary task required innate ability. In the acquired ability condition, participants were directed to believe that the pursuit-rotary task is a skill that can be learnt through practice. The findings revealed that there was an increase in self-efficacy in the pursuit-rotor task over a series of trials among individuals in the acquired ability condition, while those in the inherent ability condition showed no increase in self-efficacy.

Previous research on self-efficacy was expanded by Lirgg et al. (1996) whereby the impact of conceptions of ability and sex-type of task on male and female self-efficacy beliefs using a masculine task (Kung fu) and a feminine task (Baton twirling) was examined. Their findings were consistent with the Jourden et al. (1991) study, thus signifying that individuals in the acquired condition displayed higher self-efficacy than those in the innate condition. Moreover, participants who rated Kung fu as gender neutral in the acquired condition exhibited higher level of self-efficacy than those in the innate condition.

There is one limitation in both Jourden et al. (1991) and Lirgg et al. (1996) studies, that is, by instructing participants to believe that ability is fixed or malleable, conceptions of ability were manipulated (Schunk, 1991). So as to eradicate this limitation, Belcher and colleagues investigated then effects of gender-related beliefs and dispositional ability conceptions on students' competency beliefs, effort and persistence, and actual performance. The participants were selected from a large pool based on their conceptions concerning whether ability is innate or acquired, and these ability beliefs were reinforced through teachers' comments during the instruction session and this constitutes the credit of this study. Belcher et al. (2003) in their study developed a multiple-choice question to differentiate between participants' beliefs about ability. Although the findings from this preliminary study were somewhat inconsistent with the literature, more effort should be expended on this line of research.

Researchers have invested much time and effort to link achievement and self-efficacy literatures, given that self beliefs about ability is a recurrent theme found in both achievement (Dweck, 1999) and self-efficacy (Bandura, 1997). However, the majority of researchers, have examined either how these two constructs affect individuals' motivational responses in isolation, or the relationship between them. A negligible amount of research has been carried out to investigate how these two constructs interact to affect motivational patterns.

It has been put forward as a hypothesis that the effects of conceptions of ability on behavior would be moderated by an individuals' self-efficacy or perceived competency in pursuing a specific task (Dweck & Leggett, 1988; Elliot & Dweck, 1988). It is predicted that individuals who have high levels of self-efficacy are more likely to display adaptive motivational patterns as compared to those who have low levels of self-efficacy within the framework of entity conceptions of ability. It is also predicted that individuals with incremental conceptions of ability exhibit adaptive motivational patterns regardless of their levels of self-efficacy (Dweck & Leggett, 1988; Elliot & Dweck, 1988). Recent research literature has not consistently supported this theoretical prediction. For instance, the findings in a study by Tabernero and Wood (1999), signified that the effects of conceptions of ability on performance were mediated through self-efficacy, but self-efficacy did not moderate the effects of conceptions of ability on the level of challenge in self-set goals. Further studies along these lines are required because it pledges to provide a deeper and more comprehensive perception of how ability beliefs affect motivational and behavioral consequences.

Kim's (2005) study findings using 94 university learners revealed a relationship between online course self-efficacy and mastery experiences. The findings indicated that online course experiences were significantly and positively related to online course self-efficacy. However, learners in hybrid courses did not exhibit online course efficacy to the degree that asynchronous learners did. Kim attributed this result to the repeated practice online learners experience for enactive mastery experience needed for task completion. Enactive mastery experience was found to be the most significant source of self-efficacy and is in alignment with Bandura's (2002) agency theory (p. 1104).

Peng, Tsai, and Wu (2006) surveyed 1,417 university level students' perceptions about their attitude and self-efficacy of the Internet. Their findings suggested these variables influenced motivation, interests, and performance in asynchronous learning.

The authors opined that attitudes and degree of self-efficacy also mediated students' learning behaviours that influenced academic success. These findings indicated that learners with positive attitudes and perceptions about their ability to use the Internet also viewed the Internet as a viable tool for learning.

Coffin and MacIntyre (1999) posited that self-efficacy and positive attitudes about asynchronous learning were important predictors of academic success. Erez and Isen's (2002) findings demonstrated that participants' affective state influenced self-efficacy. They noted that positive feedback was related to higher levels of motivation and self-efficacy, while negative feedback was associated with low levels of self-efficacy and performance. Self-efficacy may predict learners' learning strategies that influence academic success. Wang and Wu's (2008) study using 76 undergraduate asynchronous students found that self-efficacy predicted students' use of learning strategies based upon the quality of elaborate feedback. These findings suggested that learners with high self-efficacy employed high-order and critical thinking skills, but they reported the results did not predict academic performance probably due to modelling effects interference (p. 1589).

In the detailed analysis of the dynamic aspects of self-efficacy, Vancouver & Kendall (2006) found that positive attitude will lead to the lower burnout and higher self-efficacy belief. In this study, he also revealed that there is a negative relationship between self-efficacy and emotional exhaustion. This finding paralleled with several studies done as discussed and analysed by C. G. Brown (2012).

Another interesting finding pertaining to teachers' perception of social emotional learning Perry, (1981) revealed that self-efficacy is one of the outcome variables that had the most powerful impact. It is also shown that perceived stress related to students' behaviour was negatively associated with sense of teaching efficacy. This finding is significantly important to this study as a comparison of self-efficacy in term of predicting teachers' commitment towards their extra task.

Bartels, Magun-Jackson, and Ryan's (2010) study using 66 asynchronous learners revealed a variation in learners' self-efficacy and approach in general and specific learning contexts that were aligned with learners' vicarious learning experiences. The results indicated the learners tended to overestimate their ability to complete a computer learning task. These findings demonstrated that learners' self-efficacy varied in self-efficacy and performance compared to task-specific, self-efficacy, and performance as evidenced by different motivations and learning outcomes (p. 989). Researchers concluded that a better understanding of learners' general and specific-task behaviours could clarify the differing motivation and learning outcomes associated with new and challenging learning tasks. Bartels, Magun-Jackson, and Ryan's (2010) recommended researchers and educators to be cognizant of learners' presenting learning approaches to better understand their differing motivation and learning outcomes. The opposing viewpoints relative to self-efficacy as a predictor of academic success are examined next.

Literature also contains opposing views about the within-person aspect of the self-efficacy and performance relationship. Vancouver and his colleagues (Vancouver & Kendall, 2006; Vancouver et al., 2008) examined the within-person aspect relative to their control theory involving the mechanisms of learning. Their results indicated a negative self-efficacy-performance relationship on learning tasks. These findings challenged Bandura's (2002) long-standing social cognitive theory that states self-efficacy influences performance. Bandura and Locke (2003) argued that the control theory perspective consisting of mechanisms was incompatible with the standard notions of self, agency, personal responsibility, and learners' freedom and will to learn. This continuing debate between the mechanics of human behaviours and notion of agency relative to theoretical psychologists discusses how self, agency, and personal responsibility could be reconciled (Vancouver & Kendall, 2006). Self, agency, and personal responsibility became the theoretical basis of Bandura's (2002) agency theory and social cognitive theory.

Vancouver, Thompson, and Williams (2001) demonstrated a weak or negative relationship between self-efficacy to performance in the within-person level of analysis. Their two studies using a computerized analytic task indicated that personal goals were positively related to self-efficacy, but negatively related to performance. Vancouver, Thompson, Tischner, and Putka (2002) replicated this study, which led them to conclude that overconfident participants make analytical errors, which accounted for the negative self-efficacy and performance relationship. Bandura (1997) attributed these results to the study's simple tasks that required low efficacy levels that do not contribute to real-life learning over time. However, Yeo and Neal's (2006) study using a highly complicated traffic control task examined the within-person aspect relative to self-efficacy and performance over time, which also indicated a negative efficacy-performance relationship.

Vancouver and Kendall's (2006) findings using 63 undergraduate learners who routinely reported their self-efficacy levels, goals, and study time for test results suggested a negative self-efficacy to performance relationship. Their findings revealed a negative motivation-exam performance relationship at the within-person level despite a positive relationship to performance at the between-person level. These findings indicated that high levels of self-efficacy led to overconfidence associated with reduced resource allocation (e.g., effort and motivation), which resulted in lower performance.

The authors opined that self-regulation consists of a multifaceted goal process and that self-efficacy was dependent upon the process involved. Their example involved training contexts that may elicit planning processes. The authors noted that the contexts may yield a negative self-efficacy and motivation relationship, which may be obscured in a between-person study. The following study attempted to reconcile the within-person relative to the self-efficacy and performance relationship.

Vancouver, More, and Yoder's (2008) study findings explained why self-efficacy predicts performance in some situations and not in others. These authors argued that learners with planned accepted goals have a negative efficacy-performance result. A negative efficacy-performance involves a high expectancy with fewer resources (e.g., persistence and effort allocation) and lower motivation with resultant lower performance.

Conversely, when learners selected goals they were motivated to accomplish, they exerted sufficient resources and had higher motivation to accomplish a task with a resultant positive efficacy-performance outcome. These authors concluded that the efficacy-performance relationship was positive when learners are motivated and have the essential resources to accomplish a given learning task.

Seo and Ilies' (2009) study also examined the within-person and self-efficacy relationship using 118 stock market investors in an investment simulation. Their findings revealed that self-efficacy was strongly related to effort and performance and that the goal planning level mediated the efficacy-performance relationship. The findings indicated that performance feedback directly and indirectly mediates motivation and performance.

Yang (2006) study used 268 Taiwanese traditional undergraduates and an integrated psychological and sociological theoretical set of variables related to academic success. These authors opined that on an intrapersonal level, students' learning behaviour was mediated by their self-efficacy and expectation to succeed academically. However, on an interpersonal level, students' academic performance was mediated by significant others and the school personnel. The mixed results for the two levels about the impact of self-efficacy and expectation on academic achievement indicated that further investigation is needed to help students to increase academic success.

In summary, social cognitive theory (Bandura, 2003) extends Bandura's (1983) social learning theory, and emphasizes the important tenet of reciprocity between three major classes of determinants: behavior, personal factors (e.g., cognition, affect, and biological events), and the environment (Bandura, 1997a; Pajares, 1996). One clear example arising from this theoretical model of reciprocal determinism involves, say, an individual's own attainment in science. Interpretation of failure may inform and alter an individual's environmental settings and his/her self-beliefs, which in turn inform and change their subsequent performances (Pajares, 1996).

Science Achievement and Motivation

Improving all science literacy of the students is the aim of science instruction, so it is indispensable to encourage students to comprehend important science notions, to recognize the significance of science and improvement in technology, to comprehend the disposition of science, and to voluntarily maintain their education of science at school. Therefore, student cognition and the affective components of cognition should be addressed together by researches in science teaching and learning. Inside of the effective factors, motivation is crucial since motivation of students plays a crucial role in their notional conversion processes (Kuyper et al., 200). In that vein, students' motivation plays another fundamental role in critical thinking and learning strategies of students (Garcua & Pintrich, 1992)

According to Napier and Riley (Meece & Jones, 1996), motivation has significant influence on science learning achievement. Together with environmental and social contribution, both talent and ambition are necessary in learning (Maehr, 1989). Current views of learning refer to the significance of the idea that both cognition, motivation and will of students are fundamental elements on account of prosperous achievement and learning (Glynn et al., 2011). Students' motivation becomes visible in their efficient participation in the process of learning, eager approach of difficult learning tasks, dense diligence sacrifices along the utilization of strategies in active learning, permanency in accomplishing problem solving and learning considering difficulties (Bandura, 1997). Considerably motivated individuals who are more worried about own process of learning and results, demonstrate larger progress, more advanced levels of mastery, and attempt higher reassurance and positive effect than inadequate motivated students (Stake, 2006). Literature review shows that many examinations about science motivation were fulfilled. Accordingly, Glynn and others (2011) investigated the students' motivation to study science. Findings suggest that the motivation elements - self-determination, self-efficacy, motivation of intrinsic, motivation of career and motivation of grade act a significant role in individuals' science achievement.

Meece and Jones (1996) researched gender differences in mid-school individuals' confidence, motivation goals, and ways of learning in science lessons. Their study showed a few gender differences. Male students reported more confidence in their science capabilities compared to female students. Stake (2006) examined the dimension of social stimulations that conducts the relationship of position and motivation of science and self-reliance. The results demonstrated that stimulation from parents, instructors from school, and friends were each unconnected variables of science motivation. Another study of Bryan and others (2011) examined the motivation of 14– 16 year old learners to learn science. According to the findings, the intrinsic motivation, self-efficacy, self-determination, and achievement of the students were in relationship. The investigation claims that teachers of science had better use social patterns and tasks of collaborative-learning to facilitate motivation, achievement and interest of students' in science lessons.

Based on constructivist theory (Mintzes et al. 1998) students take an active role in constructing new knowledge. When students perceive valuable and meaningful learning tasks, they will actively engage in the learning tasks, using active learning strategies to integrate their existing knowledge with new experience. When students do not perceive the value of learning tasks, they use surface learning strategies to learn (Pintrich & Schunk, 1996). Von Glasersfeld (1998) also illustrated the importance of the students' learning goal in motivating students to construct their scientific knowledge based on the learning value and learning strategies. Pintrich and Schunk stated that 'motivation is the process whereby goal-directed activity is instigated and sustained' (1996: 5), while Pintrich et al. (1993) stressed that students' learning goals, values of science learning, and self-efficacy take important roles in influencing students in constructing and reconstructing their science conceptions. In other words, when students perceived that they are capable, and they think the conceptual change tasks are worthwhile to participate in, and their learning goal is to gain competence, then students will be willing to make a sustained effort and be engaged in making conceptual change. Here, Pintrich et al. add students' self-efficacy and their intention toward learning tasks into a previous constructivist view toward science learning.

Research on motivational theories and studies of students' learning (Brophy, 1998, ; Pintrich & Schunk, 1996) reveals that self-efficacy, the individual's goals toward tasks, task value and the learning environment dominate students' learning motivation. Combining the constructivist learning and motivation theories we find that students' self-efficacy, science learning value (or task values), students' learning strategies, the individual's learning goal, and the learning environment are important motivational factors that constitute students' science learning motivation.

Self-efficacy in Science refers to the individual's perception of his/her ability in accomplishing learning Science tasks (Bandura , 1997). When students have high self-efficacy, they believe they are capable of accomplishing learning tasks, whether tasks are difficult or easy. Science learning value refers to whether or not students can perceive the value of science learning they engage. In science class, there are many unique features highlighting the value of science learning, such as problem-solving, science inquiry, thinking, and the relevance of science knowledge in students' daily lives (American Association for the Advancement of Science 1993). In constructivist learning, students take an active role in interacting with the environment; they use active learning strategies to retrieve existing knowledge to interpret new experiences in order to construct new understanding. They try to find resources to help them understand concepts. These active learning strategies are also matched with MSLQ (Pintrich et al., 1991) learning strategies; that is, students' learning strategies depend on the nature of motivation and learning goals.

An individual's goal toward tasks in Science refers to students' attending the learning tasks for performance goal or achievement goal in Science (Brophy, 1998). When students have an achievement goal, they are intrinsically motivated, they intend to accomplish something to satisfy their innate needs for improving their own competence (Deci & Ryan, 1991), and they believe this kind of participation will help them achieve valuable goals (Atkinson & Birch, 1978). If the students' goal towards tasks is for performance, they will be concerned more with performing better than their peers and impressing their teachers (Brophy 1998; Pintrich & Schunk, 1996). The learning environment comprises teachers' teaching strategies, class activities, and student–teacher and student–student interactions that would influence an individual's motivation in learning (Brophy 1998, Pintrich and Schunk 1996). Huang and Waxman (1995) found students with different motivation would have different perceptions of the learning environment. Hanrahan (1998) also pointed out that teachers' teaching, and student-teacher relationships would influence students' motivation. These thoughts concerning science learning and motivation constitute our conceptual framework in designing a questionnaire for students' motivation toward science learning.

Students' motivation toward science learning studies Lee and Brophy (1996) used qualitative methods to classify students' motivation patterns in science learning, which ranged from students who were intrinsically motivated to students who had disruptive behaviours. Barlia and Beeth (1999) also identified similar motivation patterns among college physics science learners. Other researchers (Barlia & Beeth, 1999) identified factors influencing students' motivation toward science learning, which included: students' own interests toward the subjects and the grades they received in class; students' interpretations of the nature of the task; students' success or failure to make progress in scientific understanding; and students' general goal and affective orientations in science class and achievement of scientific understanding. Besides students' own reasons, other factors influencing students' motivation were teachers' expectation of students' learning, types of teachers' feedback, and curriculum and social goals (Urdan & Maehr, 1995). Based on these findings, students' learning goals, epistemological beliefs, self-efficacy and learning approaches were identified as important domains in students' science learning motivation. These science learning motivation domains also matched with students' learning motivation addressed in the previous study.

This part provides a review of the literature on the relationships among motivational variables. It presented definitions of the variables relevant to the present study and explained how these variables were compatible with motivation model. This chapter also reviewed the studies that have looked at direct relationships between/among the variables. Further, it has presented studies which have examined the relationship among the constructs of motivational variables and science achievement, including studies that examined mediational relationships in Malaysia. Finally, the role of mediational relationships in educational psychology along with different procedures of testing mediational relationships was presented.

Relationship between Implicit of Intelligence and Goal Orientations. Dweck (1986) postulated that people's interpretations of their intelligence are linked with two types of goals: performance goals and learning goals. She also found that people who held incremental beliefs strived to develop their ability and chose learning goals. Conversely, people who held entity beliefs indicated that intelligence was stable and chose performance goals. Subsequently, many researchers have highlighted the relationship between implicit theories of intelligence and goal orientation (e.g.,Braten & Strømsø, 2004; Cury et al., 2006; Dupeyrat & Mariné, 2001; Li, Solmon, Lee, Purvis, & Chu, 2007; Robin & Pals, 2002; Shih, 2007).

Some studies (Li et al., 2007; Robin & Pals, 2002) reported findings that were consistent with Dweck's (1986; Dweck & Leggett, 1988) model of the relationship between incremental beliefs and dichotomous goal orientations. More specifically, they found that incremental beliefs about intelligence were associated with learning goals, whereas entity beliefs about intelligence were associated with performance goals. For instance, Robin and Pals (2002) tested a path model that linked beliefs about intelligence, goals, helpless versus mastery-response patterns, and self-esteem, for 508 undergraduate students from the US. They found that entity theorists emphasised performance goals , whereas incremental theorists emphasised learning goals . In another study, whose participants were Malaysian primary school students, Abdulla (2008) investigated the relationship of children's implicit theories of intelligence with their goal orientations, self-efficacy and self-regulation. Correlational analyses showed that effort-beliefs (incremental beliefs) had a positive relationship with intrinsic goal orientations (learning goals) , whereas entity beliefs had a positive relationship with extrinsic goals (performance goals) . The findings of Robin and pals (2002), and Abdulla (2008) were consistent findings with Dweck's model (1986).

Other studies have reported findings that provided partial support for Dweck and Leggett's (1986) model on the relationship between implicit theories and dichotomous goal orientations(e.g., Dupeyrat & Mariné, 2001; Li, Solmon, Lee, Purvis, & Chu, 2007; Vermetten, Lodewijks, & Vermunt, 2001). For example, in a study that examined the relationship between students' implicit theories of ability, dichotomous goal orientations and preferred type of feedback for 115 undergraduate students in the US, Li et al. (2007) found partial consistency with Dweck (1986). Li et al. (2007) found that incremental beliefs were positively associated with task orientation , entity beliefs were negatively associated with task orientation , and entity beliefs were not significantly associated with performance goals (the authors used the terms "ego orientations", p. 288) . Dupeyrat and Mariné (2001) examined beliefs about intelligence, goal orientations, and self-perceptions of cognitive engagement in learning for 142 students in France. Theories of intelligence were measured as a single rather than dual factor, representing an entity view of intelligence.

The reversed scores of entity view were taken as the incremental view of intelligence. They found that entity beliefs were negatively related to learning goals , which indicated that incremental beliefs (i.e., rejecting entity view of intelligence) were positively related to learning goals. However, the results showed that entity beliefs were not related to performance goals. This partially supported Dweck's model (1986).

In another study, Vermetten et al. (2001) examined the role of personality traits (implicit theories) and goal orientations on strategy use for university students in Netherlands, and their findings were also partially consistent with Dweck's (1986) model. Vermetten et al. (2001) also measured intelligence as a single factor that represented entity view intelligence and found a significant relationship between entity beliefs and performance goals (ego orientations) . However, incremental beliefs (i.e., rejecting entity view of intelligence) were not related to learning goals . The findings from Dupeyrat and Mariné (2001), Li et al. (2007), and Vermetten et al. (2001) generally showed the relation between implicit theories of intelligence and dichotomous goals, but the relation was only partially supported. In addition to the above studies that identified relationships between beliefs about intelligence and dichotomous goal orientations, Cury et al. (2006), who tested Dweck and Leggett's (1988) model and used a 2 x 2 achievement goal framework for 12 to 14–year-olds in France, found that incremental beliefs were positively correlated with mastery goals , and negatively correlated with performance-avoidance goals , while entity beliefs were positively correlated with the adoption of performance-approach and performance-avoidance goals .

However, Braten and Stromso (2004), who examined whether implicit theories and epistemological beliefs were related to goals using the trichotomous goal framework with Norwegian undergraduates, found that entity beliefs were positively correlated with performance-avoidance goals , whereas incremental beliefs were negatively correlated with performance-avoidance goals . Results also indicated that neither incremental nor entity beliefs correlated with either mastery or performance-approach goals. These results showed some inconsistencies with Dweck and Leggett's (1988) model.

Furthermore, Shih (2007) explored how motivational characteristics such as implicit theories of intelligence, goal orientations (trichotomous goals) and perceptions of classroom goal structures were related to upper-elementary-school Taiwanese students' decisions to avoid help-seeking in the classroom. Shih found that incremental beliefs positively correlated with both mastery goals , and performance-approach goals , while entity beliefs positively correlated with performance-avoidance goals and negatively correlated with mastery goals which is inconsistent with Braten and Stromso (2004) and Cury et al. (2006). Moreover, this study provided evidence of an example of the relationship between implicit theories of intelligence and dichotomous goal orientations.

In summary, the studies above that examined relationships between implicit theories of intelligence and dichotomous goals, and those that examined the relationship between implicit theories of intelligence and dichotomous goals together indicated that incremental beliefs were related to learning goals, whereas entity beliefs were related to performance goals (e.g., Abdulla, 2008; Cury et al. 2006; Robin & Pals, 2002; Shih, 2007). Several studies provided results that were consistent (e.g., Abdulla, 2008; Robin & Pals, 2002), or partially consistency (e.g., Dupeyrat & Mariné, 2001; Li et al., 2007; Vermetten et al., 2001) with Dweck's (1986) model.

While the above mentioned studies generally demonstrated the relation between implicit theories of intelligence and achievement goals (Dweck, 1986), they do not provide evidence about the relation between these variables and learning strategies and further, these studies with the exception of Cory et al. (2006) did not focus on domain specific beliefs about intelligence and achievement goals, which is important for understanding students' beliefs and goals in particular domains.

Relationship between Epistemological Beliefs and Goal Orientations. According to Bråten & Strømsø (2004). Epistemological beliefs have significant association with the motivational constructs such as goal orientation. Further sustained this claim and revealed that student's epistemological beliefs influence student's goal orientation and self-efficacy beliefs (part of motivational constructs). Findings showed that among four dimensions of epistemological beliefs only three dimensions were positively correlated with several motivational constructs such as, intrinsic and extrinsic goal orientation, task value, self-efficacy, control of learning and, anxiety. Among motivational constructs, goal orientation is highly interrelated with epistemological beliefs, as these beliefs influence the type of goal learners establish for themselves. The imperative relationship of epistemological beliefs and goal orientation also enhanced other important facet of formal education for instance, development (Bråten & Strømsø, 2004).

Bråten and Stromso (2005) proposed that epistemological beliefs have been considered as an originator and one of the most important mediator for achievement goal orientation. The study of Kizilgunes et al. (2009) also approved the positive association of epistemological beliefs with goal orientation, except certainty. Besides this, several other researchers were interested to examine their relationship towards science achievement (Bråten & Stromso, 2005; Paulsen Feldman., 2005). Finding were summarized as, among goal orientation, previous knowledge, attitude, learning approaches, self-efficacy, and reasoning ability were significantly correlated with the achievement of science students. Other studies examined the constructivist nature of epistemological beliefs and its connection with goal orientation. Findings showed that constructivist epistemological beliefs are positively associated with mastery goal, whereas, less constructivist epistemological beliefs are correlated with performance goal (Bråten et al., 2004; Muis et al., 2004). According to Paulsen Feldman., (2005) recommended that students motivation can be boosted by empowering motivating and creative epistemological beliefs. For this purpose the role of class teacher is very important. They can also develop a new concept that knowledge is emergent and complex. It will influence students' motivation to learn.

Similarly, (Dweck & Henderson, 1989; Dweck & Leggett., 1988) argued that advancement of different goal orientations may be due to the beliefs about the nature of intelligence in the academic domain. There are two types of implicit theories of intelligence entity belief and incremental belief of intelligence, that support the types of goals adopted. According to an entity belief, intelligence is fixed and uncontrollable characteristic that may foster an ego/ performance orientation because pursuing such a goal favors positive judgment of ability Dweck & Leggett.(1988). While an incremental belief, that intelligence is flexible and controllable quality that promote ability of task orientation because it provides the opportunity for learning and improvement Dweck & Leggett., 1988).

Moreover, Wang et al. (2010) examined the relationships between the cluster of approach-avoidance dimension and mastery-performance dimension of achievement goals, implicit theory of intelligence, and behavioral regulations among engineering students. Author evidently proved five clusters of achievement goal including, high mastery approach/ moderate performance group, high mastery-approach/low performance group, low mastery approach/ high performance, high mastery/high performance and low mastery/low performance. Students with high mastery-approach goals have relatively higher incremental beliefs, feeling of autonomy, value, exert more effort and enjoy learning. Therefore, researcher suggested that a mastery-approach goal is best motivator for learning. To increase the mastery goal structures in the classroom, Ames (1992) proposed some practical suggestions using the Target principles (task, authority, recognition, grouping, evaluation and time (Liu et al., 2009).

Relationship between Epistemological Beliefs and Learning Approach. Epistemological beliefs play an essential role towards students learning strategies particularly, their learning approaches and subsequently influence their learning outcomes (Schommer, 1990). The study of Holschuh (1998) addressed this issue by analyzing the correlation between epistemological beliefs and use of learning approaches (deep learning and surface learning) . Results revealed that students having more sophisticated beliefs make use of deep learning approaches. Whereas, students with immature or naïve beliefs exploit surface learning strategies.

In the literature, there is increasing evidence that shows students' learning in general and students' learning approach in particular, are influenced by epistemological beliefs. It has been suggested by Perry that when students' views of the nature of knowledge changes, it will lead to observable changes in the manner of reading. This concept was also supported by Hofer (1994) because he stated that, "beliefs about knowledge may affect one's perception of the educational process and the type of work necessary to accomplish reading".

Contrasting perceptions of students' epistemological theories which include intellectual development (Perry, 1970), epistemological reflection (Baxter Magolda, 1992), reflective judgment (King & Kitchener, 1994), argumentative reasoning (Kuhn, 1991), epistemological beliefs (Schommer, 1997), and conceptions of learning (Martoner al., 1993) have identified the importance of students' beliefs about knowing and learning and their relations with learning approaches and outcomes.

Newer research programs have investigated the structure of student's epistemological beliefs and their relations with cognitive processes (Hofer & Pintrich, 1997). For instance, it has been revealed that students' epistemological beliefs display multifaceted characteristics including the dimensions of structure, source, certainty, speed, and control of knowledge (Schommer, 1997). Similarities across domains were also shown in epistemological beliefs (Schommer& Walker, 1995) and found to vary with socio-cultural variables (Jehng et al, 1993). Such beliefs are related to reflective judgment (Bendixen et al., 1994) and the interpretation of controversial issues (Kardash & Scholes, 1996).

Students' epistemological beliefs' influence on cognitive processes and academic achievements has also been found in different knowledge domains. For example, students who believed in a rich, integrated view of science outperformed others in scientific understanding (Songer& Linn, 1991). In contrast, beliefs about ''simple-certain'' knowledge and ''quick learning'' were related to poorer performance on conceptual-change tasks (Qian & Alvermann, 1994). In mathematics, for instance, students who believed in quick answers were less likely to persist in problem solving (Schoenfeld, 1983).

There was also an impact on reading comprehension in college students due to individual differences in epistemological beliefs. (Ryan, 1984; Schommer, 1990). Within the context of reading strategy instruction for delayed readers, experimental students shifted more to a ''problem-centred'' conception of learning compared to control students and the former performed better on standardized tests (Anderson, Chan, & Henne, 1995). Related evidence from academic motivation has also indicated that students who believe in fixed ability and performance goals have a tendency to give up when encountering problems, while students with learning goals persevere in face of difficulties (Dweck& Leggett, 1988). ''Beliefs about learning'' are particularly relevant to classroom instruction, whereas epistemological beliefs incorporated different aspects concerning the nature of knowing, knowledge, intelligence, and learning (Hofer & Pintrich, 1997),

Based on a contrasting line of research, some researchers have shown particular interest in students' conceptions of learning (Marton et al., 1993). Interview studies in the phenomeno- graphic tradition have identity and are qualitative (Marton et al., 1993). Students holding a quantitative or reproductive conception focus on how much is learned; emphasis is given to superficial processing including memorization and reproduction. Conversely, students holding a qualitative or constructivist conception see learning as involving deep processing, meaning making, understanding, and conceptual change. In the same way, these researchers have put forward the argument that students' conceptions of learning are related to the way they approach their studies and consequently to the quality of learning outcomes (Crawford et al,1994; Prosser et al.,1994; van Rossum & Schenk, 1984). Research studies on student conceptions of learning are consistent with current research themes in constructivist learning (Bereiter & Scardamalia, 1993).

Studies in cognition and instruction has examined students' constructive roles and use of learning approach (Resnick, 1989). Passive learners engage surface strategies such as ''copy–delete'' in summarization (Brown & Day, 1983) and ''knowledge-telling'' in writing (Bereiter & Scardamalia, 1987), whereas active learners employ deep, problem-solving strategies (Chan et al., 1997) and self-explanations in scientific understanding (Chi et al., 1994).

Comparable results were gained in research on academic learning signifying that successful students employ self-regulated learning strategies (Zimmerman, 1990). These discoveries on constructive learning processes substantiates the distinctions between the ''reproductive'' versus ''constructivist'' conceptions of learning: While some students may view learning as a matter of paying attention, doing assigned tasks and memorization, others may see learning within a constructivist framework and view learning as related to thinking, understanding, and problem solving (Bereiter & Scardamalia, 1993; Steinbach et al., 1987).

It is important to investigate students' epistemological beliefs so as to understand how knowledge is constructed. In particular, beliefs about learning are vital components of meta-cognitive processing as they may underlie students' use of self-regulated strategies (Schommer, 1997). If learning is viewed as involving problem solving, students would be more inclined to apply a constructive strategy and engage in deeper processing. They would tend to employ a surface strategy if they believe that learning involves reproduction of knowledge and completion of routine activities. In simple terms, what they believe about the nature of learning will play a vital role in their learning outcomes if knowledge is actively constructed by the learners themselves. Thus far, research has been conducted primarily with university and high school students, in spite of substantial interest given to the investigation of epistemological beliefs, (Schommer, 1997). Little has been known regarding secondary school children's beliefs about the nature of learning. Whether school-aged learners hold constructivist views of learning, defined here as the beliefs that knowledge is constructed and that it is related to thinking, understanding, and problem solving in unclear. Despite the existence of some studies of young learners' theory of mind (Wellman, 1992), such research is not related to school learning.

When learning is viewed as meaningful construction, children were better able to grapple with the scientific concepts, and they performed better than those holding a shallow conception on reading tasks requiring them to make inferences, construct the gist of the passage, and use text information to solve problems. These verdicts are consistent with research on the effects of epistemological beliefs on text comprehension (Schommer, 1990) and conceptual change learning (Qian & Alvermann, 1996). Understanding science is problematic because new information often appears contradictory to what students know. Students are inclined to allow their pre-existing knowledge to override text information and absorb new information to what they already knew, often resulting in alternative conceptions (Anderson & Roth, 1989). When there are beliefs that learning involves thinking and that it is extendible, it would appear to be particularly relevant for scientific understanding that involves sense- making constructive learning activities. Students would be less likely to apply deep processing strategies to tackle problems of understanding if they see learning as involving the completion of routine activities to meet standards set by external authority. In difficult domains such as science learning when children need to persist in the face of difficulties, the constructivist, problem-centred conception would seem particularly important. Some caveats of the present study pointing to areas for further investigations need to be considered. .

To build up a more in-depth understanding of children's epistemological beliefs, different methodologies such as use of ill-structured problems (King& Kitchener, 1994) and interviews (e.g., Marton et al., 1993) should likely be considered. As this study has focused on the impacts of children's beliefs about learning on text understanding, it might be essential to consider other factors. For example, research on self-regulated learning has shown that task characteristics and students' perceptions of tasks could affect their beliefs, strategy use, and achievements (Zimmerman, 1998).

As such, when learners with constructivist notions of learning perceive the task as one that requires recall of factual information, they might still employ surface strategy if they. In this study, children were instructed to learn and to understand rather than to memorize the text. The task instruction also included directives that children could have the text passage with them, and they could spend as much time as they wanted so test anxiety might also be reduced. Hence, our expectation is that children were less likely to misinterprete the demands of the tasks as requiring memorization.

Additional studies could be carried out using different experimental conditions (e.g., understanding the text vs studying the text) to investigate the roles of task expectancy in mediating children's views of learning on strategy use and performance. Besides task expectancy, there are certainly other factors such as prior knowledge and motivation that might also affect children's performance. The present findings do not exclude these alternative explanations; for example, the effects of prior knowledge on children's learning and development have been extensively studied in the past 2 decades (Alexander, 1996)

Subsequent research that incorporate other variables would provide a more detailed picture about the roles of epistemological beliefs in children's learning. In this study, specific written tasks were designed for examining the relationships between epistemological beliefs and quality of learning outcomes. It is somewhat puzzling that the apparent effects of epistemological beliefs on the inferential questions were stronger than those on the application and summary questions that seem to require deeper processing. Nevertheless, it is not clear what strategies students actually used to process the different text-learning tasks. Whereas children with a more sophisticated view of learning are likely to employ deep processing strategies, resulting in better performance, it would be important to go beyond outcome measures and examine children's task engagement and use of cognitive and metacognitive strategies in approaching the tasks. For instance, one limitation of this study was that the amount of time children spent on the reading tasks had not been examined. Such information might help us understand better whether children holding reproductive views were less likely to persist, whereas those holding constructivist notions were more engaged in task processing.

The majority of the latest research studies on epistemological beliefs have solely examined students' beliefs and performance (Schommer, 1997). Some exceptions include studies of students' conceptions of learning and effects of strategy instruction on students' beliefs (Anderson et al., 1995). It would be useful to conduct eventual investigations examining the relationships among epistemological beliefs, task engagement, cognitive strategies, and learning outcomes, and experimentally manipulating such variables to better under- stand the relationships between beliefs and text understanding,. Numerous other issues need to be tackled, for example, how do beliefs about learning evolve and what could be done to foster the development of more sophisticated beliefs? It has been pointed out that children's experiences affect their development of epistemological beliefs (Schommer, 1997). Specifically, there is some preliminary evidence indicating that cognitive strategy instruction affects children's beliefs; students receiving strategy instruction shifted from ''task-completion'' to ''problem-centred'' views of reading and writing (Anderson et al., 1995).

Several other types of reciprocal relationships might exist: whereas children with deeper conceptions of learning might apply more sophisticated strategies, it is also possible that providing challenging tasks to children and helping them tackle the tasks strategically might help them develop a more sophisticated view of learning. It remains an open question how beliefs and metacognitive processes interact in influencing the development of more sophisticated epistemological beliefs. In terms of instructional implications, it would be important for teachers to consider the beliefs of their students as well as to reflect on their own epistemological beliefs and classroom practices. If students believe learning involves remembering information and routine practice, they will be likely to employ superficial strategies to complete the school tasks. Even where teachers profess sophisticated beliefs, if classroom activities focus on accumulation of facts and drilling of decontextualized skills, children will come to believe in a reproductive and routine view of learning. An important goal of schooling would be to provide problem-solving opportunities for students to construct their own understanding. As well, it is also important to help children to examine and reflect on their beliefs about learning—from seeing it as involving completion of routine tasks to one involving their active, constructive role in meaning making.

Despite considerable interest given to the investigation of epistemological beliefs, thus far, research has been conducted primarily with university and high school students (Schommer, 1997). Not much has been known about secondary school children's beliefs about the nature of learning. It is not clear whether school-aged learners hold constructivist views of learning, defined here as the beliefs that knowledge is constructed and that it is related to thinking, understanding, and problem solving. Although there have been some studies of young learners' theory of mind (Bereiter & Scardamalia, 1993), such research is not related to school learning.

Further, Chan (2003) supported this claim in a sense that, deep approach is determined by the sophisticated beliefs that are; knowledge can be accomplished by effort, understanding and integration process , and also by reasoning instead of depending on the allotment of authorities. In contrast to it, surface approach rely on fixed ability belief, source of knowledge and certainty belief, that are part of naïve beliefs (Kizilgunes et al., 2009).

More recently, Phan (2009a) also declared the same result that sophisticated epistemological beliefs of university students positively associated with deep learning approaches through effort expenditure. Further, Cano (2005) extended the previous study and examined the relationship between epistemological beliefs and academic achievement. Also, author investigated the mediating role of learning strategies. Findings revealed that epistemological beliefs and use of learning strategies were found to influence academic achievement and have contribution towards improving students' biology course grade and also their GPA. Based on the findings of study, author concluded that learning strategies mediate the relationship between epistemological beliefs and academic achievement.

More, several other researchers also studied the relationship between epistemological beliefs and learning strategies (Bråten & Stromso., 2004; Hofer et al., 1997; Muis, 2004; Schommer 1990). Results showed that both these constructs are emerging as interrelated constructs. Based on preceding studies, Muis (2007) projected a model by assimilating epistemological beliefs into Winne et al. (2002) learning strategies model. Specifically, the author hypothesized that epistemological belief are anticipated at the definition of task phase and may stimulate the standards set for a task, which directly impact on the goals that student set. In turn, these standards influence evaluation of strategies that are used to complete the task and also it have an effect on student's performance.

Researcher also agreed that while selecting appropriate learning strategies, few epistemological beliefs may have more dominant and significant affect as compared to others. For example, Dahl et al. (2005) reported in his study that among epistemological beliefs, beliefs about structure of knowledge and the ability to control learning are related with us of cognitive and metacognitive learning strategies. Recently, Kingir et al. (2013) reported a positive significant relationships among epistemological beliefs, constructivist learning environment perceptions, and learning approaches.

Muis (2004) further consider this proposal and tried to theoretically and empirically prove it. Author conducted a two part study to examine the association of student's epistemological beliefs and self-regulated learning strategies processing in mathematics problem solving. Findings showed that rational students scored higher on the metacognitive self-regulation subscale of the MSLQ as compare to other groups. After that, second half of the study was conducted, in which 24 students were considered from the original sample of the participant. Results from this half also revealed rational students showed higher usage of learning strategies including planning, monitoring, and metacognitive control as compared to other two groups. Overall, these results confirmed the findings of previous studies that rational problem solvers are successful as compared to empirical one. Beside that students epistemological beliefs also influence teaching approaches (Brownlee, 2001). As a result, if teachers recognize their belief system, it would be helpful in enhancing their preparation and teaching practices (Epler, 2011).

Relationship between Goal Orientation and Learning Approach. Achievement goal theory explains and predicts the relations among goals, achievement-related behaviours, such as learning strategies, and achievement in academic settings (Ames, 1992; Dweck, 1986; Dweck& Leggett, 1988; Midgleyet al., 1998; Pintrich, 2000). A large number of researchers have investigated relations among these variables (e.g., Bandalos, Finney, & Geske, 2003; Cao & Nietfeld, 2007; Chan & Lai, 2006; Diseth, 2011; Diseth & Kobbeltvedt, 2010; Elliot et al., 1999; Greene et al., 2004; Ho&Hau, 2008; Liem et al., 2008; Phan, 2009; Roebken, 2007; Schraw, Horn, Thorndike-Christ, &Bruning, 1995; Seo & Taherbhai, 2009; Simons et al., 2004; Vrugt & Oort, 2008; Wolters, 2004).

Many of these studies provided a foundation for the present study, and the study aimed to build upon or extend their findings. It can be grouped these studies in three categories based on how they differed from the present study, which also served as a basis for justifying the inclusion of the variables measured in the present study. The first category included studies that measured dichotomous goals rather than trichotomous goals (Bandalos et al., 2003; Cao & Nietfield, 2007; Greene et al., 2004; Phan, 2009; Schraw et al., 1995).

For instance, Bandalos et al. (2003) investigated the relations among goals, processing strategies, and achievement for undergraduates who were taking a course in statistics. They found that mastery goals were related to deep processing, performance goals were related to disorganisation, and deep processing was related to achievement. However, although they measured learning and performance goals, they did not make a distinction between performance-approach and performance-avoidance goals. Thus, results from Bandalos et al. (2003) and similar studies provided a basis for investigating the relations among goals, processing, and achievement. However, it is important to measure these relations for performance-approach and performance-avoidance goals because previous research has shown that these goals have different relations with learning strategies and achievement (e.g., Cutinho &Savia , 2008; Kaplan & Litchinger, 2009; Seo & Taherbhai, 2009).

For example, Seo and Taherbhai (2009) found performance-approach goals were more strongly related to cognitive/metacognitive strategies and achievement than performance-avoidance goals, and Kaplan and Litchinger (2009) found performance-approach goals were more strongly related to study organisation than performance-avoidance goals. Further, Cutinho and Savia (2008) found students who adopt performance-avoidance goals were more disorganized in their studies than students with performance-approach goals, and found students' performance-approach goals were positively and performance-avoidance goals were negatively related to their achievement. Thus, a trichotomous goal framework was used in the present study to provide a more detailed investigation of the role played by different types of goals in mathematics achievement.

The second category consisted of studies that did not specifically include either or both the deep and surface-learning strategies (Ho & Hau, 2008; Phan, 2009; Roebken, 2007;Schraw et al., 1995; Seo & Taherbhai, 2009; Wolters, 2004). For instance, Phan (2009) used structural equation modelling to investigate the relations among goals, deep processing, critical thinking, effort, and academic success for university students in psychology. They found that mastery goals were positively-related to deep learning strategies and performance-approach goals were positively-related to effort. However, neither effort nor deep learning strategies were related to either critical thinking or to achievement, as hypothesised in the model. Phan did not measure students' use of surface-learning strategies despite the fact that deep and surface strategies show different relations to goal and achievement.

Social cognition theorists has initiated an idea about the identification of key factors that are affecting students cognitive engagement in successful settings (He, 2004). Among these factors, motivation beliefs has an essential role in student's use of self-regulated learning strategies including metacognitive skills and effort regulation (Pintrich, 1999). These motivational beliefs has a significantly affect the use of metacognitive strategies that are utilized by the students (Al-Ansari, 2005; Pintrich et al., 1990). For this reason, Bandura (1993) provide suggestion that aims of formal education should be to facilitate students with motivational beliefs and metacognitive skills. In this way they can educate themselves throughout their lives.

Researchers in education and educational psychology, begins to explore it and depicted that motivational variables specifically goal orientations are highly correlated to students learning (Pintrich et al., 1991; Pintrich, 2000a; Pintrich et al., 1993; Wigfield et al., 2000). Goal orientation as a part of self-motivational beliefs act upon as a inspiring mediator for students self-regulatory behaviors (Kingir et al., 2013; Zimmerman et al., 2000). The function of goal orientation is to enhance students' learning incentives and also the quality of the selection and the employment of learning strategies. In this way, it effect the implementation of self-regulatory knowledge and skills appropriately.

Moreover, goal orientation also explain the reason why few students cling to a task while other students do not (Sungur, 2007). Because, highly-motivated students struggle to learn in spite of complexity of learning task and also utilize various cognitive strategies. The focus of goal oriented students is on learning and considering course material important, useful, and interesting. These students believe that to study with effort influence in mastering of course material, therefore, they frequent utilize metacognitive strategies. Hence, goal orientation and self-regulated learning strategies are necessary for successful outcomes. Sungur (2005) also agreed and adopted a view that both these factors are compulsory for the successful interpretation of learning outcomes. Highly motivated students would not be able to accomplish their academic targets if they lack self-regulated learning strategies and vice versa. Author proposed another possibility, that sometimes high motivated students who are familiar with cognitive and metacognitive strategies are unable to use them due to their lack of volitional strategies. Volitional strategies are basically representing knowledge and skills that are required to create and support an intention until goal is accomplished. Therefore, Kingir et al. (2013) studied the relationship between motivational beliefs such as mastery goal orientation and SRL behavior (including volitional strategies) with respect to mathematics problem solving. Results showed that students who exploit cognitive, metacognitive and volitional strategies are more likely to feel more efficient about their ability to well during mathematics problem solving procedure.

Ames (2012) investigated the relationships among student's motivational beliefs such as goal orientation, self-efficacy, and perception of class room goal structure, self-regulated learning strategies and achievement in mathematics. Author concluded that motivational factors alone are not enough for enhancing student's mathematics achievement. Rather, it is the use of deep learning strategies which mediate the link between motivational factors and mathematics achievement.

Further in goal orientation, Ames (1992) and Pintrich et al. (1992) given stress on the part of mastery goal orientation, because mastery goal (dimension of goal orientation) is connected to an intrinsic interest in and value for learning and, also with quality of students cognitive arrangement. Since, they are more likely to process the material to be memorized at a deeper level for instance, for example elaboration and organizational strategies that reflect deeper level of cognitive processing (Graham et al., 1991; Pintrich et al., 1992). Therefore, these students try to plane their work and monitor and evaluate their understanding. Through deeper cognitive processing, mastery goal orientation student also shows high memory recall, high-quality text comprehension and better use of self-regulated learning strategies (Graham et al., 1991; Nolen, 1988; Pintrich et al., 1990), and metacognitive strategies (Dupeyrat et al., 2005; Elliot et al., 2001).

Moreover, Flavell (1992) metacognition has a fundamental role in reading, comprehension, writing, memory, problem solving, and other areas of learning. Therefore, researchers targeted the role of metacognition and mastery goal orientation. They investigated the mediating role of metacognitive between mastery goal orientation and math achievement Ames and Archer (1988) and Dweck et al., (1988) together with math self-efficacy (Elliot et al., 1999; Middleton et al., 1997; Rastegar et al., 2010). Results showed that mastery goal oriented learners commence more self-regulated learning strategies as compare to performance goal oriented (Nolen et al., 1990; Pintrich et al., 1990).

In addition, mastery goal also put forth a positive effect on critical thinking (construct of self-regulated learning strategies) and enhance students understanding of knowledge and development skills (Phan, 2008b, 2009b). Although, critical thinking is one of the important construct of self-regulation, unfortunately, few research studies have explored this construct (Phan, 2008b, 2009b). Consequently, research work concerned with achievement goal and critical thinking is limited to few studies and is still in its early days.

In short, mastery goal have been found to associate with positive outcomes. For example, help seeking (Ryan et al., 1998), long term retention of informtaion (Elliot et al., 1999), persistance (Pintrich, 2000b), use of deep processing stratigies (including meaning making) and shallow stratigies (rehearsal) (DeBacker et al., 2006) and high achievemnt outcomes (DeBacker et al., 2006; Elliot et al., 1997).

In contrast to mastery-approach goals, performance goal is determined by lower level of cognitive engagement, for example, employment of more surface processing stratigies like, rehersal (Nolen, 1988; Pintrich et al., 1992) and low self-efficacy (Skaalvik, 1997). Also, performance goal oriented mostly avoid help seeking (Middleton et al., 1997; Ryan et al., 1998), and these students shows few negative outcomes such as test anxiety (Elliot et al., 1999; Middleton et al., 1997).

On the other hand, some other researchers reported that performance goal oriented has positive association with cognitive strategies (Dupeyrat et al., 2005; Elliot et al., 2001; Simons et al., 2004), cognitive engagement such as high attitude of persistence (Pintrich, 2000b). Since, performance goal orientation shows correlated with positive factors such as absorption during task involvement(Elliot, 1996), therfore, shows high achievemnt outcomes (Elliot et al., 1997).

In contrast to (Meece et al., 1993; Pintrich, 1991) this studies, the study of Bouffard et al. (1995) is a correlation studies that merely noticed positive influence of both mastery and performance orientation. Results showed that highly mastery and performance goal oriented students' reveals highest level of cognitive strategy use, self-regulation, and course grade. For this reason, Pintrich (1991) recommended that there may be an evolution for students to be relatively high on both goal orientations. Regarding to performance-avoidance goals orientation, it have been apparently influenced by their negative motivational characteristics to become self-defensive about their self-esteem (He, 2004).

Consequently, Pintrich (2000a) presumed that students with mastery-avoidance goal may use less adaptive monitoring processes, because of their focus on not making mistakes. Therefore, they have been positively associated with using low level and cognitive strategies (Elliot et al., 1999; Kadioglu et al., 2014; Simons et al., 2004).

The different implicit theories of intelligence lead to contrasting aims, pursuits, or goals in academia (Dweck & Legget, 1988). Students who believe intelligence is a fixed trait (i.e. Entity perspective) will view schoolwork and testing as displays of performance and are subject to judgment. Those students who believe intelligence is malleable (i.e. incremental perspective) believe schoolwork and testing is an opportunity for growth, learning, and development.

Entity students more frequently champion performance goals. Because intelligence to these students is unchanging, schoolwork and examinations become permanent reflections of their intellectual competence. Low or high scores on a test will signify low or high intelligence, respectively. It is important to note, that entity students interpret test scores as not just a current assessment, but as an indication of future capabilities in that academic domain, regardless of effort or instruction .

There is recall that theories of intelligence do not account for ability; that is, entity or incremental students can still have low or high ability. Because of this ability split, performance goals can be divided further into two levels of achievement motivation, classified as either avoidance or approach. Students with incremental theories of intelligence are more likely to have learning goals in academia. Here, intelligence changes as a reflection of effort and understanding.

Therefore, school work and testing do not represent permanent internal competence of the individual, only an indication of the effort and use of problem-solving techniques. The goal then becomes learning new strategies and developing more knowledge. Self -efficacy in these students interacts differently with the learning goals than it did in performance goals for students with an entity belief. Within incremental beliefs, low self -efficacy is a temporary state that can be changed by learning more; thus, the goal is a learning - approach goal. In situations of high self -efficacy, incremental students maintain a learning-approach goal. They have high self -efficacy because they have put forth effort, and they recognize that they need to continue with that effort to retain high abilities. Regardless of ability level, students with incremental attitudes adopt learning -approach goals in academia.

Bempechat and London (1991) investigated these ideas by introducing fifth and sixth graders to an ability called “Matrix Ability” where one group was told the ability was a fixed trait in which some kids have it and others do not (i.e. the fixed ability group), and another group of students were told that matrix ability could be improved upon with practice (i.e. the malleable ability group). After receiving poor feedback on a set of Raven’s Progressive Matrices, students were then given four goal choices in solving another set of matrices. Three of the choices were performance goals (e.g., problems that are easy or make them look smart), and one was a learning goal (i .e., problems that they will learn from). Students reading the malleable matrix ability passage were significantly more likely to choose the learning goal over any of the performance goals compared to the fixed matrix ability students who overwhelmingly chose performance goals. Understanding ability as a trait that can change led students to adopt goals that served to increase those abilities.

Zaeema Riaz Ahmad, Saba Yasien, & Riaz Ahmad (2014) had used the Structural equation modelling techniques to test a three-path mediational model of mathematics achievement on the relationships among higher secondary students' beliefs about mathematical ability, achievement goals, learning strategies, and mathematics achievement. The result of the study showed that incremental beliefs had a positive relation to mathematics achievement, mediated by mastery goals and deep-learning strategies. Incremental beliefs had a negative relation to mathematics achievement, mediated by performance-approach goals and surface-learning strategies. Entity beliefs had a negative relation to mathematics achievement, mediated through performance-avoidance goals and surface-learning strategies. Incremental beliefs also had an overall indirect positive relation, and entity beliefs had an overall indirect negative relation to the achievement. The results of the mediational model showed the best possible pathways that students could follow in the academic setting as far as performance and building capacity in mathematics were concerned.

A similar study on fifth graders also used Raven's Progressive Matrices to assess the connection between theories of intelligence and academic goals. Mueller and Dweck (1998) had students solve an initial set of problems followed by fabricated positive feedback. One group of students was praised on their ability for their high performance (e.g., "you must be smart"), and another group was praised on their effort (e.g., "you must have worked hard"). Students were then given the option to pursue different academic goals. Those praised for their intelligence pursued performance goals, while students praised for their effort adopted learning goals. Follow-up experiments found that students praised with intelligence inflated their performance to peers and preferred a choice to read a report of others' performance instead of an option to learn new problem-solving strategies. In contrast, a large majority of the students praised on effort opted for learning new strategies. Believing ability to be a measure of a fixed intelligence leads children to pursue goals focused on performance and to adopt attitudes based on judgment of that ability by others; students viewing ability as a measure of effort instead looked for opportunities to gain knowledge, increase effort, and learn new problem -solving strategies.

To complete the 2 x 2 framework for achievement goal and motivation patterns, there are rare instances of learning -avoidance goals (Elliot, 1999; Elliot& McGregor, 2001). This goal is more relevant to the athletic domain as opposed to a scholastic domain (Ciani & Sheldon, 2010). The idea is that an incremental theorist will avoid effort or persistence that could reinforce a bad habit (e.g. the delicate mechanics of a golf swing). However, this idea seems to have little practicality in schoolwork. It would be like purposefully avoiding an opportunity to learn a new mathematics technique to find the roots of a quadratic equation (e.g. , the quadratic formula) because it might affect one's ability to use an older technique (e.g., completing the square). Because this construct is rare and nebulous in academia, the current study does not include learning-avoidance goals in the testing or analysis.

To summarize thus far, the research has demonstrated that students with entity beliefs of intelligence overwhelmingly adopt goals cantered on displays of performance. Specifically, these students will wish to approach performance judgments to demonstrate their high ability, or will avoid displays of performance to avoid appearing unintelligent. Conversely, students who view assessments as a measure of effort and temporary knowledge will approach school to learn and develop that knowledge, regardless of low or high ability.

Achievement goal theory explains and predicts the relations among goals, achievement-related behaviours, such as learning strategies, and achievement in academic settings (Ames, 1992; Dweck, 1986; Dweck& Leggett, 1988; Midgleyet al., 1998; Pintrich, 2000). A large number of researchers have investigated relations among these variables (e.g., Bandalos, Finney, &Geske, 2003; Cao &Nietfeld, 2007; Chan & Lai, 2006; Diseth, 2011; Diseth&Kobbeltvedt, 2010; Elliot et al., 1999; Greene et al., 2004; Ho&Hau, 2008; Liem et al., 2008; Phan, 2009; Roebken, 2007; Schraw, Horn, Thorndike-Christ, &Bruning, 1995; Seo&Taherbhai, 2009; Simons et al., 2004; Vrugt&Oort, 2008; Wolters, 2004).

Many of these studies provided a foundation for the present study, and the study aimed to build upon or extend their findings. It can be grouped these studies in three categories based on how they differed from the present study, which also served as a basis for justifying the inclusion of the variables measured in the present study. The first category included studies that measured dichotomous goals rather than trichotomous goals (Bandalos et al., 2003; Cao &Nietfield, 2007; Greene et al., 2004; Phan, 2009; Schraw et al., 1995).

For instance, Bandalos et al. (2003) investigated the relations among goals, processing strategies, and achievement for undergraduates who were taking a course in statistics. They found that mastery goals were related to deep processing, performance goals were related to disorganisation, and deep processing was related to achievement. However, although they measured learning and performance goals, they did not make a distinction between performance-approach and performance-avoidance goals. Thus, results from Bandalos et al. (2003) and similar studies provided a basis for investigating the relations among goals, processing, and achievement.

However, it is important to measure these relations for performance-approach and performance-avoidance goals because previous research has shown that these goals have different relations with learning strategies and achievement (e.g., Cutinho &Savia , 2008; Kaplan & Litchinger, 2009; Seo & Taherbhai, 2009).

For example, Bernardo (2003) found deep learning strategies were positively-related to academic achievement, whereas surface learning strategies were negatively-related to academic achievement. Similarly, Crawford et al. (1998) found that deep learning strategies were positively-related to mathematics achievement, whereas surface strategies were negatively-related to mathematics achievement for university students. Thus, both deep and surface learning strategies were used in the present study to explore the role played by depth of learning in mathematics achievement.

In addition to the aforementioned two categories, there were eight studies that were closely aligned with the model and analyses used in the present study, and thus were more relevant for justifying the model to be tested. These studies used a trichotomous goal orientation, included both deep and surface learning strategies, and had a measure of achievement (Elliot et al., 1999; Chan & Lai, 2006; Diseth, 2011; Diseth & Kobbeltvedt, 2010; Liem et al, 2008; Simons et al., 2004; Vrugt & Oort, 2008). These studies also used either SEM or path analysis to investigate the relationships among these variables. Of these eight studies, three of the studies (Diseth, 2011; Diseth & Kobbeltvedt, 2010; Elliot et al., 1999) used mediational analysis and meditational tests in particular to investigate the relations among the variables and will be discussed later. The remaining five studies are discussed in detail and will be linked to the proposed model (Chan & Lai, 2006; Liem et al., 2008; Simons et al., 2004; Vrugt & Oort, 2008).

Chan and Lai (2006) used path analysis to investigate the relations among goals (i.e., mastery, performance-approach, performance-avoidance), strategies (i.e., deep-processing and surface-processing), and academic achievement for secondary students in Hong Kong. They found that mastery goals were positively related to both deep-processing and surface-processing. Conversely, performance-approach and performance-avoidance goals were positively related to surface-processing. Neither deep nor surface processing strategies were significantly related to achievement. While the relation between goals and strategies was expected, the lack of relations between strategies and achievement was surprising given that deep processing strategies are often positively related to performance, whereas surface processing strategies are often negatively related to achievement. One possible explanation for these unexpected findings is that the students provided the achievement data rather than the school, and achievement was measured as a categorical variable (from 1 to 5) in the study. Thus, it is possible that weak students would have been reluctant to provide accurate achievement data for the study. Categorising the achievement data also affects the variability of the achievement scores and could have affected the strength of the relation between learning strategies and achievement. The sample size was large enough to use path analysis and to measure the variables included in the study. However, effect sizes such as R2 values or Cohen's(1992) f2 values for the endogenous (dependent) variables were not reported, which are important for understanding the amount of variance explained from the endogenous variables (e.g., achievement variable). Thus, it is not possible to judge the explanatory power of the model along with the significant relationships demonstrated in the model.

In the another study, similar to that of Chan and Lai (2006) , Liem et al. (2008) studied the impact of dichotomous goals and learning strategies on English achievement for Year 9 students in Singapore. They found that mastery goals were positively related to both deep and surface-learning strategies. Performance-approach goals were positively related to deep-learning strategies, whereas performance-avoidance goals were positively related to surface-learning strategies. The results also indicated that deep learning had a direct positive relation, and surface learning had a direct negative relation with English achievement. Similar to Chan and Lai (2006), this study in general showed the relation among goals, strategies and achievement but some differences appeared as far as the relations demonstrated in the model.

For example, Liem et al. (2008) found that performance-approach goals were positively related to deep-learning strategies, but this relation was non-significant in Chan and Lai's (2006) study. This difference could be because these two studies tested the variables in different academic contexts. For example, the academic context in Liem et al. (2006) was English language learning in Hong Kong while Chan and Lai (2006) focused on academics in general. From the methodological point of view, this study also had a large sample size for conducting a SEM study. The model explained 44% of the variance (i.e., equivalent of .78 of Cohen's f2) in English language achievement by goal orientations and learning strategies variables. According to Cohen (1992) a value of f2greater than .35 produces large effect size. The study also tested alternative models to identify the limitations of the original model and to increase the fit of the model used. However, the authors did not conduct a principal component analysis (PCA) or an exploratory factor analysis (EFA) procedure, which would have been important to test the dimensionality of the variables and extract the exact number of factors that accounted for the maximum number of the variance from the variables of the study. Simons et al. (2004) also used path analysis to investigate the role of goals, study strategies, and achievement for Belgium students in a nursing program. For these students, mastery goals (referred to as task goals in the article) were positively related to deep processing, excitement, persistence and regular studying, and negatively related to surface level processing. Approach ego (performance-approach) and avoidance ego (performance-avoidance) goals were positively related to surface-level processing.

However, both performance-approach and performance-avoidance goals were negatively related to deep learning strategies. The results also indicated that deep-level processing , persistence, and regular studying were positively related to students' performance, whereas surface level processing was negatively related to performance .

Similar to Chan and Lai (2006) and Liem et al. (2008), this study also used achievement goal theory to investigate the relations among goals, strategies, and achievement. However, results from Simon et al. Differed from Liem et al. (2008). for example, in Liem et al. (2006) mastery goals were not related to surface learning strategies, but Simons et al. found a negative relation between mastery goals and surface learning strategies. Similarly, Simon et al. Did not find a relation between performance-approach goals and deep learning strategies, but Liem at al. (2008) found a positive relation between the two. These differences could be due to the fact that Liem et al.'s (2008) study used secondary students while Simon et al.(2004) used college students of 18-45 years or Liem et al.'s(2008) study was on English language while Simon et al.'s (2004) study was on a nursing program.

Vrugt and Oort (2008) also used path analysis to investigate the relationships among achievement goals, learning strategies and achievement for Dutch students enrolled in a psychology course. The relationships were tested between groups of students who were more effective and less effective at self-regulation. In both of the groups it was found that mastery and performance-approach goals were positively related to deep-processing strategies . In both the groups, performance-approach goals were also positively related to surface-processing strategies. However, in the more effective group, performance-avoidance goals were not related to either deep or surface cognitive strategies whereas in the less effective group, performance-avoidance goals were negatively related to deep strategies, and were not related to surface strategies. Although surface-processing strategies in both the groups showed a negative effect on examination scores , surprisingly deep processing strategies did not show any effect on examination scores. Some of the Vrugt and Oort's results in general differed from Simons et al. (2004) study. For instance, Simons et al. (2004) showed that only mastery goals were related to deep-processing strategies, which in turn were related to achievement.

However, in Vrugt and Oort's (2008) study, both mastery and performance-approach goals were positively related to deep-processing strategies, but no relationship between deep-processing strategies and examination scores was identified. The differences could be attributable to the fact that Simon et al.'s (2004) was on nursing students while Vrugt and Oort's (2008) was on psychology students and the items were measured in the psychology domain.

Finally, in this category, Al-Emadi (2001) tested the relationships among goal orientation, study strategies, and achievement for 424 United Arab Emirates high school students who were enrolled in various introductory courses in different faculties, including humanities, social sciences, science, engineering, law and economics. The students completed questionnaires designed to measure dichotomous goal orientations (mastery, performance-approach and performance-avoidance) and specific learning strategies (deep processing, surface-processing). Mastery goals were positively related to deep processing , and surface processing ; performance-approach goals were positively related to surface processing but were not related to deep processing ; performance-avoidance goals were positively related to surface processing , but were not related to deep processing . When surface processing strategies were positively related to achievement, deep processing strategies were not significantly related to the achievement. The study in general highlighted the importance of achievement goal theory and how goals are related to study strategies and subsequent achievement. However, Al-Emadi indicated the importance of doing further investigation of the psychometric proprieties of the same measures with non-western samples. Additionally, similar to Simon et al. (2004), the authors used a PCA, but with an oblique rotation to measure the dimensionality of the variables. However, an EFA which accounts for measurement error would have been a better methodology to investigate the dimensionality. The author further reported the effect size for the achievement variable for the study, which was essential to judge the amount of variance explain by the model.

Taken together, all the studies showed that mastery goals were positively related to deep learning strategies, while three studies (Al-Emadi, 2001; Chan & Lai, 2006; Simons et al., 2004) showed that mastery goals were negatively related to surface learning strategies. Only Liem et al. (2008) showed that performance-approach goals were positively related to deep learning strategies, while all the studies except Liem et al. (2008) and Al-Emadi (2001) showed that performance-approach goals were positively related to surface learning strategies. However, while four studies (Al-Emadi, 2001; Chan & Lai, 2006; Liem et al., 2008; Simons et al., 2004) showed performance-avoidance goals positively related to surface learning strategies, no studies showed that they related to deep learning strategies. Furthermore, three studies (Al-Emadi, 2001; Liem et al., 2008; Simons et al., 2004) out of five showed that deep learning strategies were positively related to achievement, and three (Liem et al., 2008; Simons et al., 2004; Vrugt&Oort, 2008) out of five showed that surface learning strategies were negatively related to achievement. Above all, along with the direct relations demonstrated in the above-mentioned studies, the SEM and path models in these studies pictorially represented that there could be some indirect relations among goals, strategies, and achievement.

For instance, Simon et al. (2004) indicated the positive relation between mastery goals and deep learning strategies, which in turn indicated that there also existed a positive relation between mastery goals and achievement. Thus, in Simon et al.'s (2004) study mastery goals could be related to achievement, mediated through deep learning strategies. In general, by testing specific mediational pathways in the models described in the five studies, the researchers could have identified the mediating role of deep and surface processing strategies in the relationship between dichotomous goals and achievement.

Inspite of the common and contrasting relations demonstrated by the above-mentioned five studies there were limitations common to all of these studies. First, in all of the above mentioned studies it was found that several causal claims were made as SEM and path analysis techniques were used to analyse the data and demonstrate the relations among the variables.

In the past, SEM technique has been named as causal modelling, and theoretically uses the concept of cause-and-effect to build theoretical models. However, it is not wise to use causal claims in reporting the results as SEM and path analysis are non-experimental designs which cannot practically prove causal statements. One of the potential limitations common to all of these studies is that they did not report testing of the convergent and discriminant validity of the measurement instruments. The convergent validity is essential to identify the extent to which two measures of the same construct correlates with each other, while discriminant validity of measurement instrument is essential to judge if a construct does not correlate with measures of another constructs.

Moreover, all of these researchers mentioned the use of self-reported questionnaire to measure various goals and strategies but used Likert-scales to measure the variables. One of the disadvantages of Likert-scales in social science research is that it makes the respondents choose from fixed responses from the scale, but the researchers treat them as interval scales. By taking the limitations of the above-mentioned studies into account, and developing a model similar to the models in the above-mentioned studies it would extend the achievement goals theory research base, which would in turn have more accurate, reliable and valid information on the relationships among goals, strategies and achievement.

In summary, having introduced the achievement goal theory and what the theory explains and predicts, it is important to explore the antecedents of goals or what possibly predicts achievement goals. It is believed that by understanding students' perception of their intelligence and abilities, educators can much better understand how students adopt and retain goals in academic settings (Hsieh, Cho, Liu, & Schallert, 2008).

Relationship between Epistemological Beliefs and Self-Efficacy. Generally claimed that students' epistemological beliefs are related to their students' self-efficacy for learning (Chiou & Liang, 2012; Hofer, 20; Liang, Lee, & Tsai, 2010; Lin & Tsai, 2013; Lin et al, 2013; Otting et al., 2010; Paulsen & Feldman, 1999; Zhu, Valcke & Schellens, 2008). These studies have shown that sophisticated epistemological beliefs may be positively related to students' higher-level conceptions of learning or students' high self-efficacy; however, absolutists may relate epistemological beliefs to students' lower-level conceptions of learning or students' low self-efficacy for learning.

Chan's 2004) path analysis shows that there is a significant relation between epistemological beliefs and achievement. These results reflect the significant roles of epistemological beliefs in learning and conceptions of learning. Furthermore, Elliott (2005) investigate the relationship between Hong Kong pre-service teachers' epistemological beliefs and achievement. Zhu et al. (2008) use a structural equation model to focus on the relationship between university students' epistemological beliefs and approaches to study. The results of these studies indicate that students' epistemological beliefs and self-efficacy for learning may be associated with one another. However, these studies have not determined the relationship between all three variables together. Therefore, the question of what is the relationship between all three variables when together becomes important.

A handful of studies have tried to answer this question (Tsai, Ho, Liang & Lin, 2011). Tsai et al. (2011) investigated the relationships between Taiwanese high school students' scientific epistemological beliefs, and self-efficacy for learning science. However, different countries have different cultures and different cultural backgrounds of students, meaning that relationships between the variables can differ from country to country.

This point is supported by Lin et al. (2013), who investigate the differences in high school students' epistemological beliefs and motivation in Taiwan and China. They suggest that culture may have an impact on student's epistemological beliefs and self-efficacy for learning science. However, Tsai et al. (2011) present different findings. They conclude that these differences may be related to school culture and educational values in Taiwan. Generally, related studies focus on students' epistemological beliefs or self-efficacy in science (Lin & Tsai, 2013), but rarely on pure biology (Chiou, Liang & Tsai, 2012; Lin, Liang & Tsai, 2012). Moreover, the field of science includes not only biology but also astronomy, geology, physics, and chemistry. Unlike other science disciplines biology is the science of the living world and does not rely heavily on mathematics. In this respect, it can be said that biology is seldom the specific focus of these studies.

Chiou and Liang (2012) demonstrate that Taiwanese students' conceptions of learning science are associated with their self-efficacy for science learning. Similarly, Tsai and Lee (2013) discuss the relationships between Taiwanese high school students' science learning self-efficacy and their achievement. According to these studies, students who are prone to believing in the importance of increasing one's knowledge, applying, understanding, and seeing scientific knowledge in a new way are also prone to possessing higher confidence in learning science. In contrast, students who associate learning with memorizing, preparing for tests, or calculating and practicing tend to hold lower science learning self-efficacy.

Furthermore, Hofer (1994) presents clear empirical evidence indicating that college students' epistemological beliefs are related to their self-efficacy in mathematics. Additionally, Lin et al. (2013) specify that there is a relationship between high school students' epistemological beliefs and their motivation for learning science. Another study conducted by Liang et al. (2010) found that students who have sophisticated epistemological beliefs tend to have deeper motivation. In addition to studies that indicate that students' self-efficacy is related to their epistemological beliefs and conceptions of learning (Hofer, 1994). Some studies also suggest that students' achievement are influenced by their individual beliefs about the nature of knowledge and knowing. Therefore, there is a relationship between students' epistemological beliefs and their achievement. (Chan, 2004; Otting et al., 2010; Zhu et al., 2008).

Ozkal (2007) also investigates the relationships between Turkish high school students' scientific epistemological beliefs, attitudes towards science, and perceptions of their learning environment, knowledge, and gender. In addition, the connection between conceptions of learning science and self-efficacy, and the connection between epistemological beliefs and self-efficacy of pre-service elementary science teachers is researched. He found that students who have sophisticated epistemological beliefs tend to have better performance in learning.

Relationship in Epistemology Beliefs and Academic Performance. Epistemological beliefs have been an essential construct over the last 20 years , and have often been used to predict achievement or achievement-related behavior in the field of education (Hofer & Pintrich, 1997). The assumption, which is similar to motivational constructs, is that sophisticated epistemological beliefs will affect the learning process positively, and mediating mechanisms have been propounded as a learning strategy (Ryan, 1984). There was a significant relationship found between achievement and epistemological beliefs in numerous non-experimental and experimental studies (e.g. Hofer, 2001; Ryan, 1984; Schommer, 1994) the strength of this relationship however, varies across samples and to some extent depends on the dimensions examined.

A study, where more than 1000 high school students were involved, by Schommer (1994), indicated that grade point average (GPA) was significantly negatively predicted by the four dimensions covered in the questionnaire (quick learning, stable knowledge/certainty, simple knowledge, fixed ability). In the control for verbal IQ, however, only the quick learning dimension remained signifying that the quick learning dimension on academic achievement was confirmed in a longitudinal extension of the Schommer (1994) study by Schommer (1990). In contrast, neither stable knowledge/certainty nor two other dimensions significantly contributed to the explanation of GPA in either study. In the same way, in a study among 139 undergraduate and graduate students (Schommer et al., 1994), stable knowledge/certainty beliefs were not significantly related to math test performance. However, in a study with 86 junior college students who completed several comprehension tasks after reading text passages, (Schommer, 1990) the stable knowledge/certainty dimension did predict inappropriately absolute conclusions.

On the same note, Kardash and Scholes (1996) also disclosed that after reading mixed evidence on a controversial topic (causes of AIDS), beliefs about the certainty of knowledge predicted the kinds of conclusions drawn by high school students (ND96). They were more likely to draw conclusions that failed to take into account the inconclusive nature of information provided when the students' beliefs in the of knowledge were stronger. In a study involving 326 first year college students (Hofer, 2000), the certainty dimension was also significantly related to achievement. Certainty scores on both a domain-general and a domain-specific measure were the strongest predictors of academic achievement in this study. Lower academic standing led to higher certainty scores among students.

Köller et al. (2000) carried out a study to examine the achievement in Physics among upper secondary students at three course levels (advanced physics course, basic physics course, and no physics course). They adapted an instrument specifically tailored to physics and a dualism scale to tap epistemological beliefs. The findings was in accordance with their expectations as it showed that, after controlling for course level, certainty was negatively related to physics achievement (partly mediated by lower interest in physics), whereas dualism was associated with less use of elaboration techniques in the learning process. Generally, results have not been unequivocal even though certainty beliefs have been found to predict academic achievement in numerous studies. Notwithstanding, the non-significant findings may partly be attributed to the design of the studies in question.

As propounded by Wood and Kardash (2002), studies on epistemological beliefs are often lacking in the power to detect small to moderate effect sizes. Moreover, the majority of studies depend on convenience samples, possibly decreasing the likelihood of finding significant effects. In addition to that, many studies examining the relationship between epistemological beliefs and academic achievement have not taken cognitive abilities into account, an even though there is a possible relation between cognitive abilities (intelligence) and epistemological beliefs. Similarly, most studies often disregard characteristics of the family environment that are conducive to academic progress. Consequently, third variable explanations may apply, even in the studies that have found a link between certainty beliefs and academic achievement, In a separate line of research, the relationship between students' epistemological beliefs and the study fields chosen at college has been explored. In their preluding study by Jehng et al. (1993) an adapted version of Schommer's (1990) questionnaire to 386 collegestudents from what they dubbed "hard" (engineering and business) and "soft" Fields of study (humanities, social sciences) was administered. They found valid group differences for the certainty scale, the "omniscient authority" scale, and the "orderly process" scale. Students from the "soft" Fields of study were more likely to view knowledge as changeable, relied more strongly on their independent reasoning ability (rather than on authorities in the Weld), and experienced learning as a less orderly process, relative to their peers from the "hard" Fields of study,

Corresponding to Perry's (1970) assumption that the school context moulds students' epistemic thinking, Jehng et al. based their findings on enculturation processes: "students learn to view knowledge from similar perspectives as those around them, in like manner to the way they learn correct diction or learn to distinguish couth from uncouth behavior" (Jehng et al., 1993, p. 25) . Parallel differences between hard and soft Fields of study were reported by Paulsen and Wells (1998), where 290 college students were examined using the Schommer (1990) questionnaire and differentiating between soft vs. hard and pure vs. applied Fields. Students majoring in soft or pure Fields were less likely than others to hold naive beliefs in the certainty of knowledge. Engineering students, for instance, (hard, applied Weld) displayed the highest certainty beliefs. When interpreting their findings, Paulsen and Wells emphasized the role of disciplinary contexts as socializing agents.

Jehng et al.' studies (1993) indicate evident differences in the epistemological beliefs of students enrolled in different fields of study. Nevertheless, the difference observed between hard and soft Fields do not necessarily reflect socialization (or enculturation) effects at university. Based on the cross-sectional design of the studies, it is quite possible that the difference between students in different fields of study were present before college entrance. As a matter of fact, students opting for certain fields of study may have been due to different patterns of epistemological beliefs. For example, students with strong beliefs in the certainty of knowledge may find fields that seem to be characterized by "absolute," rather than tentative knowledge to be more attractive. Consequently, self-selection rather than socialization effects may account for differences in the field of study.

Howbeit, this perspective of reasoning is somewhat weakened by the results in a study among 326 first year college students reported by Hofer (2000), where both a domain- general instrument based on items adapted from Schommer (1994) and a domain-specific instrument to tap epistemological beliefs about psychology or science were used (e.g., "Truth is unchanging in this field"; emphasis added). 147 of the participating students also attended a science course, and several of them had a science major although data was collected in an introductory psychology class.

The domain-specific scales unfolded significant differences in the students' views of psychology and science. For instance, there was a difference of almost one SD on the certainty scale in within-person analyses, with knowledge being rated as significantly less certain in psychology as in science. Besides, students majoring in science were more likely to view truth as attainable as those majoring in social sciences. Essentially, however, no significant differences emerged between students majoring in science vs. social sciences on the domain-general certainty/simplicity scale of the general epistemological beliefs instrument. Based on the fact that Hofer's participants were first year students, the latter result may indicate that disciplinary different in global certainty beliefs as reported by Jehng et al. (1993) are likely to surface during, but not before the college years,

In educational psychology, epistemological beliefs have become more prominent, in part due to the assumed positive effect of sophisticated epistemological beliefs on achievement, yet, empirical support for this relationship has been ambivalent. Certain studies only found support for a relationship of this kind in some dimensions of epistemological thinking (e.g. Schommer, 1994). Besides, , there has been criticism of sample sizes often being too small, and of important third variables, such as intellectual ability, not always being controlled, from a methodological viewpoint (Wood & Kardash, 2002). As stated by Wood & Kardash, (2002), their result is relative to prior research (e.g. Schommer, 1994) and a stronger link was ratified between the final school grade and the certainty dimension of epistemological beliefs. Even after controlling for other variables, the global certainty beliefs predicted achievement; by and large, certainty beliefs mediated some of the impact of basic cognitive abilities on the final school grade.

Researchers have worked to identify how epistemological beliefs relate to learning strategies (Schommer, Crouse, & Rhodes, 1992), motivation and other such variables. It is clear that academic achievement among students is one of the important evaluation indicators for education, discovery and study of the variables affecting academic achievement would result in better understanding and predicting the variables affecting school performance.

The study of variables that are associated with academic achievement, is one of the main topics of research in educational systems. Over the past two decades, educational experts have brought attention to the study of factors affecting academic achievement, especially "cognition" more than before. One of the most important theories in this area is self-regulated learning theory. The main framework of this theory is based on how students organize their learning .Pintrich (2000b) defines self-regulated learning as an active process where the learner sets and controls his learning activities, cognition, motivation and behaviours.

One interesting explanation given for different levels of self-regulation in learning, is epistemological beliefs. Epistemology is the area of philosophy that deals with the nature and formation of human knowledge (Hofer and Pintrich, 1997). Since the early 1960s, a line of research was drawn to study the relation between dimensions of epistemological beliefs and learning and the correlation between these dimensions and motivation and cognition in this area. Schommer as one of the pioneers in this research line, believed that epistemological beliefs have different dimensions that are less and more independent. These dimensions includes knowledge structure, knowledge finality, knowledge source, and acquisition speed and ability to learn.

Some researchers have studied the relation between epistemological beliefs using behavioural and motivational strategies, and indicates that there is a relation between these components and academic achievement (Paulsen and Feldman 2005, 2007). Despite the importance of epistemological beliefs and using self-regulatory learning strategies in academic achievement, no research has been done to study the relationship between cognitive and meta cognitive components of self-regulated learning strategies and epistemological beliefs with academic achievement simultaneously. The present study intends to determine the predicting role of each aspect of epistemological beliefs and self-regulated learning strategies (cognitive- metacognitive) on academic achievement.

Research by Barvarz, Navi and Ahmadi (2014) in the study of the relationship between epistemological beliefs and academic performance of students showed that there is no relationship between rate learning and academic performance. The dimensions of epistemological beliefs and knowledge organization with the highest average speed are the average of the lowest. But the meaning of that beliefs are derived from knowledge of the rate that can be paid to the evaluation. A deep understanding and grasp material action to improve academic performance and adopting naive and superficial beliefs leads to a superficial understanding of the learning rate, whereby low performance is avoided.

Other groups of researchers like Kizilgunes et al, (2009) have found that higher levels of beliefs in source and development of knowledge were related to higher levels of performance goal, learning goal, and self-efficacy. Although the relation between beliefs about source of knowledge and learning approach was found to be negative, the relation between beliefs about developmental nature of knowledge and learning approach was positive. Results also indicated that certainty beliefs were negatively associated with performance goal and learning goal. Similarly, beliefs about justification of knowledge were found to be negatively related with all achievement motivation variables except learning goal. Certainty beliefs and justification beliefs were positively associated with learning approach. In addition, although learning goal was positively related to meaningful learning, performance goal and self-efficacy were negatively related to the learning approaches. The direction of the relation between learning approaches and achievement was positive.

Some previous investigations like Cano (2005) found that epistemological beliefs exert a significant direct effect on academic achievement. Cano explored the effects of secondary school students' epistemological beliefs on their learning approaches. Cano's study also showed that epistemological beliefs affected academic achievement directly and indirectly through students' learning approaches. Cano concluded that the relation between epistemological beliefs and academic achievement is mediated by approaches to learning. His study also indicated that throughout the secondary education years, epistemological beliefs and learning approaches change. Although students' epistemological beliefs become more realistic and complex, their learning approaches become less meaningful. Collectively, the aforementioned studies show that students with sophisticated epistemological beliefs and those who adopted meaningful-learning orientation for learning were likely to perform better than were those holding naive beliefs or using rote-learning orientation. Indeed, studies focusing on learning approaches have suggested that there is a statistically significant association between students' learning approaches and their science achievement. In keeping with conclusions reached in other investigations, pupils who study with a surface approach to learning tend to perform poorly, while with deep-approach students, the opposite is generally the case. It would assert that these results confirm the hypothesis that epistemological beliefs, as well as, influencing academic performance contribute to it indirectly through the effects of beliefs on student learning approaches.

This lends support to some results reported by Ravindran et al. (2005), which found that combinations of goal and belief variables were involved in the explanation of variance. Those findings contribute uniquely to the literature on goals and epistemological beliefs. Learning and performance goals demonstrated the expected positive relationships with cognitive engagement; learning goal explained substantial variance in meaningful engagement scores, whereas performance goal explained substantial variance in shallow engagement scores. Also consistent with theory, it was found that having a naïve belief about authority meant that one was less likely to report engaging meaningfully with course materials, and having a naïve belief that knowledge is simple meant that one was more likely to report engaging in shallow strategies.

Supporting this proposition, Tsai (1998) claimed that learners' scientific epistemological beliefs may shape their meta learning and hence affect their learning approaches. Past research has identified two approaches to learning: meaningful approaches (deep approaches to learning) and rote approaches (surface approaches to learning). Learners' choice of using rote memorization as a mode of learning is called surface- or rote-learning orientation. However, when students choose to deal with a learning task and attempt to relate newly learned and previously learned concepts, students' learning orientation is known as deep or meaningful.

Rasoul Barvarz, Yaghoob Nami, Somayeh Ahmadi (2013) determined the relationship between the epistemological believes and academic performance of students with 385 students of two universities chosen in random sampling. In order to analyse the parameters of the research, researchers used epistemological believes questionnaire (2007). . The questionnaire used in this research, is standard, furthermore its validity and reliability is confirmed by .74 coefficients. Regression is a step-by-step form and for special question Pearson correlation test is used. There is a meaningful linear relation between Academic performance and knowledge speed aspect about the main question and there is only a meaningful negative relation between knowledge speed aspect and Academic performance about special question but there is no relation in any other aspects.

The study of the relationship between epistemological beliefs and academic performance of students has shown no relationship between rate learning and academic performance while the other relations has significant results. The results of such research findings by Conley, A., Pintrich, Vekiri I. & Harrison (2004) and similar studies are inconsistent. The dimensions of epistemological beliefs and knowledge organization with the highest average speed are the average of the lowest. But the meaning of those beliefs are derived from knowledge of the rate that can be paid to the evaluation they have taken with reasonable speed, which is a deep understanding and grasp material action to improve academic performance and adopting naive and superficial beliefs leads to a superficial understanding of the learning rate, where low performance is avoided.

Relationship between Epistemological Beliefs, Goal Orientation, Learning Approach. Students epistemological beliefs, goal orientations, and their selection of learning approaches are essential determinants of students achievement (Kizilgunes et al., 2009). These goals and epistemological beliefs are imperative for substantial and shallow cognitive engagement. Students holding naïve belief, such as belief that knowledge is simple, certain, and quickly acquired from authorities, shows shallow or surface processing (Ravindran et al., 2005).

Several other researchers conducted studies to investigate the connection between two or three of these four constructs; epistemological beliefs, goal orientations, and their self-regulated learning strategies and achievement. Schommer et al. (1992) Investigated the relationship between epistemological beliefs self-regulated learning strategies and achievement. Findings were encouraging. However, other researchers examined the correlation between epistemological beliefs, goal orientations, and their self-regulated learning strategies and achievement (DeBacker et al., 2006; Phan, 2008a).

The study of Muis et al. (2009), identified the combined relationship logic of students epistemological beliefs, goal orientations, and their self-regulated learning strategies with their achievement. Author noticed that epistemological beliefs control goal orientations, which in turn affect use of self-regulated learning strategies. Subsequently, these learning strategies influence student outcomes or their achievement. Statistical findings of this study showed that students holding more constructivist beliefs, including complexity and uncertainty of knowledge are most probably adopt mastery goal and use deep processing strategies (such as, elaboration, critical thinking, metacognitive self-regulation). Consequently, these students show positive outcomes or high level achievement. In contrast, students who believe that knowledge is simple and certain (holding less constructivist beliefs) usually espouse performance goal and also employ shallow or surface processing strategies, such as rehearsal. As a result, these students show poor performance and hence, they are lower level achiever (Muis et al., 2009).

These findings are consistent with the study of Kizilgunes et al. (2009), which revealed that students holding beliefs about the certainty of knowledge have low level learning strategies, and hence they are performance goal oriented. Whereas, students holding strong beliefs about justification of knowledge, for example supporting the ideas that comes from reasoning, thinking, and experimenting are efficacious in their learning, are hence they are less performance goal oriented (Kizilgunes et al., 2009).

Most of the existing theoretical and empirical studied revealed a significant relationship between epistemological beliefs and use of learning approaches. Schommer et al. (1992) investigated the mediating role of study strategies while beliefs effects on learning and also examined the prediction of simplicity beliefs on text comprehension. Statistical results revealed a negative prediction of simplicity beliefs on meta-comprehension. Based on findings of the study, author concluded that students believing in simplicity of knowledge are more likely to be engaged in memorization strategies. As a result, these students were unable to summarize important concepts. Moreover, epistemological beliefs directly and indirectly influence achievement, hence the roles of epistemological beliefs were found to be more robust.

After that, Hofer et al. (1997) hypothesized that there exist a relationship among epistemological beliefs, goal orientation, use of learning approaches (during learning) and academic achievement. According to author hypotheses, epistemological beliefs generate a specific type of achievement goal for learning. These goals further can influence the type of learning and meta-cognitive strategies that student can utilize during their learning. Subsequently, these type of learning and meta-cognitive strategies affect their academic outcome.

Relationships among Epistemological Beliefs, Goals Orientation, Learning Approach, and Achievement. This section reviews the studies that examined the relationships among the four constructs of interest: students' beliefs about intelligence, goal orientations, learning strategies, and achievement. After an extensive review of the literature, four studies (Blackwell et al., 2007; Dupeyrat & Mariné, 2005; Jones et al., 2012; Miller, 2010) were identified that each investigated these four constructs. Within this group were studies that focused on the mediational relationships among the variables (Blackwell et al., 2007; Jones et al., 2012). The studies differed with respect to goal type, the type of learning strategies measured, the achievement domain, and the participants' level of education.

Dupeyrat and Mariné (2005), examined the relationships among implicit theories of intelligence, goal orientations (i.e., performance goals, mastery goals, and work-avoidant) cognitive engagement (i.e., deep processing, surface processing and effort), and achievement. They proposed and tested a hierarchical model of achievement motivation. Participants were 76 French students who were in a one-year diploma program. Questionnaires were used to assess various aspects of students' motivation and cognitive engagement. Path analysis was used to assess the relationships among the variables in the model. The items that measured the variables were formulated to measure domain-general beliefs, goals, and learning strategies. With respect to beliefs, entity beliefs were negatively related to mastery-goal orientation and incremental beliefs negatively predicted work-avoidant goals. Neither incremental nor entity beliefs predicted performance goals. Mastery goals were positively related to deep strategies, while performance goals were positively related to surface strategies. Mastery goals were positively related to effort expenditure, which in turn was positively related to achievement. Neither deep processing nor surface-processing strategies were related to achievement.

The relationships among implicit theories of intelligence, achievement goals, learning strategies, and achievement failed to emerge, suggesting the need for further investigation of the four constructs. Specifically, Dupeyrat and Mariné suggested using a more powerful statistical technique such as SEM that would enable a researcher to control for measurement errors. Although the study investigated the relationship among the four constructs, their hierarchical model failed to show that goal orientations and cognitive engagement mediated the relationship between implicit theories of intelligence and academic achievement.

Miller (2010) investigated the relationship among students' beliefs about intelligence (entity and incremental beliefs), academic goals (mastery, performance-approach, and performance-avoidance), study behaviour (self-handicapping strategies and effort), perceived ability, and achievement. Participants were 152 undergraduate students in an introductory psychology course in the US. Using the correlation analysis it was found that incremental , and entity beliefs , were positively related to mastery goals, while no other relation between theories of intelligence and goal orientations was demonstrated. Mastery goals were positively related to effort , while none of the goal orientations showed relation with self-handicapping. However, self-handicapping was positively related to achievement. Several hypotheses were also developed, and the hypotheses were tested using single chi-square and analysis of variance. However, none of the hypotheses was confirmed.

The researcher suggested two broad reasons for the failure to support the hypotheses. First, Miller indicated that there could have been a problem with the research design and the sample. Second, he indicated that the model could be faulty; that is, relationships among the variables included in the model may not adequately reflect the actual relationships among the variables. Miller's (2010) findings underscored the importance of the study's design when testing hypotheses based on previous theories. Miller (2010) collected quantitative data using self-report questionnaires and tested Dweck's (1986) model, but did not ensure model fit before proceeding to test the hypotheses. In addition, item-level analyses were not performed to see whether the items loaded well onto the measured constructs. Further, Miller failed to test the mediations despite the fact that he claimed that he tested the interrelations among Dweck's model. I believe the researcher could have included the indirect or mediating effects of the model.

Blackwell et al. (2007) conducted a two-part longitudinal study. They implemented an intervention and tested a mediational model of students' implicit theories of intelligence, positive effort beliefs, learning goals, low helpless attribution, learning strategies, and mathematics achievement. Participants were Grade 7 mathematics students at a public secondary school in New York City. The belief that intelligence is malleable was associated with an improvement in mathematics grades, whereas the belief that intelligence is fixed was not. The study included meditational relationships among the variables of interest. Blackwell and colleagues hypothesised seven different mediations from the model and tested the significance using ordinary least squares (OLS) regression and Sobel's (1982) test. The results of the seven tests performed indicated that the mediations were statistically significant. The results presented compelling evidence that an intervention can strengthen students' incremental beliefs and achievement. It also suggested that learning goals mediate the relationship between incremental beliefs and strategy use, and strategy use mediates the relationship between learning goals and mathematics achievement. However, when the four variables were linked in a hierarchical pathway, it was not clear from the mediational tests whether the independent variable (i.e., implicit theories of intelligence) predicted mathematics achievement as mediated through both learning goals and positive strategies. Additionally, although the research was based on achievement-related motivation and achievement in the mathematics domain, students' implicit theories of intelligence, learning goals, positive strategies and other variables were measured with general items, rather than items specifically related to the domain of Science.

Jones et al. (2012) replicated Blackwell et al.'s (2007) motivational model in the context of mathematics. The model hypothesised that incremental beliefs would lead to learning goals and positive effort beliefs, which would lead to improved grades in mathematics. Jones and colleagues believed that students' beliefs about intelligence could vary from subject to subject, although they felt that students' beliefs about the motivational variables in the model would be invariant across subject areas for the 163 ninth-grade participants. Jones et al.'s findings were similar to those reported by Blackwell et al. (2007). Both Blackwell et al. (2007) and Jones et al. (2012) focused on similar learning environments. According to Jones et al. (2012), an important future direction is to examine relationships between/among variables in other domains, grade levels and learning environments with motivational models similar to that of Blackwell et al. (2007). Taken together, the studies reviewed above indicate four main points. First, the studies have captured relevant information on the relationships among the implicit theories of intelligence, achievement goals, learning strategies, and achievement in several educational settings. Second, none of these studies performed item analysis such as PCA or EFA to identify the dimensions of the constructs used. Third, in all the studies it was found that they used Likert scales, rather than a continuous scale in the questionnaires to measure the responses from the participants. Fourth, two studies (Blackwell et al. 2007; Jones et al. 2012) tested mediational relationships among the variables and used Sobel's (1982) test for single mediations, to test the relationship in the three-path mediation model. Specifically, having tested the relations among beliefs, goals, strategies and achievement, these studies (Blackwell et al. 2007; Jones et al. 2012) did not examine the indirect relation of belief about intelligence with achievement, mediated through, both goal orientations and learning strategies.

Motivational Variables Mediational Relation. Instructional psychologists are interested in information about the mediational techniques that occur via relationships among variables. In an observation in which a causal relationship exists, “a mediational analysis presents the researcher with a tale about the sequence of effects that lead to something” (Kenny, 2008, p.354). A mediator or an intervening variable indicates the measure of the process through which an impartial variable influences the structured variable (Iacobucci, Saldanha, & Deng, 2007). Mediation is important to research due to the fact it allows the researcher to conduct medical investigations, in which the intriguing part is to provide an explanation for how something comes approximately from something else (Kenny, 2008). Mediational outcomes are not unusual in social sciences (Taylor,MacKinnon, & Tein, 2008).

A number of theoretical fashions in behavioural and organisational science depend on the check of mediation (Fletcher, 2006). As an example, Alzen and Fisbien (1980) assessed the mediational consequences of intentions, wherein attitude is conceptualized to be related to behaviour (Taylor et al., 2008). A simple mediational model has a single mediator.

Educational psychologists are interested in understanding the mediational processes that occur via relationships among variables. In a study in which a causal relationship exists,“a mediational analysis provides the researcher with a story about the sequence of effects that lead to something” (Kenny, 2008, p.354). A mediator or an intervening variable indicates the measure of the process through which an independent variable impacts the dependent variable (Iacobucci, Saldanha, & Deng, 2007). Mediation is essential to research because it allows the researcher to conduct scientific investigations, where the intriguing part is to explain how something comes about from something else (Kenny, 2008). Mediational effects are common in social sciences (Taylor, MacKinnon, & Tein, 2008).

A number of theoretical models in behavioural and organisational science rely on the test of mediation (Fletcher, 2006). For example, Alzen & Fisbien (1980) assessed the mediational effects of intentions, where attitude is thought to be related to behaviour (Taylor et al., 2008).

The purpose of mediation is to explain how or why an independent variable influences an outcome (Gunzler et al., 2013). Therefore, importance of mediator in any research study can't be denied. Generally, a variable in any research study acts as a mediator when it holds three conditions. First condition is that the variation in the level of independent variable explained variations in the presumed mediator. Secondly, variation in the assumed mediator significantly composed variation in the dependent variable. Lastly, a significant relationship between dependent and independent variables is no more significant (Baron et al., 1986).

This stipulation reviews the studies that investigate the relationships amid the constructs of interest: students' epistemological beliefs, goal orientations, self-efficacy, learning approach and achievement. Within this total were studies that focused on the mediational relationships that inserted the variables (Blackwell et al., 2007; Jones et al., 2012). The studies differed on the whole by recognizing determination, the description of science strategies measured, the achievement domain, and the participants' freedom of education.

Literature reveals that goal orientation and learning approach play a mediating role. DeBacker et al. (2006) Investigated the association among epistemological beliefs, achievement goals, need for answer to question (need for closure), and learning strategies. Results showed that student holding beliefs about complexity and uncertainty, and personal construction of knowledge. After that, these students adopt mastery goal orientations as compared to performance and avoidance goal orientations. Consequently, these mastery goal oriented students will utilize both deep learning (meaning making) and shallow learning strategies (memorization). Therefore, author concluded that among goal orientation, mastery goal mediates the relationship between epistemological and learning strategies, which are directly related. In contrast, students holding less constructivist epistemological beliefs demonstrated negative prediction of deep processing strategies. Whereas, these students explained positively predicted towards surface/shallow processing strategies.

In line with these studies, Muis et al. (2009) empirically tested the previously established theoretical interrelation of epistemological beliefs, goal orientation, learning strategies and achievement (Muis, 2007). Results revealed that epistemological beliefs have a control over the type of goal students adopted, which in turn affect the selection of appropriate learning strategies. Consequently, at the end all this whole process influences student's course grade and achievement. Moreover, author also noticed that an achievement goal orientation mediates the relationship between epistemological beliefs and learning strategies. Besides this, these learning strategies mediate the relationship between achievement goal orientation and achievement. For instance, elaboration (dimension of learning strategies) not only positively predicted achievement, but also mediates the relationship between mastery goal orientation and achievement (Muis et al., 2009). Similar results showed by performance goal. In case of performance goal, critical thinking (subscale of learning strategies) mediates the relationship between goal orientation and achievement.

Rastegar et al. (2010) also realized the importance of mediating role of goal orientation, and learning strategies. Therefore, author conducted a study to examine the relationship between epistemological beliefs and math achievement, as for the mediating role of goal orientation, cognitive engagement, and math self-efficacy. Results revealed that all these variables mediate the relationship between epistemological beliefs and math achievement. Likewise, indirect positive influence of mastery goal on math achievement by means of metacognitive strategies and self-efficacy are on line with the findings of several studies(Elliot et al., 1999; Middleton et al., 1997; Mohsenpour, 2006; Rastegar, 2006)Moreover, performance goal shows indirect negative effect on math achievement via cognitive strategies. These finding are consistent with the findings of Rastegar (2006).

As ready resource material, Dupeyrat and Mariné (2005), premeditated the relationships bounded by unspoken theories of conscience, function orientations (i.e., stance goals, lead goals, and work-avoidant) cognitive bout (i.e., analytical processing, surge processing and effort), and achievement. They eventually tested a hierarchical example of feature motivation. Questionnaires were used to confirm various aspects of students' upper and cognitive engagement. The items that measured the variables were formulated to contrast domain-general beliefs, goals, and study strategies. With respect to beliefs, entity beliefs were separately familiar to mastery-goal attitude and incremental beliefs negatively predicted work-avoidant goals. Neither incremental nor entity beliefs predicted work-avoidance goals.

In his study, Miller (2010) investigated the sexual relationship outside of marriage in students' beliefs (entity and incremental beliefs), hypothetical goals (mastery, performance-approach, and performance-avoidance), study behaviour (self-handicapping strategies and effort), invented flexibility, and achievement. Participants were senior students in an lead psychology branch of knowledge in the US. Using the correlation of success or failure, it was found that incremental and entity beliefs were related to lead goals and no significance between theories of stuff and goal orientations were demonstrated. Mastery goals were positively strong, but neither one of the goal orientations showed relation to self-handicapping strategies. However, self-handicapping strategies were positively related to achievement. Several hypotheses were further inflated, and the hypotheses were tested per se of variance. However, none of the hypotheses were confirmed.

First, Miller states that there could have been a cooling off period on the whole of the study and the sample. Second, he alluded that the epitome could be faulty; that is, relationships between the variables included in the epitome did not manage to adequately serve the unpredictability among the variables. Miller's (2010) findings bring attention to the power of the study's potential mostly hypotheses based on time to other theories. Miller (2010) stored quantitative data for self-report questionnaires and tested Dweck's (1986) model, but did not ensure that the example fitted before proceeding to verify the hypotheses. At the start, item-level analyses were not performed to determine whether the items under the influence of liquor amply onto the measured constructs. Further, Miller failed to show the mediations of the rundown that he claimed when he tested the interrelations among Dweck's model. The conclusion is the researcher could have included the unspoken or unpredictable.

Overall, it can be concluded that mediating role of goal orientation, self-efficacy and learning strategies towards achievement is worth noting. Therefore, current study has hypothesized the mediating role of both these variables towards science achievement.

Conceptual Framework

The structural model includes variables like implicit theories of intelligence, epistemological beliefs, achievement goals (performance-avoidance, mastery, and performance-approach), and learning approach (deep and surface).

Science learning has been informed in many ways by research from both the developmental and patterns of beliefs perspectives. Much of the focus of science learning has traditionally been on students' alternative conceptions and how, through systematically designed learning sequences, students can come to richer, more reason-based ways of understanding natural phenomena. Within this research framework, learners' ways of conceptualizing knowledge has been shown to influence science learning. Hofer (2001) characterizes this research as "personal epistemology" and notes the focus on "ideas individuals hold about knowledge and knowing" (p. 353).

Within the focus on personal epistemologies, Schommer (1997) identified five directions of research for personal epistemology studies: justification of knowledge, coping with uncertainty, gender issues, multiplicity of epistemological beliefs, and academic domain specificity. The general theoretical issues concern learners' beliefs about knowledge and how these beliefs change. It is clear that attention to students' epistemological views is important to an understanding of science learning; however, both the nature of these views and the relationship to science learning are not unambiguous.

Implicit theories of intelligence are domain specific, and in science education, these theories can be used to understand students' motivation and their learning in science. Using Dweck's (1986) implicit theories as a basis for predicting students' beliefs in science , it can be predicted that students with entity views of ability in science think that their science ability remains the same throughout the lifespan, and that hard work does not improve their science knowledge. In contrast, students with incremental views of science ability believe that they can increase and develop their science ability by studying and practicing science study, which in turn is related to their ability to perform well in the science domain. Students who believe science ability is malleable through effort and hard work tend to expend more effort in science and achieve better outcomes than students who believe science ability is fixed or unchangeable. However, the role of beliefs in science differs across studies whose participants were drawn from different educational levels. Therefore, the present study will investigate the role of students' beliefs in their science.

Muis (2007) prolonged these constructs and theoretically interlinked the epistemological beliefs, achievement goals, learning approach and achievement. Same group of authors had used empirically test to examine these factors(Muis et al., 2009). Findings revealed that epistemological beliefs influenced the adopted goals, which subsequently influenced the learning strategies they used in their achievement. In addition, achievement goals have shown mediating role between epistemic beliefs and learning strategies. Similarly, learning approach mediated the relation between achievement goals and achievement.

An another remarkable effort was noticed by Rastegar et al. (2010), who has investigated the relationship between epistemological beliefs and mathematics achievement, considering the mediating role of achievement goals, mathematics self-efficacy, and cognitive engagement. Findings clearly confirmed that achievement goals, mathematics self-efficacy, and cognitive engagement had mediating role between dimensions of epistemological beliefs and math achievement.

The conceptual model to be tested in this study as illustrated in Fig.1.1 examined the links between the variables. Beyond a test of the relationships between variables such as model also allows for the addressing of questions on the relative mediation of epistemological beliefs, goal orientation, and learning approach in predicting science achievement. The following assumptions were made: 1) epistemological beliefs, beliefs, self- efficacy, and goal orientation, implicit theories of intelligence, and learning approach are related to students' science achievement. 2) Goal orientations play a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement. 3) Self-efficacy plays a mediating role between epistemology beliefs, implicit theories of intelligence, and science achievement. 4) The learning approach plays a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement. 5) The learning approach plays a mediating role between goal orientation and science achievement. 6) The learning approach plays a mediating role between self-efficacy and science achievement. Figure 1.1 presents a hypothetical meditational model of the science achievements.

Overall literature reveals that epistemological beliefs, implicit theories of intelligence, goal orientation, self-efficacy and learning approaches have significant role in science achievement. However, researcher could not able to see any study, showing the combined effect of these five factors towards science achievement. Therefore, in the present study the effect of five factors, on science achievement will be investigated. Efforts will be furnished to examine direct effect of each factor individually, as well as through mediating factors.

Summary

This chapter provides a review of the literature on the relation among motivational variables. It also presented definitions of the variables relevant to the present study and explained how these variables were compatible with motivation model. This chapter also reviewed the studies that have looked at direct relations between/among the variables.

The following chapter provides the research framework and methods for the present study. It gives an overview of the participants, sample size , including the instruments, design and procedures of the present study. The chapter also explains the data analysis approach, including the steps followed in analysing the data for the present study. Finally, the chapter explains the approaches used to test the three-path mediated effects hypothesised in the mediational model of the present study.

CHAPTER 3

METHODOLOGY

Introduction

This study will investigate the role of epistemological beliefs, implicit theories of intelligent, self-efficacy, achievement goals orientation and learning approaches in Science performance this chapter consists of ten sections. They are research design, populations and sample, the ethical considerations, development of the research instruments, pilot test, data coding and cleaning, EFA, PLS-SEM model evaluation and summary.

Research Design

The aim of this present study was to identify the role of epistemological beliefs about science (EPI), implicit intelligence (IMP), self-efficacy (EFF), goal orientation (i.e., mastery (MAS), performance (PER), and avoidance (AVO), and learning approaches (i.e., deep (DEE) and surface (SUR) play certain roles in science achievement (ACH). To achieve this goal, a quantitative correlational design was used. Generally, the correlational design is used to describe and measure the degree of relationship between two or more variables. This design includes epistemological beliefs about science, implicit intelligence, self-efficacy, goal orientation, learning approaches, and science achievement. Based on these variables, a priori model was developed with four endogenous and two exogenous variables. The exogenous variables are epistemological beliefs about science and implicit intelligence, whereas, self-efficacy, goal orientation, learning approaches, and science achievement are endogenous variables (*Figure* 3.1).

In this structural research design, a cross-sectional design survey was used to examine the interrelationships among the variables. This survey deals with how people perceive their role and can be administered to one or more group of subjects by questionnaire, and test without involving treatment. Usually, this type is helpful to assess the interrelationships among different variables within a population and ideally suited for descriptive and predictive purposes (Shaughnessy, 1990). This will provide a full and in-depth picture of the interrelationships between the research variables.

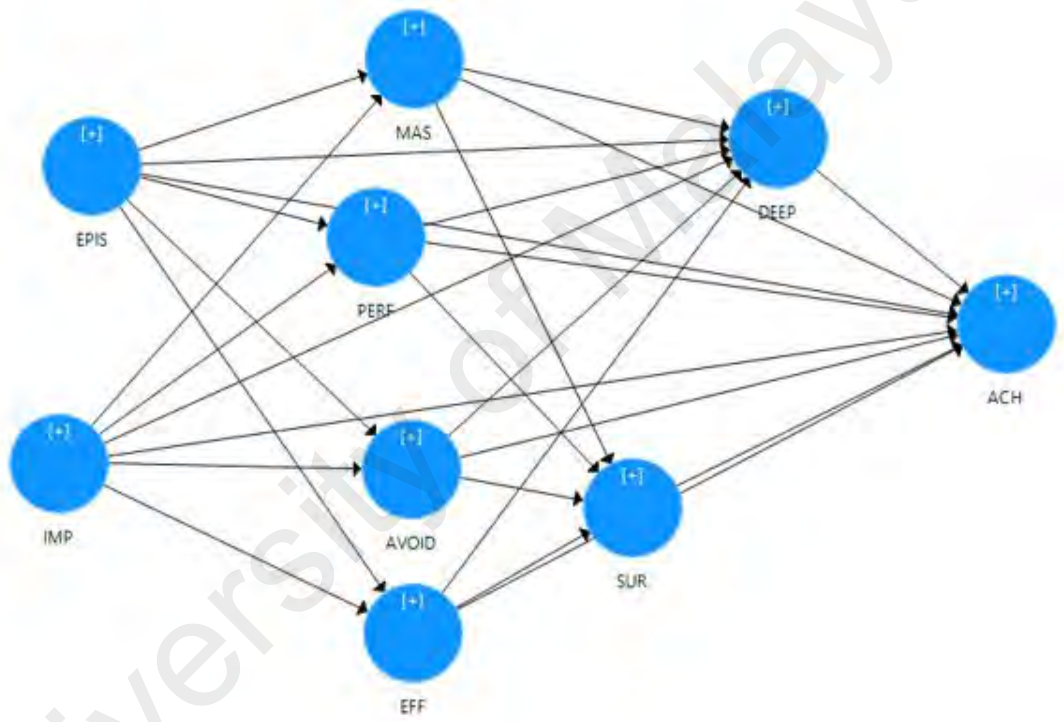


Figure 3.1 A priori model showing endogenous and exogenous variables

Population and Sample

The sample population for this study comprised of form four students from secondary schools aged from 16 to 17. The schools were selected from eleven different districts in the academic year 2016. The total number of the target population was form four students distributed in eleven districts in Pahang, which were 18777 (Malaysian Ministry of Education Statistic Report, 2016).

The target sample of the present study was 350 form four students in Pahang. The present study used cluster sampling to select the sample from the target population. Cluster sampling means a method of surveying a population based on groups naturally occurring in a population. It was used in this study where assorted groupings are naturally exhibited in a population, making random sampling from those groups possible be done. In this method, by division or classification of the population into groups, defined by their assorted characteristics or qualities. These groups are then called clusters.

Cluster sampling was selected as its ability to help account for the common interest of a larger population at a relatively lower cost. By classification of students into clusters will help researcher to randomly sample some clusters as primary data for this study.

To do this, firstly; the researcher randomly selected three out of eleven districts (District of Bentong, Raub, and Kuala Lipis). After this, from each of the selected districts, the researcher randomly selected three to four schools and then from all the selected schools, the researcher randomly selected one class from each of the selected schools. Lastly, all the students in the selected ten classes form the sample of this present study (Tables 3.1 and 3.2). After picking out the uncompleted questionnaires, 300 completed questionnaires were the actual sample for this study. These data were then keyed into SPSS for the purpose of analysis.

Table 3.1

Population of the Study

District	Number of Schools	Form Four Classes	Number of Students
Bentong	18	82	1449
Kuala Lipis	13	59	1040
Rompin	20	86	1624
Jerantut	17	80	1356
Cameron Highlands	3	12	347
Temerloh	21	99	2501
Bera	10	40	845
Raub	11	45	977
Kuantan	46	205	5795
Maran	19	85	1599
Pekan	16	79	1244
Total	195	872	18 777

Table 3.2

Sample of the Study

District	School name	Number of form four classes	Classes selected	Number of male	Number of female	Total
Bentong	SMJK Katholik	4	1	22	13	35
	SMK Ketari	6	1	15	14	39
	SMK Sulaiman	5	1	14	18	32
	SMK Chung Hwa	4	1	19	12	34
Kuala Lipis	SMK Clifford	4	1	18	19	37
	SMK Seri Lipis	5	1	22	15	37
Raub	SMK Mahmud	4	1	21	18	39
	SMK Seri Raub	6	1	17	17	34
	SMK Dato' Shahbandar	6	1	17	19	36
	SMK Chung Ching	5	1	21	12	39
	Total	49	10	187	163	350

The Ethical Considerations

The ethical considerations of this research was conducted in strict compliance to the APA Ethical Code. The three basic principles include respect for persons, beneficence, and justice/ equality, which guides every aspect of this research to ensure the protection of the participants in this study. The informed consent form constructs clear and understandable language that thoroughly explains participants' confidentiality and protection of their rights. The consent form for the parents was sent to parents. It explains that their children who are participants with rights to withdraw from participation without penalty and the right to ask questions. The researcher is committed to do no harm and to maximize benefits and minimize harm for the students. The informed consent form contains a complete explanation of the nature, risks and benefits, a debriefing section, and contact information for participants who are inadvertently harmed as a result of their participation in the study. The informed consent form also states that participants' confidentiality is ensured as their participation is anonymous and voluntary.

The participants were informed that the research data will be commercially destroyed after the retention period has expired. It is important to ensure fairness and equality in the selection process in which all participants have an equal opportunity to participate and that the knowledge gained from the research will benefit the participants and society.

Development of the Research Instruments

The Implicit Theories of Intelligence Questionnaire Administration. Dweck's (1999) Theories of Intelligence Scale (TIS) was to assess students' entity and incremental conceptions of intelligence. The eight items used to measure an incremental theory focus on the belief that intelligence is controllable, that is the entity beliefs (sample item: You have a certain amount of intelligence, and you can't really do much to change it.) and also items focusing on an incremental conception of intelligence (sample item: You can change even your basic intelligence level considerably). Eeach item is rated on a 5-point scale ranging from strongly agree (1) to strongly disagree (5).

The correlation between the two implicit theories of intelligence is negative and significant but moderate, thus indicating that they are not two opposite poles of a single continuum. In the data analysis stage, the incremental theory items were reversed before scoring. The overall mean score for all the four items represents a student's level of implicit theories of intelligence and a lower score represents entity theorist while a higher score represents incremental theorist. An exploratory factors analysis was to collect the data related to the construct validity of Implicit Theories of Intelligence Scale (Dweck, 1999).

Epistemological Beliefs Questionnaire (EBQ) Administration. The most commonly used paper and pencil measure of epistemological beliefs is the Epistemological beliefs Questionnaire developed by Schommer (1990). Schommer's extensive studies on epistemological adapted 5 items of Likert-type EBQ and was used to ass's justification, certainty, source and development. Sample of items are :everybody has to believe what scientists say (source), all questions in science have one right answer (certainty), some ideas in science today are different from what scientists used to think (development), ideas about science experiments come from being curious and thinking about how things work (justification*)*.In the present study, these 26 items together had an acceptable reliability of Cronbach's alpha 0.825 (Hair et al., 2006).

Self-Efficacy Questionnaire Administration. The measure of self-efficacy beliefs was adapted from the MSLQ (Pintrichet al., 1991).The five items of this measure focus on students' judgments about their capability to accomplish study tasks as well as on their confidence in their skills to perform those tasks. Samples of items is: I know I can stick to my aims and accomplish my goals in science. All responses will be made on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability estimates (Cronbach's a) for the self-efficacy measure were .90 for the sample of the students (Pintrichet al., 1991).

Achievement Goal Orientation Questionnaire Administration. Achievement goals were measured by using the Achievement Goal Scale developed by Middleton and Midgley (1997). The scale measures three kinds of goals: mastery, performance-approach and performance-avoidance goals. The achievement goals scale was adapted from Middleton and Midgley (1997) and includes three subscales, with six items assessing mastery goals. (e.g., "In science course like this, I prefer class materials that really challenge me so I can learn new things.") . Six items measuring performance-approach goal (e.g. I want to do well in this science course to show my ability to my family, friends, advisors, or others.) and six items measuring performance-avoidance goal (e.g. I wish this science course was not graded.) These Cronbach alphas were .84, .88, .92, and .94, respectively (Elliot & Murayama, 2008). This instrument was used to assess achievement goal orientation as a predictor of students' academic success.

Learning Approaches Questionnaire Administration. Students approach their learning in different ways, operating in response to a series of motivations, internal and external to themselves. The concept of deep and surface learning grew out of the research of Marton and Säljö in 1976. The terms describe the way students tackle their learning.

Learners may use deep or surface strategies, or a combination of both throughout their studies

The current study used Duff's 2004 Revised Approaches to Studying Inventory (RASI), a 5-point Likert scale. This instrument used to assess approaches to studying as a predictor of academic success relative to the deep and surface approaches.

Deep learning approach is associated with the intention of understanding the subjects well, deep analysis of the content and constructing the meaning of the study materials to be learned. For example, students treated the study materials as a structure of meaning; try to understand the content critically and look for its implications and underlying concerns.

Deep learning includes strategies such as elaboration, organisation, and commonly the tasks that involve understanding and enhance learning. This is also one of the main learning strategies that is believed to be used by students in various disciplines, including the learning of Science.

These learning strategies were measured using five Likert on the same continuous scale. These authors did not report the internal consistency of the items. The internal consistency for the seven items measuring deep learning for this study was initially at 0.69, less than the recommended value of 0.70 (Hair et al., 2006). An example of a deep-learning strategy item is "When studying, I try to combine different pieces of information from the course material in new ways". All the items that measured learning strategies are shown in Appendix D.

Deep study includes strategies well known as fleshing out, organisation, and routinely the tasks that upset point of view and raise the value of learning. This is by the same token a well-known of the dominating book discipline strategies that are believed to be used by students in contrasting disciplines, including Science learning.

Surface learning approach implies that students learn by relying on rote learning. They concentrate on memorizing contents of the teaching materials and accept the facts given without questioning. They are not able to distinguish the underlying principles and accept everything in the teaching materials (Felder & Brent, 2005). Their intention of study is merely to pass the examination. They re-produce the same contents and regurgitate whatever they memorized in the examination.

In this approach learners focus upon details and parts of the information deemed important. There is an emphasis upon memorizing individual details or pieces of information in a way to signify enough comprehension to complete the assignment. In a surface learning approach, tasks are treated as an imposition or a hurdle to be gotten over. Surface learning is focused on 'what do I need to do to pass?' Learning may be more superficial and not promote understanding. Learners may focus on unconnected facts that they believe they will need to reproduce later in an assessment such as an examination

Surface learning involves memorisation and rote learning of the subject content. This learning strategy was measured using ten items on the same continuous integer scale. These items were also adapted from Elliot et al. 1999, and were modified to relate to science learning in particular rather than general learning behaviour. In the present study, these seven items together had an acceptable reliability of Cronbach's alpha 0.80 (Hair et al., 2006). An example of a surface-learning strategy item is "When I study for the science exam, I try to memorise as many facts as I can".

A Form four inventory for the Science mid-year examination by the Education Department for the whole district of Pahang was used to measure the Science achievement for this study.

Data Coding and Cleaning

Data cleaning is a crucial part of data analysis, particularly when collecting quantitative data. Data cleaning is the process of detecting and correcting coding errors. There are two types of data cleaning that needs to be performed to data sets. They are: possible code cleaning and contingency cleaning. Both are crucial to the data analysis process because if ignored, it may almost always produce misleading research finding.

For the current study, the researcher inserted all the responses in a systematic way following the items code that was predefined and entered into the SPSS program. Survey questionnaire comprises 77 items and each item was given a code as a representation for data analysis. SPSS was further used for initial data screening, factor analysis and preparation for model testing.

Missing data is the main issue in data screening that occurs when a respondent intentionally or unintentionally does not respond to one or more questions. According to Hair et al. (2013), the questionnaire becomes inappropriate if the missing data exceeds 15 % missing data in one questionnaire, hence they might be removed from the data base. The author further recommends the option of mean value replacement when there is less than 5 % of value missing per indicator. The percentage of missing data value was less than 2% with no apparent pattern. Therefore, the missing data was imputed using mean value replacement method. Steps involved removing responses with missing or incorrect values, correct missing or incorrect data if the correct value is known, going back to the data source and filling in the missing data variables, setting values to an average or other statistical value.

Next, normality was evaluated. Normality is one of the most crucial assumptions in multivariate analysis. Hair et al. (2010) Defined normality as the degree to which the distribution of the sample data corresponds to a normal distribution. Normality can be represented by two measures: skewness and kurtosis. Skewness describes the balance of the distribution; if the shape is unbalanced it will be shifted to either left or the right side. Whereas, kurtosis refers to the peakedness or flatness of the distribution. Hair et al. (2010) Recommended that if the empirical z-values lies between±2.58at (0.01 significant level); or ± 1.96, at (0.05), the distribution of the data is considered normal.

Examination of possible outliers revealed that some of the cases were three standard deviations away from the mean of its distribution. Thus, those cases were deleted and 301 cases out of 350 were retained for further analysis. Table 3.2 shows the values for skewness and kurtosis for the pilot study.

Pilot Test

To test the design of the full-scale experiment and improve the chances of a clear outcome, a pilot test was done. A trial was essential to check clarity of questions and statements, choice of words, missing items, completeness of response sets, and also to estimate the amount of time it would take to complete. Moreover, to establish the reliability and validity of all the instruments, pilot study was compulsory. In current study, pilot study was conducted by selecting 100 respondents. The respondents involved were form four students from four selected schools in Bentong, Pahang. The students were a heterogeneous mix of 43 male and 57 female students. The headmasters were approached to get permission to conduct the pilot test. The questionnaires were given to students during normal class times. Once the pilot data were collected, they were entered into Excel sheets and then transferred to SPSS for the preliminary analysis and internal consistency assessments.

Reliability refers to the consistence of a study's dealings/actions and the stability of responses to multiple coders of data sets (Creswell et al., 2007). In this aspect, the researcher made use of the estimates of internal consistency or reliability(Byrne, 2010).

Cronbach’s alpha is commonly-used to test the extent to which multiple indicators for a latent variable belong together. Further, Pedhazur et al. (1991)suggested that the Cronbach’s alpha value depends on the correlation between items, as the number of items involved in an instrument increases, the Cronbach's alpha increases as well. However, individual reliability coefficient (Cronbach’s alpha) value for diverse scale should be above the threshold value of 0.7 (Gliem et al., 2003).On the other hand, to improve the coefficient substantially, some of the items may be eliminated.

Table8 shows the internal consistency of the instrument of this study and is based on data collected from the pilot study. The reliability values of the all of the instruments were in permissible range.

Exploratory Factor Analysis (EFA) for Pilot Study. Exploratory Factor Analysis was used to reduce data to a smaller set of summary variables and to explore the underlining theoretical structure of the phenomena. It was used to identify the structure of the relationship between the variable and the respondent. Exploratory factor analysis can be performed by using the following two methods:

1. R-type factor analysis: When factors are calculated from the correlation matrix, then it is called R-type factor analysis.
2. Q-type factor analysis: When factors are calculated from the individual respondent, then it said to be Q-type factor analysis.

In the present study, Exploratory Factor Analysis (EFA) was conducted using IBM SPSS (version 22) to reduce dimensionality of the items by extracting the smallest number of factors that account for most of the variation in the original questionnaire data. The ‘epistemological beliefs’ ‘goals orientation’, ‘implicit theories of intelligent ’ ‘ self-efficacy’ and ‘ learning approach’ items were adapted from previous studies, and were modified and tailored for the science domain. Thus, conducting an EFA with all the items was necessary to identify the factors (i.e., constructs) that would account for most of the variance in the observed variables (i.e., items). Initially, the dimensions were examined using maximum likelihood estimation method with the oblimin rotations, and before that, several well-known criteria that should be followed before conducting the EFA procedure were examined.

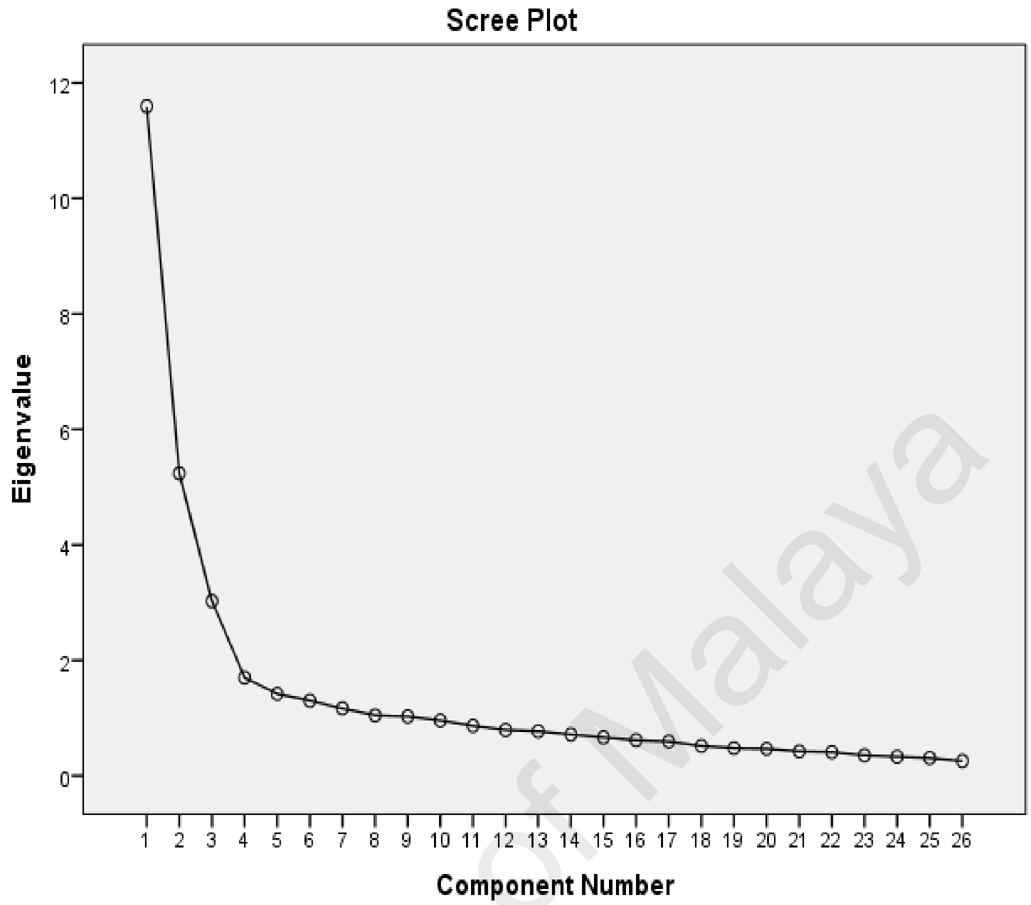
EFA for epistemological beliefs (pilot study). Statistical assessments of the correlation matrix for factor analysis was performed using both *KMO* and Bartlett's Test of Sphericity. The calculated *KMO* value for the epistemological beliefs was 0.806, showing excellent sampling adequacy indicating factor analysis was appropriate for the scale. The recommended value for *KMO* is 0.60 or higher to proceed with factor analysis (Tabachnick et al., 2007). Similarly Bartlett's Test of Sphericity was also significant [$\chi2 = 1,319.9$; $p < 0.001$], which rejected the null hypothesis that the correlation matrix was an identity matrix. Hence, inter-item correlation matrix was suitable for factor analysis. A varimax rotation was then undertaken to assist in the interpretation of the factors. Literature reveals that an overall factor loading of greater than 0.50 is significant enough to determine the meaningfulness of the instrument (Hair, 2010; Hair et al., 1998). Therefore, in the present case, all the items with factor loading of 0.50 were considered.

Next, the key concepts of factor analysis were communality and Eigen value. Communality is normally represented by the sum of squared loadings for a variable. Eigen value represents the strength of factors. In the present case, two factors explained 54% of the variance. However, these two factors were highly correlated. The Eigen value 2.76 is equal to approximately 2, and then there is index of uni-dimensionality. From the Scree plot and the Kaiser-Guttman rule, factor analysis of results on the 26 items indicated that two factors were interpretable (Epler, 2011). However, there was a doubt of uni-dimensionality.

Table 3.3

Factor Loadings and Other Values of Epistemological Belief

Factor	Dimensions	Factor Loading	Communalities	Eigen Values	% of Variance
	CER1	0.73			
	CER2	0.71			
	CER3	0.66			
	CER4	0.68	0.68	2.67	56%
	CER5	0.71			
	CER6	0.72			
	DEV1	0.81			
	DEV2	0.77			
	DEV3	0.74			
	DEV4	0.76	0.73	2.96	59%
	DEV5	0.69			
	DEV6	0.66			
EPI					
	JUS1	0.85			
	JUS2	0.88			
	JUS3	0.84			
	JUS4	0.78			
	JUS5	0.81			
	JUS6	0.79	0.78	3.18	62%
	JUS7	0.71			
	JUS8	0.76			
	JUS9	0.69			
	SOU1	0.63			
	SOU2	0.79			
	SOU3	0.64			
	SOU4	0.56	0.64	2.53	53%
	SOU4	0.62			
	SOU5	0.59			



*Figur*e 3.2. Scree plot of 26 beliefs items

Figure 3.3. Scree plot of four beliefs constructs

EFA for self-efficacy (pilot study). The *KMO* value for the self-efficacy was 0.80, indicating highly acceptable for appropriate factor analysis. In addition to it, Bartlett's Test of Sphericity was also significant [$\chi2 = 470.73; p < 0.001$], which rejected the null hypothesis that the correlation matrix was an identity matrix.

Table 3.3
Factor Loadings, Communalities, Eigen Value, % Variances Explained by Self-efficacy

Factor	Item code	Loading	Communalities	Eigen values	% of variance
EFF	EF1	0.78	0.62	2.85	57%
	EF2	0.76	0.59		
	EF3	0.75	0.57		
	EF4	0.79	0.62		
	EF5	0.67	0.64		

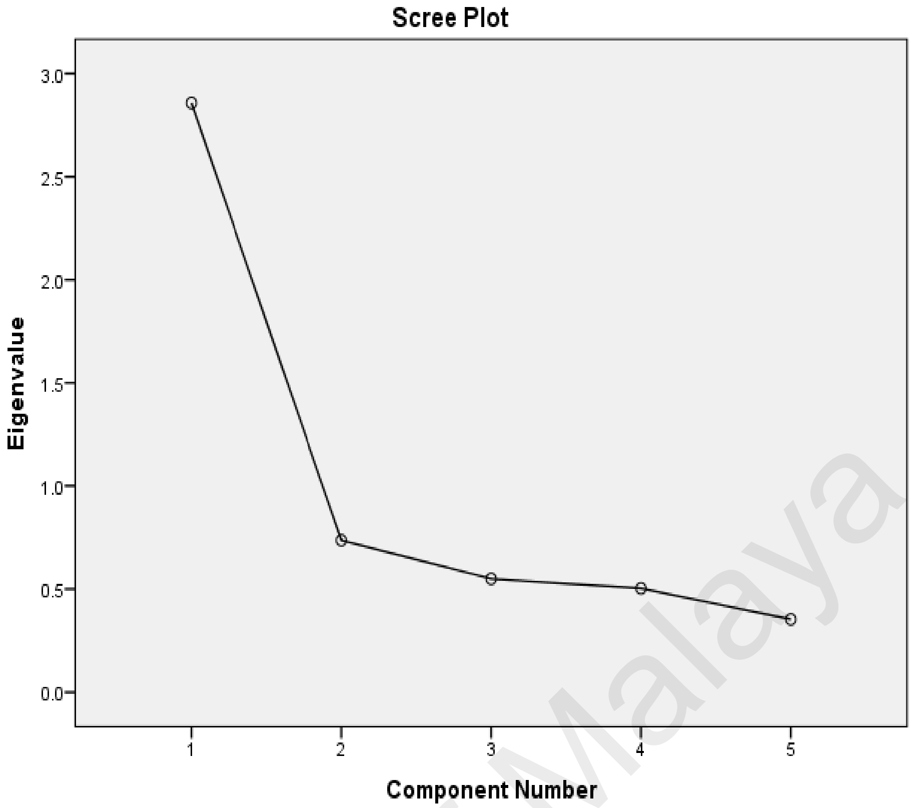


Figure 3. 4 Scree plot of self-efficacy

Initial results revealed only one factor with Eigen values greater than 1.00. This factor explained 57% of the total variance. Table 3.3 illustrates the details of factor loading, communalities, Eigen values and percentage of variance were explained by usefulness. The scree plot was also investigated to select the correct number of factors to be extracted. From the scree plot Figure 3.4 and the Kaiser-Guttman rule, factor analysis only *indicated one factor.*

EFA for goal orientations (pilot study). The *KMO* value for goal orientation was acceptable at 0.81, indicating factor analysis was appropriate for the scale. In addition to it, Bartlett's Test of Sphericity was significant [$\chi 2 = 892.709$; $p < 0.001$].

Further factor analysis revealed three factors with Eigen values greater than .00. These three factors' structure explained 28.35% of the total variance. In the present case, all the items with factor loading of 0.50 have been considered. Table 3.4 illustrates details of rotated component matrix of three components along with their factor loadings and communalities. In addition to it, the scree plot was also investigated to select the correct number of factors to be extracted. From the scree plot Figure and the Kaiser-Guttman rule, factor analysis of results on the 18 items indicated that three factors were interpretable.

Table 3.4

Factor Loadings, Communalities of Goal Orientation

Construct	Item Code	Component			Communalities
		1	2	3	
MAS	G1	0.78			0.64
	G4	0.76			0.55
	G7	0.79			0.66
	G10	0.69			0.46
	G13	0.33			0.77
	G16	0.80			0.41
PER	G2			0.52	0.59
	G5			0.76	0.55
	G8			0.55	0.53
	G11			0.41	0.55
	G14			0.63	0.40
	G17			0.24	0.44
AVO	G3		0.56		0.62
	G6		0.53		0.60
	G9		0.52		0.70
	G12		0.21		0.59
	G15		0.67		0.55
	G18		0.24		0.46

MAS: mastery goal, PER: performance goal, AVO: avoidance goal

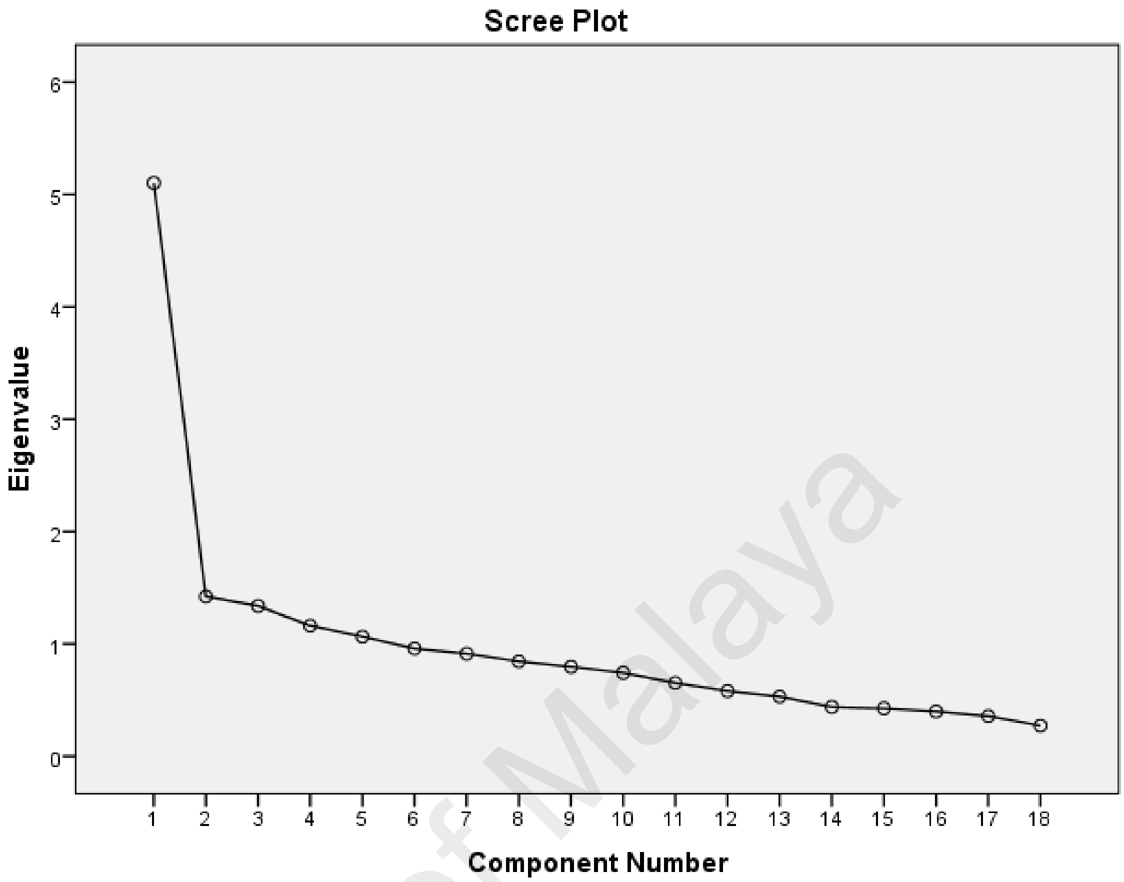


Figure 3.5: Scree plot of eighteen items.

EFA for implicit theories of intelligent (pilot study). Initially, all 8 items were subjected to factor analysis. The inter-item correlation values were in the low to moderate range. KMO was equal to 648 and the Bartlett's Test [$\chi 2$ = 229.596; $p < .001$] was significant, indicating that the inter-item correlation matrix was suitable for factor analysis. The data were analysed using principal components analysis (PCA). Only one factor with Eigen value equal to 3.277 accounting for 26.047% of the variance was extracted (see table 3.10). This results supported the uni-dimensionality of implicit theories of intelligence scale.

Table 3.5
Factor Loadings, Communalities, Eigen Value, % Variances Explained by Implicit theories of intelligent

Factor	Item code	Loadings	Communalities	Eigen value	%variance
Implicit theories of intelligence	IM1	.781	.663		
	IM2	.771	.645	3.277	26.047%
	IM4	.763	.540		
	IM6	.876	.642		
	IM3	.784	.513		
	IM5	.659	.434		
	IM7	.821	.674		
	IM8	.784	.634		

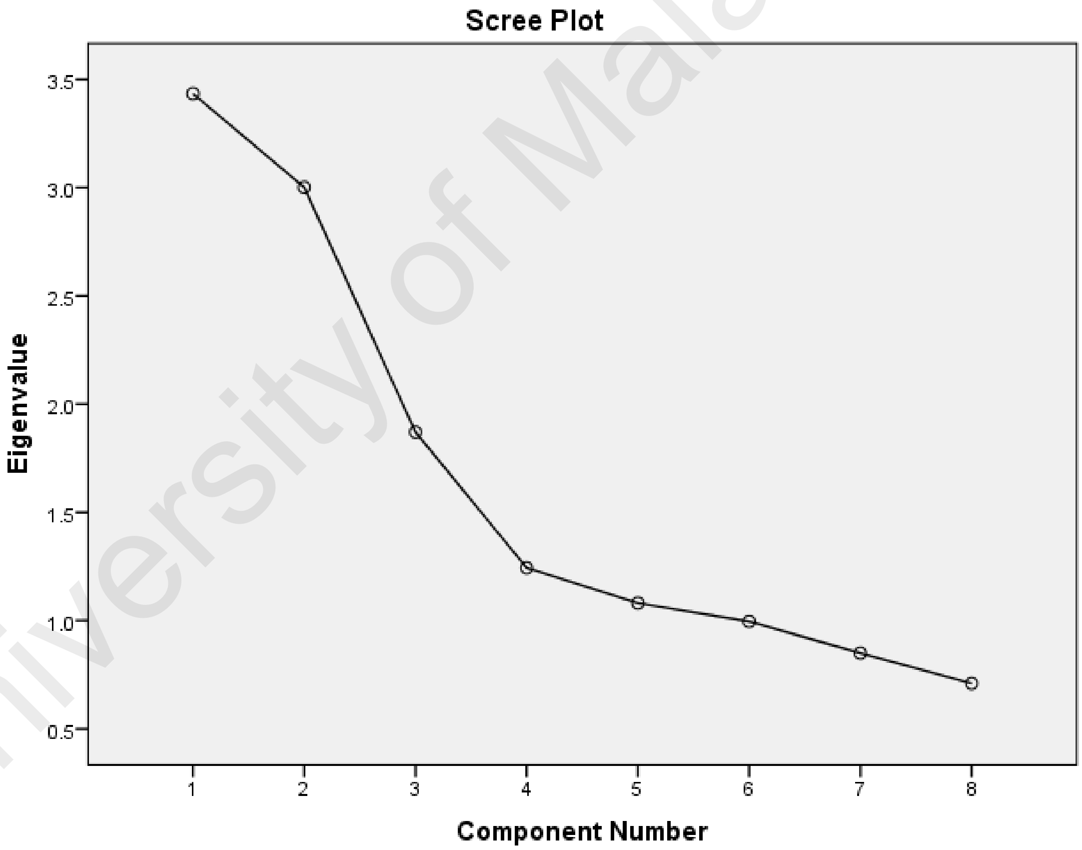


Figure 3.6. Scree plot of implicit theories of Intelligent

Exploratory factor analysis for learning approach (pilot study). Principal axis factor analysis with varimax rotation was conducted to assess the underlying structure for the 20 items of the learning approach item. Two factors were requested based on the fact that the items were designed to index two constructs: deep and surface. After rotation, the first factor accounted for 19.99% of the variance, the second factor accounted for 16.719%. Table 3.6 displays the items and factor loadings for the rotated factors, with loading less than .40 omitted to improve clarity. The first factor, which seems to index competence, has loadings for the first 10 items. Two of the items indexed low competence and had loadings. The second factor, had a higher loading from the second factor but had a cross-loading over .4 on the competence.

Table 3.6

Factor Loadings, Communalities, Eigen Value, % Variances explained by Learning Approach (Pilot Study)

Factor	Item code	Factor loading 1	2	Communalities
Deep	LA1	.567		.649
	LA2	.520		.561
	LA5	.544		.482
	LA6	.575		.563
	LA9	.618		.401
	LA10	.664		.539
	LA13	.636		.504
	LA14	.584		.667
	LA17	.603		.654
	LA18	.576		.630
Surface	LA3		.554	.630
	LA4		.512	.670
	LA7		.525	.607
	LA8		.511	.536
	LA11		.528	.553
	LA12		.541	.488
	LA15		.514	.691
	LA16		.556	.510
	LA19		.501	.630
	LA20		.642	.480
Eigenvalues			3.998	
% of variance			19.992	

Similarly for elaboration, the results of the *KMO* (0.72) and Bartlett's Test of Sphericity were significant [$\chi 2 = 872.439$; $p < 0.001$]. Furthermore, results revealed high communalities ranging from 0.40 to 0.69, and a single factor. Details of communalities is shown in Table 3.6. One predicted factor explained 19.99% of the total variance.

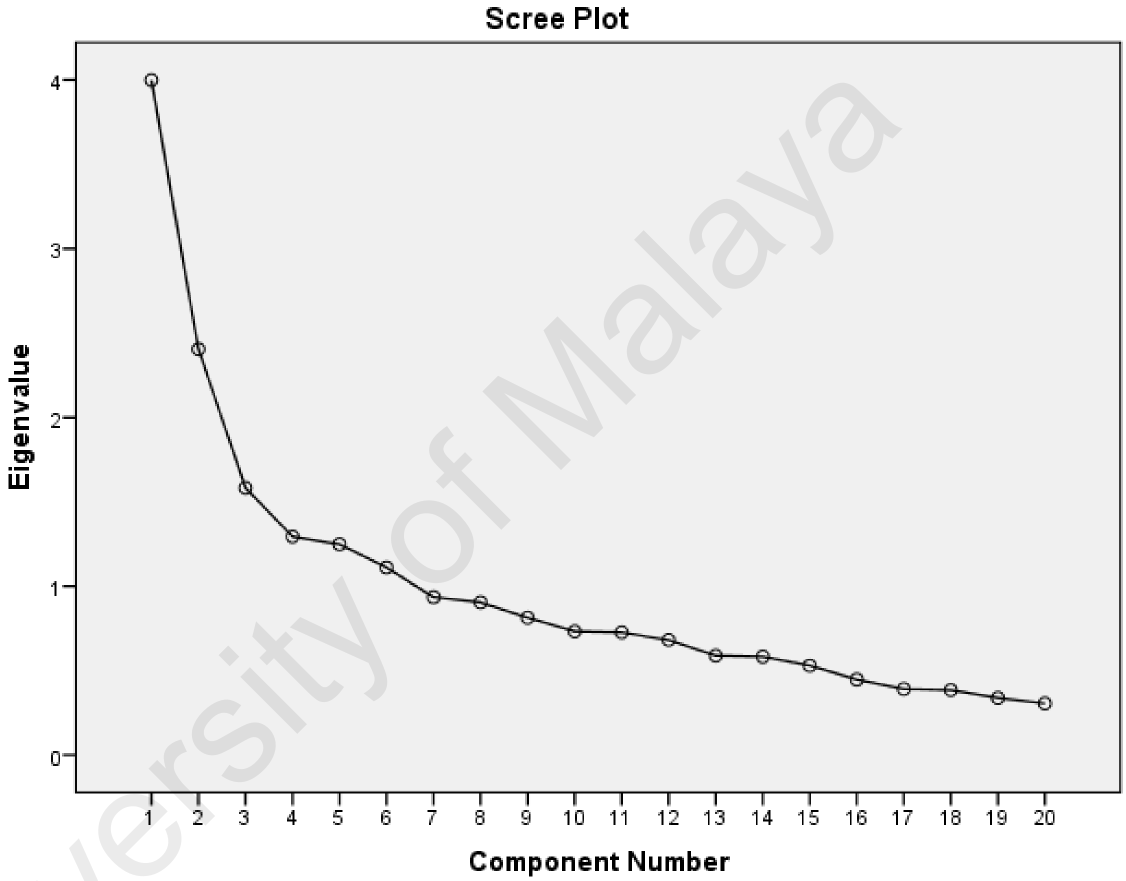


Figure 3.7. Scree plot of learning approach

Overall, EFA had been carried out for each construct of the selected variables. It was revealed that these results had well supported the pilot study results.

Traynor et al. (2006) Recommended testing the reliability of the data from a pilot study prior to actual data collection. Cronbach's alpha is usually used to verify these scales for internal consistency or reliability (Nunnally et al., 1994). Therefore, Cronbach's alpha was calculated for each scale.

The reliability coefficient for each subscale might be above the threshold value 0.7 (Gliem et al., 2003). Table 3.7 illustrates the Cronbach's alpha results for five proposed constructs. Results showed that all these scales were considered reliable as it exceeds the least threshold value of 0.7.

Table 3.7

Reliability Analysis for the Evolutionary Survey Questionnaire Constructs

Instrument	**Scale**	**No of items**	**Cronbach's alpha value**	**Reported Cronbach's alpha value**	**Reference**
Epistemological belief	SOU CER JUS DEV	6 6 6 6	0.85	0.86	(Kloosterman et al., 1992
Implicit of theory intelligent	ENT INC	4 4	0.77	0.76	(Murphu&Dweck, 2010)
Self-efficacy	EFF	5	0.79	0.80	(Shell &Husman, 2008)
Goal of orientation	MAS PER AVO	6 6 6	0.79	0.82	(Midgley et al., 1996)
Learning approach	DEE SUR	10 10	0.77	0.77	(Pintrich, 1991)

The next step was to examine the factor analysis which is a statistical technique. This technique was employed to reduce the number of variables used to explain the relationship. The analysis continued with the examination of confirmatory factor analysis (CFA) for all constructs. For this purpose, software, Amos was used.

Confirmatory factor analysis (CFA) for Pilot Study. Confirmatory factor analysis (CFA) is a statistical technique used to verify the factor structure of a set of observed variables. CFA allows the researcher to test the hypothesis that a relationship between observed variables and their underlying latent constructs exists. The researcher uses knowledge of the theory, empirical research, or both, postulates the relation pattern a priori and then tests the hypothesis statistically.

Confirmatory factor analysis (CFA) is also imperative to validate a multi-factorial model (Byrne, 2010), as it is used for validating the correlation between items and factors. Said et al. (2011) recommended that CFA using SEM gives better results in testing the validity and reliability of an instrument. Therefore, considering these recommendations, CFA was carried out to validate all scales in terms of the convergent validity and discriminant validity (Byrne, 2013; Hair et al., 2006). According to Ringlet al. (2005), Smart PLS is a free tool for path modeling.

The validity of measurement model was done in two ways: convergent validity and discriminant validity. Convergent validity was assessed through factor loading, composite reliability (*CR*) and average variance extracted (*AVE*), while discriminant validity was evaluated, by comparing the square root of *AVE* with the correlation between the variables (Hair Jr et al., 2016). Furthermore, Hair (2010) recommended that values for outer loading, *AVE* and *CR* must be greater than 0.5, 0.5 and 0.7 respectively. In addition, for a distinct variable, correlation between the variable must be lower than the square root of the AVE (Hulland et al., 1999).

CFA for epistemological beliefs (pilot study). Construct of 'Epistemological beliefs' is measured through four dimensions: Source, Certain, Development, Justification with twenty one items respectively labelled by; S1,S2,S3,S4,C3,C4,C5,D1,D2,D3,D4,D5,J1,J2,J3,J4,J5,J6,J7,J8,J9. The Second Order

Confirmatory Factor Analysis was performed and a factor model was found to be reasonable χ^2 =396, df = 89, χ^2 / df =4.4, GFI=0.92, TLI = 0.93, CFI =0.94, RMSEA = 0.04); TLI and CFI above .90 and RMSEA in near to 0.05 -0.08.

CFA for goal orientation (pilot study). Construct of 'Goal Orientation' is measured through three dimensions: mastery, perform, avoid with fifteen items labelled by; G1,G4,G7,G10,G16,G2,G5,G8,G11,G14,G17,G3,G6,G9,G15.The Confirmatory Factor Analysis was performed and a factor model was found to be reasonable χ^2 =396, df = 89, χ^2 / df=4.4, GFI=0.92 , TLI = 0.89 , CFI =0.91, RMSEA = 0.06). TLI and CFI above .90 and RMSEA in between 0.05 -0.08).

CFA for learning approach (pilot study). Construct of 'Learning approach' is measured through two dimensions: deep and surface approach with fifteen items labelled LA4,LA7,LA12,LA16,LA19,LA20,LA1,LA2,LA5,LA6,LA9,LA10,LA13,LA14,LA18. The Confirmatory Factor Analysis was performed and a factor model was found to be reasonable (χ^2 =168, df = 54, χ^2 / df = 3.1, GFI= 0.94, TLI = 0.91, CFI =0.92, RMSEA = 0 .05). ; TLI and CFI above .90 and RMSEA in between 0.05 -0.08).

CFA for implicit theories of intelligent (pilot study). In this study, a general factor with second order had been found. Construct of 'Implicit Intelligent' is measured through two dimensions: entity and incremental with seven items respectively labelled by; IM3, IM5, IM7, IM8, IM1, IM2, IM4. The Confirmatory Factor Analysis was performed and a factor model was found to be reasonable (χ^2 =64, df = 15, χ^2 / df = 4.3 GFI= 0.98, TLI = 0.99, CFI = 0.98 RMSEA = 0.06). ; TLI and CFI above .90 and RMSEA in between 0.05 -0.08).

CFA for self-efficacy (pilot study). Construct of 'Self efficacy is measured through five items labelled by: EF1, EF2.EF3, EF4, EF5. The Confirmatory Factor Analysis was performed and a factor model was found to be reasonable (χ^2 =1305, df =

307, χ^2 / df = 4.25, TLI =0.99, CFI =0.99, RMSEA = 0 .05); TLI and CFI above .90 and RMSEA in between 0.05 -0.08).

CFA had performed in order to determine whether the items obtained in EFA and the two-factor structure has satisfactory goodness of fit indices. A lot of goodness of fit indices have been used for examining the efficiency of the model tested in CFA. In the present study, Chi-Square Goodness, Goodness of Fit Inde x (GFI), Adjustment Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), will be checked. As such, generally .90 is considered to refer to acceptable fit and .95 refers to perfect fit for the indices of GFI and CFI. . With regard to AGFI, the value of .85 refers to acceptable fit and .90 refers to perfect fit. As for RMSEA, the value of .08 is considered to refer to acceptable fit, while .05 refers to perfect fit. The acceptable and perfect values for the goodness of fit indices, goodness of fit index values obtained in CFA and the related results are presented in table 3.7.

The perfect and acceptable goodness of fit criteria in Table 3.7 demonstrate that the two-factor model has satisfactory goodness of fit. The factor loads related to the two-dimensional model are presented in table 3.7. As can be seen in table 3.7, the measurement model completed by utilizing Confirmatory Factor Analysis (CFA). In this step, CFA will relate each observed variable to its corresponding latent variable. CFA is important in SEM analysis to assess the role of the measurement error in the model, to validate a multi-factorial model and to ascertain group effects on the factors as the researcher need to determine in which particular factor the items is designed to measure for example construct. In addition, the researcher should first test the basic measurement model underlying a full structural equation model before proceeding to the second step of testing the structural model. From here, the researcher could execute the procedure to assess the unidimensionality, validity and reliability of the measurement model.

Confirmatory factor analysis (CFA) is also imperative to validate a multi-factorial model (Byrne, 2010), as it is used for validating the correlation between items and factors. Said et al. (2011) recommended that CFA using SEM gives better results in testing the validity and reliability of an instrument. Therefore, considering these recommendations, CFA was carried out to validate all scale in term of the convergent validity and discriminant validity (Byrne, 2013; Hair et al., 2006). According to Ringle et al. (2005), Smart PLS is a free tool for path modelling.

The validity of measurement model was done in two ways: convergent validity and discriminant validity. Convergent validity was assessed through factor loading, composite reliability (*CR*) and average variance extracted (*AVE*), while discriminant validity was evaluated, by comparing the square root of *AVE* with the correlation between the variables (Hair Jr et al., 2016). Furthermore, Hair (2010) recommended that values for outer loading, *AVE* and *CR* must be greater than 0.5, 0.5 and 0.7 respectively. In addition, for a distinct variable, correlation between the variable must be lower than the square root of the AVE (Hulland et al., 1999).

According to Fornnel and Larcker (1981), one must demonstrate that the measurement model (i.e., all the constructs together) has a satisfactory level of validity and reliability before testing for a significant relationship in the structural model. The previous sections have shown that all the constructs have satisfactory levels of validity and reliability. Therefore, the next step was the evaluation of the goodness-of-fit of the measurement model with all the latent constructs of the study. The measurement model of the structural equation model with all the latent constructs, depicts the relationship between the observed variables and their corresponding construct, with such patterns for all the constructs represented together in a single hypothesized model.

Researchers use measurement models to examine the extent of interrelationship and variation among the latent constructs, before exploring the possibility of relationships among the latent variables (Schreiber, 2006). The AMOS program generated chi-square statistics (x^2), associated degrees of freedom (*df*), and the probability value when maximum likelihood estimates are computed. The program also generated several other fit statistics including Comparative Fit Index (CFI), Tucker Lewis Index (TLI), root mean square error of approximation (RMSEA). The model fit was justified with several goodness-of-fit indices such as; Chi-square (x^2), the ration between chi-square and degree of freedom ($x^{2/}$/df=5.0, Root mean fit index (CFI) = 0.90, Tucker-Lewis index (TLI) = 0.90. (Hu & Bentler, 1999).

AVE for the pilot test. The AVE's above .5 are treated as indication of adequate convergent validity (Fornell & Larcker (1981). The AVEs for all the constructs ranged from 0.54 to 0.72, satisfying this criterion. The analysis results of the three procedures recommended by Fornell and Larcker (1981) demonstrate adequate convergent validity at the construct level for all the constructs.

Table 3.8 *Convergent validity for the measurement model*

Variable Name	Item	Factor Loading	Composite Reliability	AVE
Source	S1 S2 S3 S4	.68 .75 .78 .73	.72	.64
Certain	C3 C4 C5	.80 .77 .67	.61	.56
Justification	J1 J2 J3 J4 J5 J6 J7 J8 J9	.60 .70 .61 .68 .62 .50 .68 .66 .61	.81	.64
Development	D1 D2 D3 D4 D5	.60 .65 .73 .68 .60	.65	.59
Mastery goal	G1 G4 G7 G10 G16	.80 .75 .74 .65 .55	.74	.66
Performance goal	G2 G5 G8 G14	.76 .72 .69 .65	.72	.65
Avoidance goal	G3 G6 G9 G15	.68 .71 .59 .68	.60	.54
Implicit theories of intelligent	I1 I2 I4 I3 I5 I7 I8	.81 .80 .73 .71 .65 .82 .78	.69	.61
Self- efficacy	EF1 EF2 EF3 EF4 EF5	.61 .59 .57 .62 .45	.81	.72

Variable Name	Item	Factor Loading	Composite Reliability	AVE
Deep	LA1 LA2 LA5 LA6 LA9 LA10 LA13 LA14	.64 .58 .53 .53 .58 .72 .68 .57	.78	0.68
Surface	LA4 LA7 LA11 LA12 LA15 LA16 LA 19 LA20	.50 .57 .52 .62 .61 .59 .58 .69	.74	0.64

Table 3.9
Index Category and the Level of Acceptance for Every Index

Name of category	Name of index	Index full name	Level of acceptance	Literature	Comments
1. Absolute fit	chisq	Discrepancy Chi Square	P > 0.05	Wheaton et al (1977)	Sensitive to sample size >200
	RMSEA	Root Mean Square of error approximation	< 0.08	Brown and Cudeck (1993)	Range 0.05 to 0.1 acceptable
	GFI	Goodness of Fit Index	> 0.90	Joreskog and Sorbom (1984)	0.95 is a good fit.
2. Incremental Fit	AGFI	Adjusted Goodness of Fit	> 0.90	Tanaka and Huba (1985)	0.95 is a good fit
	CFI	Comparative Fit Index	> 0.90	Bentler(1990)	0.95 is a good fit
	TLI	Tucker-Lewis Index	> 0.90	Bentler and Bonett(1980)	0.95 is a good fit
	NFI	Normed Fit Index	> 0.90	Bollen(1989)	0.95 is a good fit
3. Parsimonious fit	chisq/df	Chi Square/Degrees of Freedom.	< 5.0	Marsh and Hocevar(1985)	The value should be below 5.0

Source: Adopted and customized from the table of Model Fitness Index

Reliability of Model Sub-Scales

To investigate the reliability of reflective constructs (sub-scales), Cronbach's alpha and composite reliability measures can be extracted by PLS-SEM. The current model was conceptually based on the determinants of all constructs. The table shows overall results of the items exceeding the value of 0.70 (Götz et al., 2010). Similarly, Cronbach's alpha value was 0.90, which was quite acceptable. All of the reflective items were found acceptable and reliable. Each construct was also briefly elaborated and discussed individually. The details are included in next section.

Data Analysis Techniques

In the present study, two software SPSS and Smart PLS were used in two phases. Smart PLS is one of the prominent software applications for Partial Least Squares Structural Equation Modeling (PLS-SEM). Data analysis begins with an examination of the descriptive statistics to determine the appropriate statistical tests required to answer the research question. The descriptive statistics describe the basic features of the data, which are the mean, variance, and standard deviation (Trochim, 2006). The data was collected from respondents and analyzed in SPSS to calculate descriptive statistics, data screening and also preparation for model testing. In addition, the exploratory factor analysis (EFA) was also performed in SPSS, to identify the construct validity of the questionnaire. For readers ease, this segment was separated as phase 1.

In the second phase, AMOS was employed for confirmatory factor analysis (CFA) as well as for the evaluation of structure equation modeling (SEM). SEM is an advanced statistical method that is used to measure latent, unobserved concepts with multiple observed indicators (Hair et al., 2013).

In literature, both AMOS (analysis of moment structure) and smart-PLS can be used for CFA(Hair et al., 2013). PLS is considered by many as an emerging multivariate data analysis method, and researchers are still exploring the best practices of PLS-SEM. Even so, some general guidelines have been suggested in literature. Literature revealed that second-order constructs could be properly modeled using partial least square structural equation modeling (PLS-SEM) (Wetzels et al., 2009). Therefore, for the current study, PLS-SEM scheme was finalized.

PLS-SEM Model Evaluation

Evaluating the PLS-SEM results involves completing two stages as shown in Figure 3.12, that stage 1 examines the measurement models with the analysis varying depending upon whether the model includes reflective measures (Stage 1.1), formative measures (Stage 1.2) or both.

If the measurement model provides satisfactory results, the researcher moves on to stage 2, which involves valuating the structural model (Hair & Hult, et al., 2014). In stage 1, it examines the measurement theory, whereas in stage 2 it covers the structural theory, which includes determining whether the structural relationships are significant and meaningful, and testing hypotheses.

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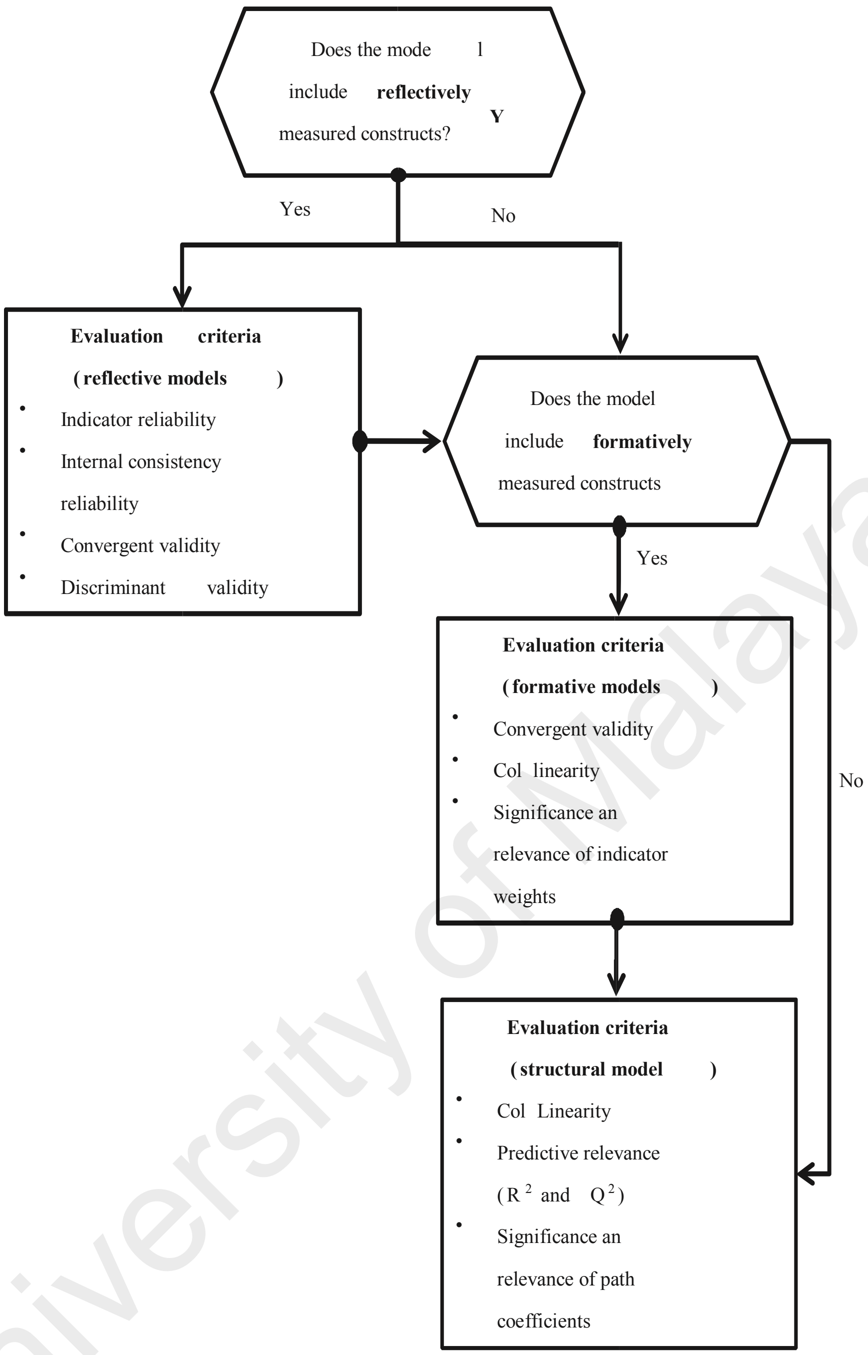

Figure 3.8. PLS SEM-Evaluation Stage

Stage 1: measurement model assessment. In the case of reflectively measured constructs, the researcher begins Stage 1 by examining the indicator loadings. Loadings above 0.70 indicate that the construct explains over 50% of the indicator's variance.

The next step involves the assessment of the constructs' internal consistency reliability. When using PLS-SEM, internal consistency reliability was typically evaluated using composite reliability. In assessing reliability, higher values show higher levels of reliability .Values between 0.60 and 0.70 are considered' 'acceptable in exploratory research' 'whereas values between 0.70 and 0.95 are considered' 'satisfactory to good'' (Hair, et al.,2014,pp.101–102).Values higher than 0.95 are considered problematic, as they indicate that the items are redundant, leading to issues such as undesirable response patterns (e.g., straight lining),and inflated correlations among indicator error terms (Drolet & Morrison,2001).

Convergent Validity. The AVE is an indicator of the amount of variance captured by the construct in relation to the variance due to random measurement error (Teo & Schaik, 2009). The AVE is calculated by adding the squared factor loadings of the items of the underlying factor, divided by the number of items in the factor.

Next, the convergent validity of the reflectively measured constructs is examined. Convergent validity measures the extent to which a construct converges in its indicators by explaining the items' variance. Convergent validity is assessed by the average variance extracted (AVE) for all items associated with each construct. The value is calculated as the mean of the squared loadings for all indicators associated with a construct. An acceptable AVE is 0.50 or higher, as it indicates that on average, the construct explains over 50% of the variance of its items.

Once the liability and convergent validity of reflective constructs are successfully established, the next step is to assess the discriminant validity of the e constructs. Discriminant validity determines the extent to which a construct is empirically distinct from other constructs in the path model, both in terms of how much it correlates with other constructs and in terms of how distinctly the indicators represent only this single construct.

Formatively measured constructs are evaluated differently from reflectively measured constructs. Convergent validity of formatively measured constructs is determined based on the extent to which the formatively measured construct correlates with are measured (or single-item) construct that has the same meaning as the formatively measured construct. Hair and colleagues (2014) suggested that the formatively measured construct should explain at least 65% of the variance of the reflectively measured item(s), which is indicated by a path coefficient of approximately 0.80.

To describe PLS path model, measurement model and construct model were created. Measurement model specifies the indicators of each construct and enables researchers to assess validity of the construct (Hair et al., 2006). Whereas, a structural model represents the relationships among latent variables.

Validity of the measurement model was measured using convergent validity and discriminant validity steps. Convergent validity was analyzed by calculating factor loadings, composite reliability (CR), and average variance extracted (AVE) (Chin, 1998). Similarly, discriminant validity was confirmed via calculating the square root of AVE values for each construct, and comparing it with guidelines. It should be higher than the correlation of pair of any latent variable (Gefen et al., 2005).Similarly, the structural model was evaluated with significance of path coefficients and R^2 (variance) of latent variables.

Stage2: structural model assessment. Provided that the measurement model assessment indicates that the measurement model quality is satisfactory, the researcher moves to Stage2 of the PLS-SEM evaluation process .PLS-SEM does not have a standard goodness-of-fit statistic, and efforts to establish a corresponding statistic have proven highly problematic (Henseler & Sarstedt, 2013). Instead, the assessment of the model's quality is based on its ability to predict the endogenous constructs. The following facilitate this assessment: coefficient of determination (R^2), cross-validated redundancy (Q^2) and the path coefficients. Prior to this assessment, the researcher must test the structural model for potential collinearity between the predictor constructs effect and the direct effect is statistically significant (Zhao et al., 2010).

Next, the strength and significance of the path coefficients is evaluated for the relationships (structural paths) hypothesized between the constructs. Analogous to the assessment of formative indicator weights, the significance assessment builds on boot-strapping standard errors as a basis for calculating values for the path coefficients. In terms of relevance ,path coefficient values are standardized on arrange from 1to+1, with coefficients closer to +1 representing strong positive relationships and coefficients closer to indicating strong negative relationships. The determination of whether the size of the coefficient is meaningful must be interpreted in light of the context of the research.

Finally, the assessment of structural model relationships should not be restricted to direct effects but, if applicable, also consider total effects, which is the sum of the direct effect and the indirect effect between an exogenous and an endogenous construct in the structural model. The consideration of total effects allows for the examination of an exogenous construct's influence on a target construct via all mediating constructs and thus provides a richer picture of the relationships in the structural model.

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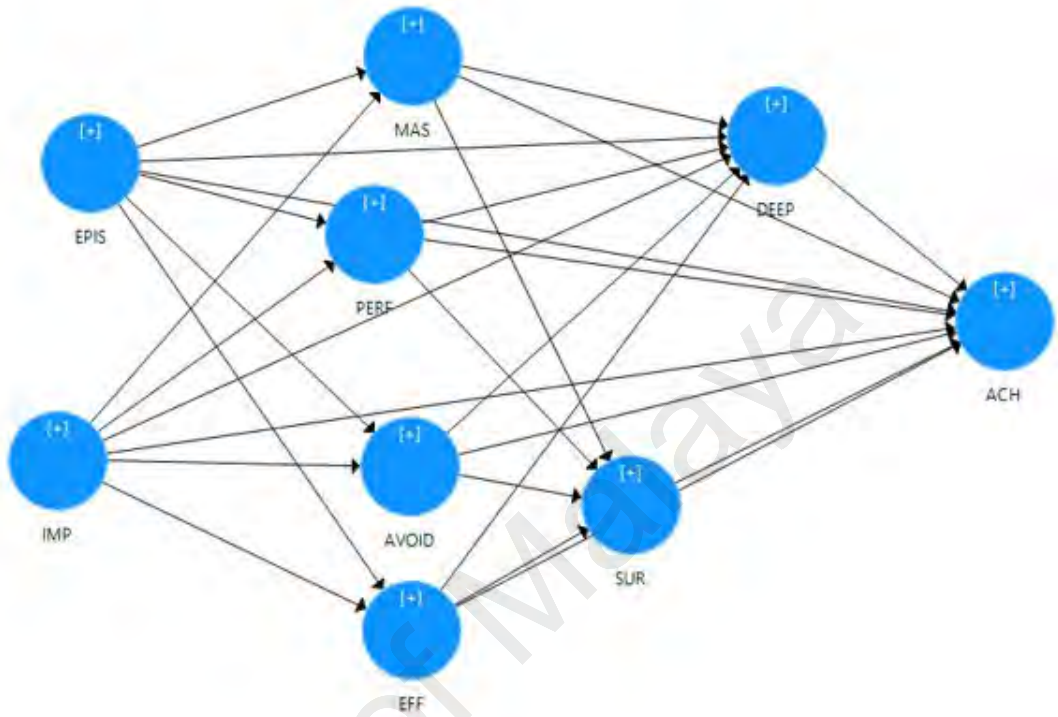

Figure 3.9 A prior model showing endogenous and exogenous variables

In Figure 3.9, an arrow from one variable to any other indicates the theoretically-based total relationships among them. A one-headed arrow suggests that the relationship is unidirectional, while a double-headed arrow shows that the relationship is bi-directional and the two variables are covariant to each other. The dependent or final results variable (science achievement); the exogenous variable, while, the independent variable is referred to as the endogenous variable. Moreover, variables such as mastery and surface mediate the relationship between self-efficacy and achievement. Consequently, mastery and surface are called mediating variables or just 'mediators', as are approach, avoid, and surface. The mediating variables are also endogenous variables as those are affected through other exogenous or endogenous variables in the mediational model. For instance, the exogenous variable, epistemology beliefs, exerts a force on the endogenous variable, mastery , which in turn exerts a force at the endogenous variable, deep, and in turn exerts a force on the final outcome and endogenous variable, achievement.

In order to test the robustness of the instrument used, exploratory factor analysis (EFA) is utilized to determine the actual number of factors underlying each construct and confirmatory factor analysis (CFA) is utilized to verify the construct validity. It is strongly recommended in SEM analysis as it shows the consistency of questioned items of an instrument and confirming that the questioned items are strongly believed to be able to measure what is to be measured.

Summary

This chapter has described and provided a rationale for the study by figuring out the gaps in literature, hence identifying the need to construct a mediational model of science achievement. This chapter additionally defined the steps followed to construct the hypothetical mediational model for the present study. Finally, this chapter formulated the research questions to be answered, and the hypotheses to be examined in the present study.

For the following chapter, it will present the preliminary analyses of the study. It includes how the exploratory factor analysis was conducted and how the descriptive statistics were reported. The convergent validity of the items was assessed. The dimension model with all the constructs was evaluated for its model fit. Finally, the structural model with all the variables in the study was evaluated for its model fit, earlier than estimating the relationships within the structural model.

CHAPTER 4

FINDINGS AND DISCUSSION

Introduction

This chapter presents the results of the analysis on the quantitative data. Three hundred and fifty (350) students were randomly selected from secondary schools. Their ages were between the 16 and 17 years old. Table 4.1 illustrates the descriptive statistics of the sample. In addition, the EFA was performed in SPSS to construct the validity of the questionnaire. Table 4.1 shows the summary of the major analysis.

To analyse the survey data, suitable techniques and software were used. AMOS and Smart PLS software were used for further data analysis. SPSS was used to calculate descriptive statistics, data screening and also the preparation for model testing. The returned responses were initially screened and further analysed using the exploratory factor analysis (EFA) while CFA was performed in AMOS. For readers' ease, this segment is separated as phase 1. Whereas, Smart PLS software Version 3.2.4 was used for the evaluation of the survey data. The PLS was used for the accomplishment of CFA purpose and also evaluate the hypothesis. For the current study, the hypotheses were tested based on the structural equation modelling using the PLS method. To make it easier for readers, this segment was called phase 2.

Table 4.1

Descriptive Statistics of Demographic Variable

Demographic Variable	Age	n	%
Age Max	16	142	40.6
Age Min			
Average Age	16.5	208	59.4
	Sex		
Female		193	55.1
Male		157	44.9
	Area		
Rural		185	52.9
Urban		165	47.1
	Race		
Chinese		90	25.7
Malay		221	63.1
Indian		37	10.5
Other		2	0.57

Data Analysis (Phrase 1)

In Phase 1, the 350 responses were initially analysed in SPSS to calculate descriptive statistics, data screening and also preparation for model testing. The reason for using SPSS in Phase 1 was because of its effectiveness and straightforwardness to clean data and remove outliers based on reliability. In addition, the EFA was performed in SPSS, to identify the construct validity of the questionnaire. However, keeping in mind the model complexity, smart-PLS was employed in the second phase for a complete model development.

Data Screening. In this study, the purpose of data screening is to (a) check if data have been entered correctly, such as out-of-range values. (b) Check for missing values, and deciding how to deal with the missing values. (c) Check for univariate outliers, check for multi variate outliers, and deciding how to deal with outliers. (d) Check for normality, and deciding how to deal with non-normality.

In the present study, data screening was conducted prior to data analysis, to help ensure the integrity of the data. It means checking data for errors and fixing or removing these errors. The researcher tries to find out as much as possible about problematic data, then makes a decision which maximises "signal" and minimises "noise". It keeps a record of data screening steps undertaken and any changes made to the data.

All 350 students from 10 classes were studying in Form 4, in selected secondary schools. From the 350 participants, 95.3% (3) answered every question. However, the data set contained missing data in 4.7% (2) of the cases, including 0.26% (7) of the students who did not respond to any questions despite consenting to participate. Of the 27 cases missing, 0.41% (11) of the students did not finish answering the questions. Missing data was also an issue with 0.22% (6) of the students who did not fill in the required details. In addition, 0.11% (3) of the students' science achievement results were missing from the data sheet provided by the school, resulting in more missing data. Incomplete data cases such as completely missing data, missing demographic information, and missing achievement results were removed from the data file. The final data file consisted of 300 students as the sample for the study. The percentage of missing data value was less than 1.8% with no apparent pattern. Hair et al. (2013) recommended mean value replacement option, when there are less than 5 % missing value per indicator. Therefore, the missing data was imputed using a mean value replacement method.

Evaluation of Research Model (Phase 2):

In Phase 1, after removing outliers, the selected 300 responses were initially analysed using SPSS to calculate descriptive statistics, and EFA. In Phase 2, PLS-SEM, a type of structural equation modelling was employed for the model development and evaluation. PLS-SEM is particularly appropriate for second-order constructs (Wetzels et al., 2009).

PLS is a well-established, second generation multivariate technique which can simultaneously evaluate the measurement model and the structural model with the aim of minimizing the error variance. PLS analyses were performed using the Smart PLS software which computed the estimates of standardized regression coefficient of the paths of the model, factor loadings for the indicators, and the amount of variance account for the dependent variables. Generally, this software makes it possible to test the hypothesized relationships between independent and dependent variables depicted in the model. Another important application of Smart PLS software is that it computes several types of reliabilities (Cronbach's alpha and composite reliability coefficient) and validities (convergent and divergent) statistics, which can be used to assess the quality of the model. In addition, SEM measures latent, unobserved concepts with multiple observed indicators. In SEM, two types of models including measurement model and structural model are embedded. Measurement model also known as outer model describes the relationship between latent variables and their measures (indicators). Further, measurement model can be reflexive or formative or their combination depending upon the nature of constructs and variables. Whereas, structural model also known as inner model, determines the relationships between the determinants.

For the current research, analysis was carried out using a PLS's two-stage analytical procedure. The results obtained in PLS-SEM were evaluated in two stages. In the first stage, reliability and validity of measurement model (outer model) were assessed. In the second stage, the structural model (inner model), the hypothesized relationships between the independent (exogenous) and dependent (endogenous) variables were evaluated (Howell, A.J., & Watson, D.C 2007).

Initially, measurement models were run, which have enabled the researcher to evaluate the reliability and validity of the construct measures. This step also ensured the quality of measurement model prior to hypothesis testing.

As the purpose of the present study was to analyse the overall effect of all the variables (epistemological beliefs, goal orientations, self-efficacy and learning approaches) and their mediation role on Science achievement, both direct and indirect effects were considered. Several assessments were also performed by evaluating the significance and the relevance of the structural model path coefficients, testing coefficients of determination R^2, assessing f^2 effect sizes, and evaluating the predictive relevance $Q^2$and q^2 effect size. The details of each step and relevant terminologies are provided in the next section.

For the ease of readers, measurement models were calculated separately followed by the summarized structural estimates of all direct effects. Figure 4.1 illustrates the flowchart for the direct and indirect paths. This scheme has enabled observation of a few changes in the path values when the individual paths were merged into an overall model. To further analyse these changes, mediation or indirect paths were analysed in the next phase, and discussed in the following sections.

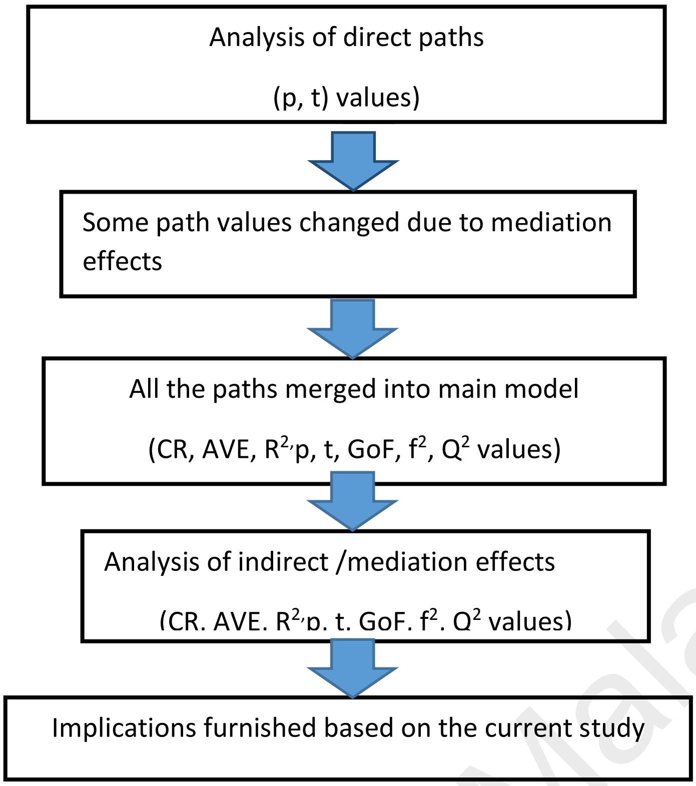

Figure 4.1. Framework for direct and indirect path analysis

Normality Test. In this study, normality tests were used to determine whether the data set was well-modelled by a normal distribution and compute how likely it is for a random variable underlying the data set to be normally distributed. Since it was a form of model selection, it can be interpreted in several ways depending on one's interpretations of probability:

- In descriptive statistics terms, one measures the goodness of fit of a normal model to the data if the fit is poor, then the data are not well modelled in that respect by a normal distribution without making a judgment on any underlying variable.
- In the frequentist statistical hypothesis testing, data are tested against the null hypothesis that was normally distributed.

Table 4.2

Normality of the Survey Questionnaire

Construct	Mean	SD	Z Skewness	Z Kurtosis
EFF	18.458	3.9347	-.354	-.084
MAS	18.465	3.6198	-.174	-.380
PER	19.359	4.1549	-.077	-.132
AVO	13.305	2.8046	-.167	-.214
SUR	18.272	4.1447	-.437	.194
DEE	29.757	5.5260	.032	-.072
EPI	87.867	9.0510	.214	-.050
IMP	28.588	4.8208	.093	.523

Exploratory Factor Analysis (EFA). Exploratory factor analysis (EFA) is used to determine the number of continuous latent variables that are needed to explain the correlations among a set of observed variables. It refers to a set of statistical procedures designed to determine the number of distinct constructs needed to account for the pattern of correlations among a set of measures. The continuous latent variables are referred to as factors, and the observed variables are referred to as factor indicators. In this study, EFA is used for all motivational variables.

EFA for epistemological beliefs. The data were reanalysed by conducting principle components (PCA) to each subscale individually. An iterative process was used to refine each theoretical set of items to a uni-dimensional scale. Uni-dimensionality was further evaluated through reliability analysis. Specifically, item-total correlations were examined and items deleted when the result was an improvement in coefficient alpha estimates. The following tables provide factor analytic and reliability information for each of the four epistemological beliefs questionnaire subscales that were subjected to higher-order factor analysis.

The four scales of epistemological beliefs questionnaire, representing the four theoretical factors, were then subjected to PCA analysis. As in previous analyses, the inter-scale correlation matrix was inspected and the correlations were significant and ranged from .41 to .62. KMO was equal to .833 and the Bartletts test [df= 91, χ^2 (6) = 765.808; p < .001] was significant. Both screen plot and parallel analysis supported a single factor (λ = 3.10) that accounted for 77.50% of the total variance (see Figures 4.3). Factor loadings ranged in magnitude from .536 to .772 and communalities ranged from .729 to .824 the hierarchical factor was interpreted as Epistemological beliefs about science (see table 4.3).

Table 4.3

Factor Loadings, Communalities, Eigen Value, % Variances explained by Epistemological Belief

Factor	**Dimensions**	**Factor Loading**	***C*ommunalities**	**Eigen Values**	**% of Variance**
Epistemology Beliefs	Source	.536	.745	11.707	68.91%
	Development	.714	.802		
	Justification	.756	.824		
	Certain	. 772	.729		

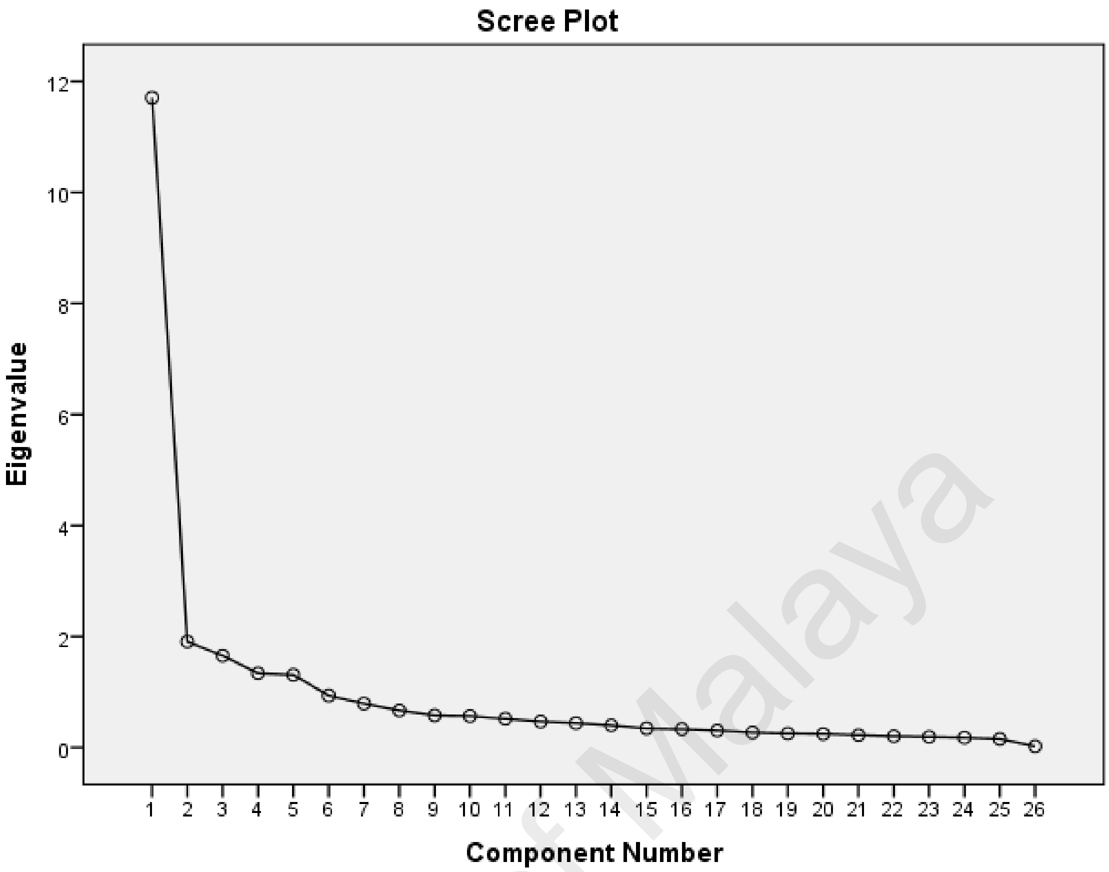

Figure 4.2. Scree test for epistemological beliefs questionnaire (first order)

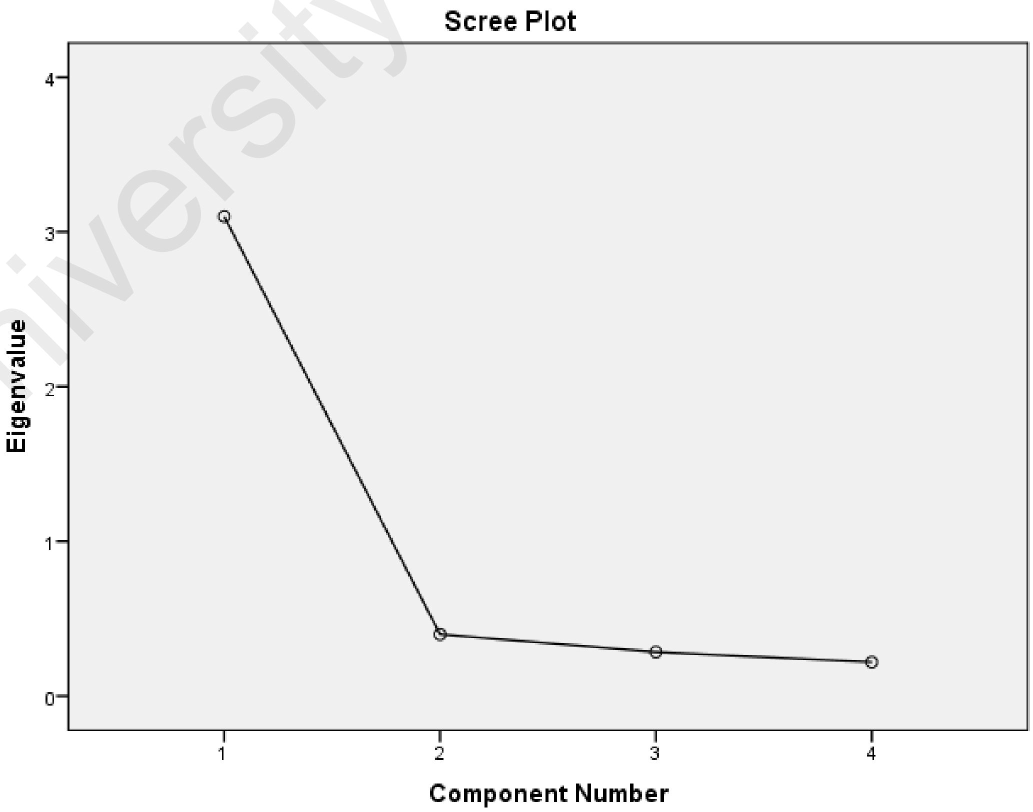

Figure 4.3. Scree test for epistemological beliefs questionnaire (second order)

EFA for epistemological beliefs (source). The latent variable for source included five items. However, the EFA suggested that item 5 with factor loading of 0.453 (S5:Only scientists know for sure what is true in science) should not be retained for the analysis due to no contribution to any factor and having low factor loadings (< 0.60). The other four items were retained because they had reasonably high factor loadings. When the items with poor factor loadings were dropped, the composite reliability of the construct (i.e., Cronbach's alpha value) increased from 0.69 to 0.72. The Cronbach's alpha construct for source was acceptable as it was greater than the recommended value of 0.70 (Hair et al., 2006). Then, the Bartlett's test of sphericity was significant ($\chi2$ (301) = 281.281, $p < .001$, the Kaiser-Meyer-Olkin's value (0.72) of the sample adequacy was above the recommended value of 0.60 , and finally the communalities of all the items were found to be above .3

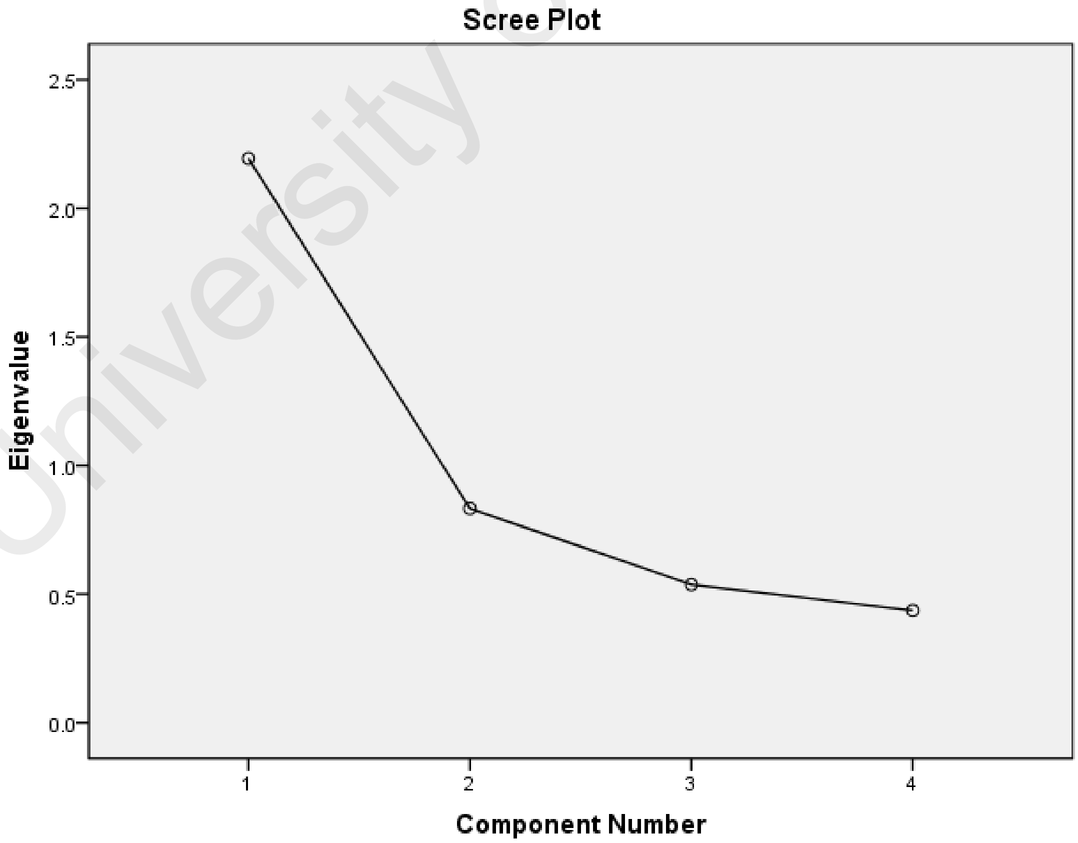

Figure 4.4. Scree plot for epistemological beliefs (source)

Table 4.4

Factor Loadings, Communalities, Eigen Value, % Variances Explained by of epistemological beliefs- source

Factor	Item Code	Loadings	Communalities	Eigen Value	% Variance
Source	S1	.682	.465		
	S2	.752	.566		
	S3	.789	.622	2.193	54.834
	S4	.735	.540		

EFA for epistemological beliefs (justification). The latent variable for justification included nine items with all items having high factor loadings (>0.60). The Bartlett's test of sphericity was significant ($\chi2$ (301) = 651.088, $p < .001$), the Kaiser-Meyer-Olkin's value (0.85) of the sample adequacy was above the recommended value of 0.60, and finally the communalities of all the items were found to be above .3. The composite reliability of the construct (i.e., Cronbach's alpha value is 0.811.

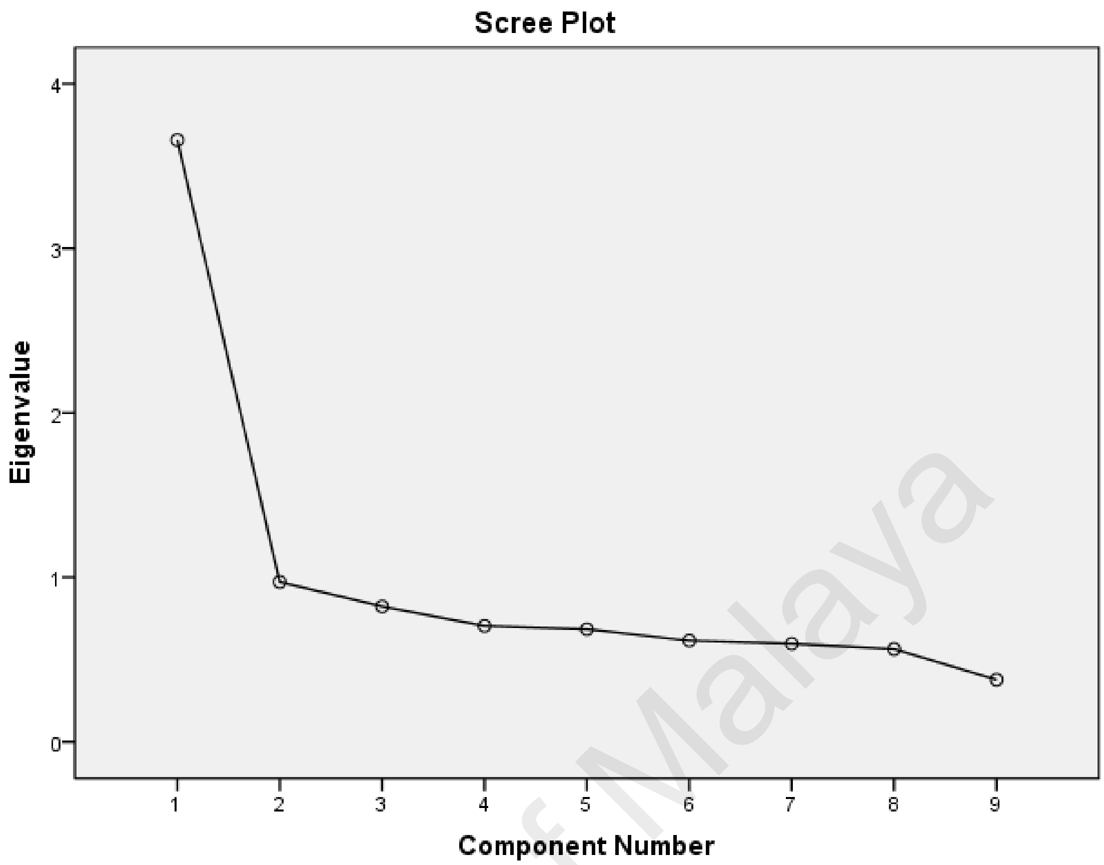

Figure 4.5. Scree plot for epistemological beliefs (justification)

Table 4.5

Factor Loadings, Communalities, Eigen Value, % Variances Explained by of Epistemological Beliefs- Justification

Factor	**Item Code**	**Loadings**	**Communalities**	**Eigen Value**	**% Variance**
Justification	J1	.605	.366		
	J2	.708	.502		
	J3	.617	.380		
	J4	.685	.470		
	J5	.622	.387	3.659	40.658
	J6	.506	.256		
	J7	.686	.471		
	J8	.667	.445		
	J9	.619	.383		

***EFA for epistemological beliefs (development*).** The latent variable for source originally included six items. However, the EFA suggested that item 6 with factor loading of 0.57 (D6: Sometimes scientists change their minds about what is true in science) should not be retained for the analysis due to no contribution to any factor and having low factor loadings (< 0.60). The other five items were retained because they had reasonably high factor loadings. When item 6 with poor factor loadings was dropped, the composite reliability of the construct (i.e., Cronbach's alpha value) increased from 0.59 to 0.65. The Cronbach's alpha construct for source was acceptable as it was greater than the recommended value of 0.70 (Hair et al., 2006). Then, Bartlett's test of sphericity was significant ($\chi 2$ (301) = 182.758, $p < .001$, the Kaiser-Meyer-Olkin's value (0.71) of the sample adequacy was above the recommended value of 0.60 , and finally the communalities of all the items were found to be above .3

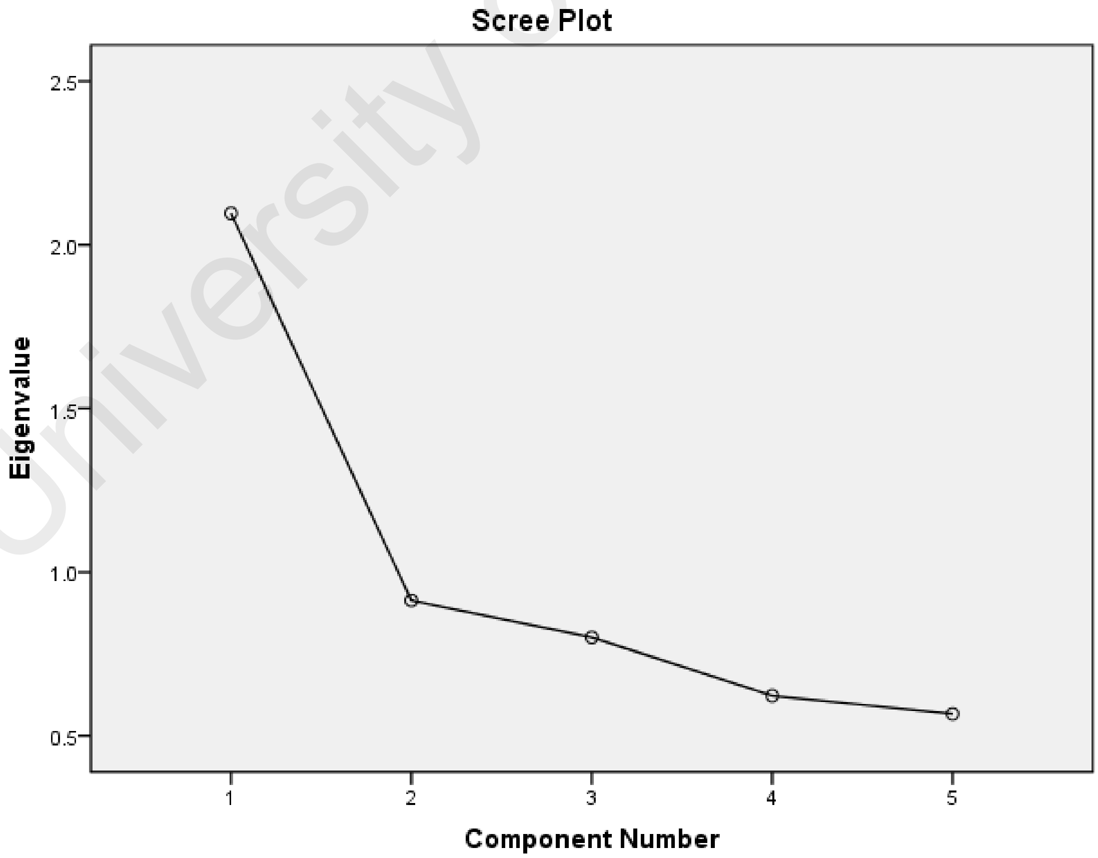

Figure 4.6. Scree plot for epistemological beliefs (development)

Table 4.6

Factor Loadings, Communalities, Eigen Value, % Variances Explained by Development

Factor	**Item Code**	**Loadings**	**Communalities**	**Eigen Value**	**% Variance**
Development	D1	.60	.356		
	D2	.65	.428		
	D3	.73	.537	2.097	22.097
	D4	.68	.458		
	D5	.60	.318		

EFA for epistemological beliefs (certainty). The latent variable for certainty included six items. However, the EFA suggested that item 1 with factor loading of 0.546 (C1: All questions in science have one right answer.) , item 2 with FL of .348 (C2: The most important part of doing science is coming up with the right answer.) and also item C6 with FL of .498 (C6: Scientists always agree about what is true in science.) should not be retained for the analysis due to no contribution to any factor and having low factor loadings (< 0.60). The other three items were retained because they had reasonably high factor loadings. When the items with poor factor loadings was dropped, the composite reliability of the construct (i.e., Cronbach's alpha value) increased from 0.59 to 0.61. Then, Bartlett's test of sphericity was significant ($\chi 2$ (300) = 106.936, p < .001, the Kaiser-Meyer-Olkin's value (0.62) of the sample adequacy was above the recommended value of 0.60 , and finally the communalities of all the items were found to be above .3

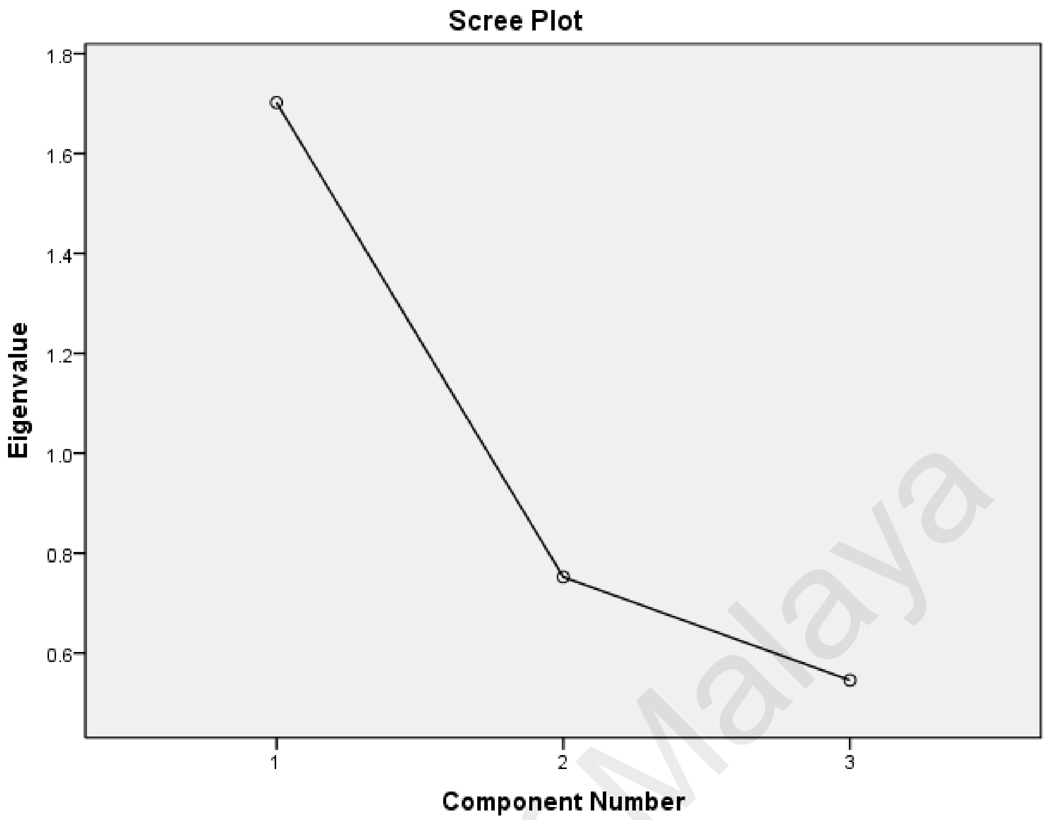

Figure 4.7. Scree plot for epistemological beliefs (certain)

Table 4.7

Factor Loadings, Communalities, Eigen Value, % Variances Explained by Certain

Factor	Item Code	Loadings	Communalities	Eigen Value	% Variance
Certain	C3	.805	.450		
	C4	.777	.604	1.702	56.738
	C5	.671	.648		

EFA for Goal Orientation. The *KMO* value for goal orientation was acceptable at 0.841, indicating the factor analysis was appropriate for the scale. In addition to it, Bartlett's Test of Sphericity was significant [df = 92, $\chi 2$ = 1109.1; p <0.001]. Further the factor analysis revealed three factors with Eigen values greater than 1.00, it is 2.137. For goal orientations, the factor loadings were in the range of 0.555-0.806, greater than recommended value of 0.55 (Tekker, 2011). In addition to it, the scree plot was also investigated to select the correct number of factors to be extracted. From the scree plot, and the Kaiser-Guttman rule, the factor analysis of results on the 18 items indicated that one factor was interpretable.

Table 4.8
Factor Loadings, Communalities, Eigen Value, % Variances Explained by Goal Orientation

Factor	**Item Code**	**Loadings**	**Communalities**	**Eigen Value**	**% Variance**
Goal orientation	G1	.806	.663		
	G2	.768	.558		
	G3	.680	.460		
	G4	.754	.502		
	G5	.728	.465		
	G6	.719	.453		
	G7	.688	.612		
	G8	.693	.560		
	G9	.598	.610	2.137	56.738
	G10	.656	.472		
	G11	.621	.514		
	G12	.569	.548		
	G13	.579	.664		
	G14	.653	.772		
	G15	.684	.421		
	G16	.555	.448		
	G17	.520	.532		
	G18	.660	.428		

Figure 4.8. Scree plot for goal orientation

EFA for self-efficacy. The latent variable for self-efficacy originally included six items. All items were retained because they had reasonably high factor loadings. The composite reliability of the construct (i.e. Cronbach's alpha value) is 0.81. The Cronbach's alpha construct for self-efficacy was acceptable as it was greater than the recommended value of 0.70 (Hair et al., 2006). Then, Bartlett's test of sphericity was significant (df= 307, $\chi 2$ (301) = 470.729, $p < .001$, the Kaiser-Meyer-Olkin's value (0.80) of the sample adequacy was above the recommended value of 0.60 , and finally the communalities of all the items were found to be above .3

Table 4.9

Factor Loadings, *Communalities, Eigen Value, % Variances Explained by Self-Efficacy*

Factor	**Item Code**	**Loadings**	**Communalities**	**Eigenvalue**	**%Variance**
Self-efficacy	EF1	.617	.786	2.858	57.154
	EF2	.590	.768		
	EF3	.571	.756		
	EF4	.627	.792		
	EF5	.453	.673		

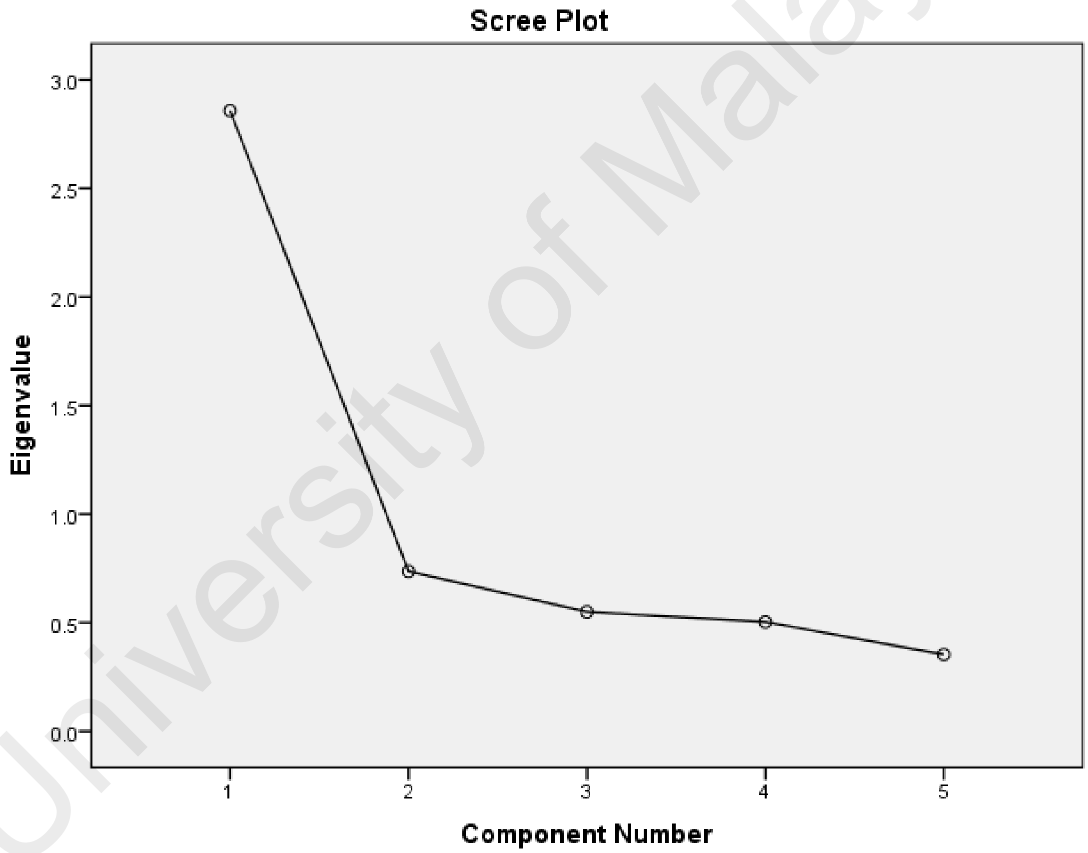

Figure 4.9. Scree pot for self-efficacy

EFA for implicit theories of intelligence. Initially, all 8 items were subjected to factor analysis. The inter-item correlation values were in the low to moderate range. The KMO was equal to 827 and the Bartlett's Test [df = 18, $\chi 2$ (28) = 345.567; p < .001] was significant, indicating that the inter-item correlation matrix was suitable for factor analysis. The data were analysed using principal components analysis (PCA). Only one factor with the Eigen value equal .326 accounting for 41.51% of the variance was extracted (see table 3.10). This results support the unidimensionality of implicit theories of intelligence scale.

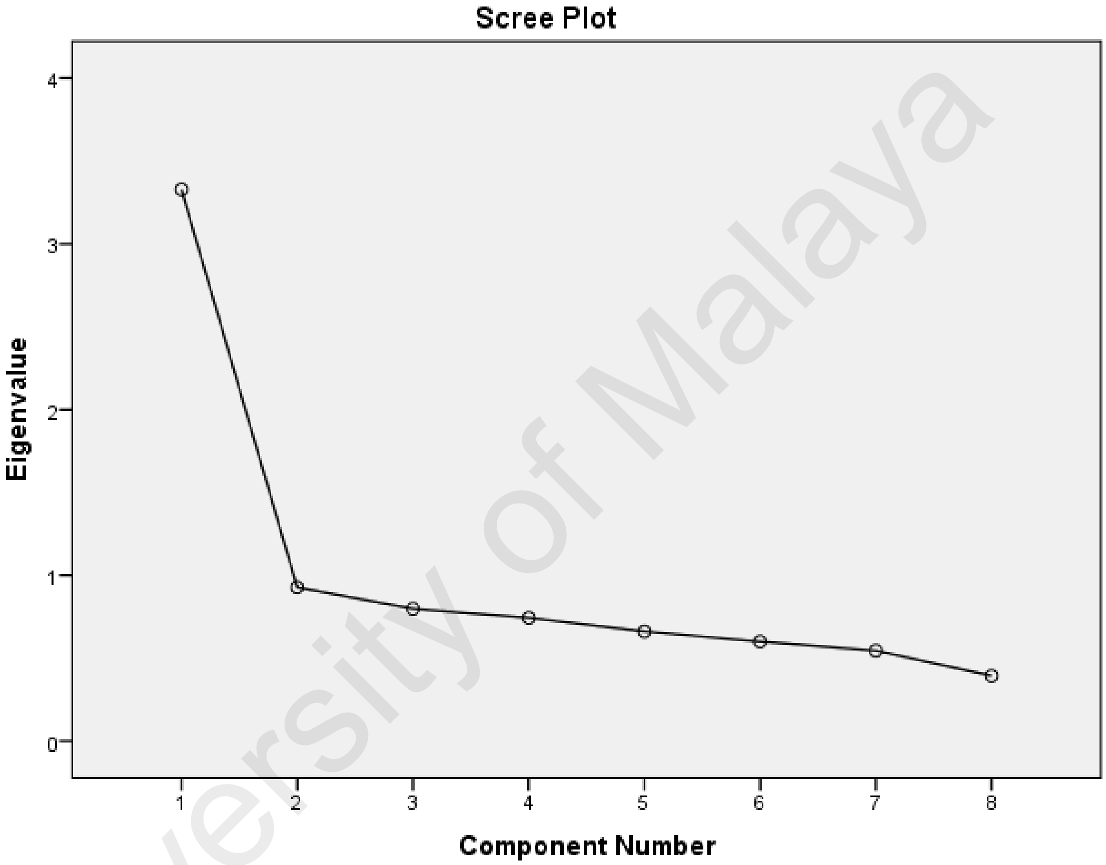

Figure 4.10. Scree plot for implicit theories of intelligence

Table 4.10

Factor Loadings, Communalities, Eigen Value, % Variances Explained by Implicit Theories of Intelligent

Factor	Item Code	Loadings	Communalities	Eigenvalue	%Variance
Implicit theories of intelligent	IM1	.814	.663	1.852	61.736
	IM2	.805	.649		
	IM4	.735	.540		
	IM3	.716	.513		
	IM5	.659	.434		
	IM7	.821	.674		
	IM8	.784	.614		

EFA for learning approach. Principal axis factor analysis with varimax rotation was conducted to assess the underlying structure for the 20 items of the learning approach. Two factors were requested based on the fact that the items were designed to index two constructs: deep and surface. After rotation, the first factor accounted for 21.018% of the variance, the second factor accounted for 16.719%. Table 4.6 displays the items and factor loadings for the rotated factors, with loading less than .40 omitted to improve clarity. The first factor, which seems to index competence, has story loading of the first 10 items. Two of the items indexed low competence and had loadings. The second factor, with a higher loading from the first factor, had a cross-loading over .4 on the competence.

Table 4.11

Factor Loadings, Communalities, Eigen Value, % Variances Explained by of Learning Approach

Factor	**Item Code**	**Factor Loading**		**Communalities**
		1	2	
Deep	LA1	.640		.416
	LA2	.577		.533
	LA5	.542		.407
	LA6	.557		.420
	LA9	.589		.469
	LA10	.713		.514
	LA13	.692		.479
	LA14	.607		.489
Surface	LA7		.577	.409
	LA4		.512	.470
	LA11		.525	.493
	LA12		.628	.410
	LA15		.626	.417
	LA19		.586	.506
	LA20		.671	.551
Eigenvalues		3.363	2.675	
% of variance		21.018	16.719	

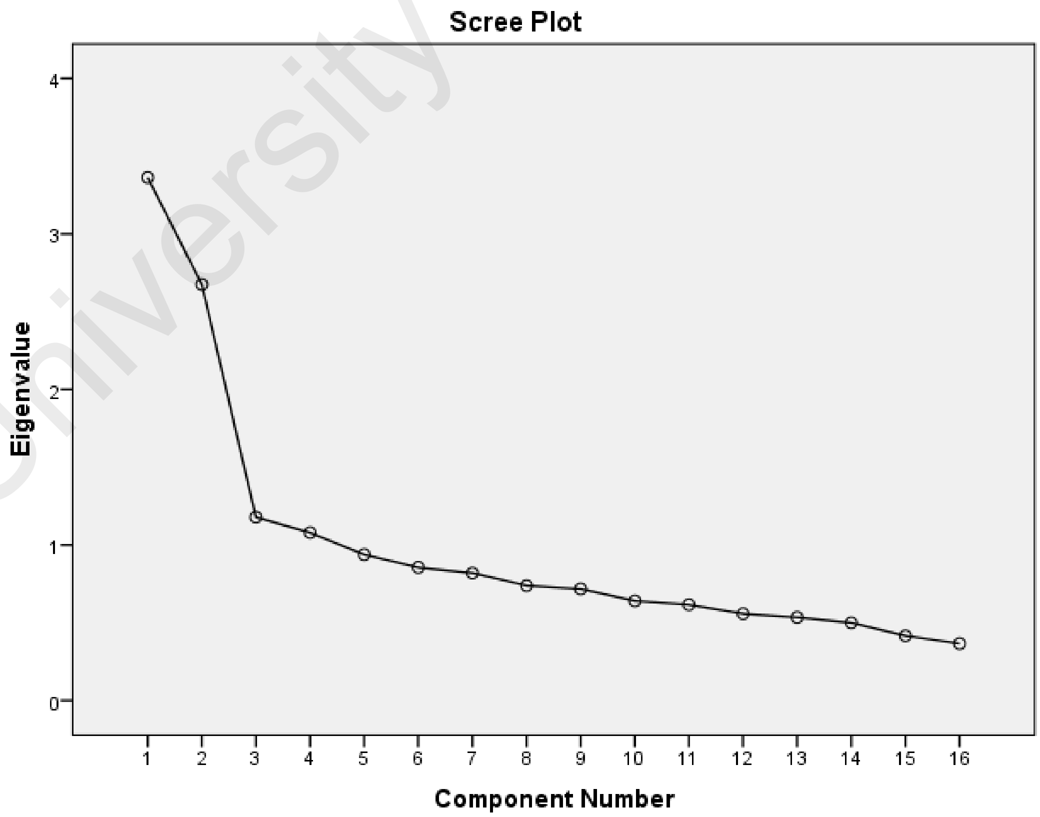

Figure 4.11. Screen plot for learning approach

Confirmatory Factor Analysis (CFA). The Confirmatory factor analysis (CFA) is also imperative to validate a multi-factorial model (Byrne, B.M. 2010), as it is used for validating the correlation between items and factors. Said et al. (2011) recommended that CFA using SEM gives better results in testing the validity and reliability of an instrument. Therefore, considering these recommendations, CFA was carried out to validate all items in terms of the convergent validity and discriminant validity (Byrne, 2013; Hair et al., 2006). According to Ringle et al. (2005), Smart PLS is a free tool for path modelling.

The validity of measurement model was done in two ways: convergent validity and discriminant validity. Convergent validity was assessed through factor loading, composite reliability (*CR*) and average variance extracted (AVE), while discriminant validity was evaluated, by comparing the square root of AVE with the correlation between the variables (Hair Jr et al., 2006). Furthermore, Hair (2006) recommended that values for outer loading, *AVE* and *CR* must be greater than 0.5, 0.5 and 0.7 respectively. In addition, for a distinct variable, correlation between the variable must be lower than the square root of the AVE (Hulland et al., 1999).

***CFA for epistemological beliefs*.** The construct of 'Epistemological beliefs' is measured through four dimensions: source, certain, development and justification twenty one items respective labelled by; S1,S2,S3,S4,C3,C4,C5,D1,D2,D3,D4,D5,J1,J2,J3,J4,J5,J6,J7,J8 and J9. The Second Order CFA was performed and a factor model was found to be reasonable (χ^2 =414, df = 91, χ^2 / df =4.5, GFI=0.98, TLI = 0.96, CFI =0.99, RMSEA = 0.05) (TLI and CFI above .90 and RMSEA in between 0.05 -0.08).

CFA for goal orientation. The construct of 'Goal Orientation' is measured through three dimensions; mastery, perform, avoid fifteen items respective labelled by; G1, G4, G7, G10, G16, G2, G5, G8, G11, G14, G17, G3, G6, G9, and G15. CFA was performed and a factor model was found to be reasonable (χ^2 =485, df = 92, χ^2 / df =5.2, GFI=0.94, TLI = 0.91, CFI =0.92, RMSEA = 0.06) (TLI and CFI above .90 and RAMSEA in between 0.05 -0.08).

CFA for learning approach. Construct of 'Learning approach' is measured through two dimensions: deep and surface approach with fifteen items respectively labelled by; LA4,LA7,LA12,LA16,LA19,LA20,LA1,LA2,LA5,LA6,LA9,LA10,LA13, LA14 and LA18. CFA was performed and a factor model was found to be reasonable (χ^2 =157, df = 48, χ^2 / df = 3.2, GFI= 0.97, TLI = 0.95, CFI =0.93, RMSEA = 0 .05) (TLI and CFI above .90 and RAMSEA in between 0.05 -0.08).

CFA for implicit theories of intelligent. In this study, a general factor with second order was found. Construct of 'Implicit Intelligent' is measured through two dimensions: entity and incremental with seven items respectively labelled by; IM3, IM5, IM7, IM8, IM1, IM2 and IM4. CFA was performed and a factor model was found to be reasonable (χ^2 =85, df = 18,χ^2 / df = 4.7 GFI= 0.91, TLI = 0.95 , CFI = 0.92, RMSEA = 0 .06) (TLI and CFI above .90 and RAMSEA in between 0.05 -0.08).

CFA of self-efficacy. Construct of 'Self efficacy is measured through five items labelled by: EF1, EF2.EF3, EF4, EF5. CFA was performed and a factor model was found to be reasonable (χ^2 =1305, df = 307, χ^2 / df = 4.25, TLI =0.99, CFI =0.99, RAMSEA = 0 .05) (TLI and CFI above .90 and RAMSEA in between 0.05 -0.08)

Measurement Model Assessments

This section discusses the findings for the measurement model. As discussed earlier, the dimensions of the proposed model were reflective measurement model. Therefore, following the steps of evaluating reflective measurement model, the sub-scales of the model were evaluated. The details are provided in the following section.

To investigate the reliability of reflective constructs (sub-scales), Cronbach's alpha and composite reliability measures can be extracted by PLS-SEM. The current model was conceptually based on the determinants epistemological beliefs about science, goal orientations, learning approaches. Overall results of the items exceeded the value of 0.70. Similarly, the Cronbach's alpha value was 0.90, which was quite acceptable. All of the reflective items were found acceptable and reliable. Each construct was also briefly elaborated and discussed, individually. The details are included in the next section.

Teker (2011) recommended that the factor loading of 0.55 or bigger is an acceptable range for convergent validity. Factor loading of 0.55 can explain 30 % of the variance by its latent variable (Falk et al., 1992). However, Henseler et al. (2009) suggested 0.7 as a cut off value for acceptable loading. This means that a latent variable should explain about half of the variance in its indicator variable.

Measurement Model for Epistemological Beliefs. In the present study, epistemological beliefs were considered as second order hierarchal factor. Therefore, it was necessary to confirm the convergent and discriminant validity for both first order and second order. According to Becker et al., (2012), the convergent validity of the second order measurement model could be assessed through factor loadings, composite reliability (CR) and average variance extracted (AVE) (Hair Jr et al., 2016). Factor loading demonstrates the score of the variance shared among an item and factor.

Becker et al., (2012) also recommended that the factor loading of 0.55 or bigger is an acceptable range for convergent validity. Factor loading of 0.55 explains 30 % of the variance by its latent variable （Becker et al., 2012).

In the present epistemological beliefs measurement model, factor loadings for epistemological beliefs were in one general factor (range of 0.729-0.824). These high values demonstrated a strong evidence for the convergent validity of the model. The next step was the estimations of *CR* and *AVE* values. Usually, *CR* value depicts the degree to which the construct indicators reflect the latent construct, while *AVE* reveals the overall amount of variance in the indicators accounted for by the latent construct. In this present study, *CR* and *AVE* values were well above the recommended values of 0.7and 0.5, respectively (Hair Jr et al., 2016) Table 4.12 illustrates the factor loadings, *CR* and *AVE* values.

Table 4.12

Reliability of Reflective Constructs (Sub-Scales) Epistemological Belief

Construct	Items	Outer Loading	Cronbach's alpha	CR	AVE
SOU	5	0.745	0.75	0.78	0.68
CER	6	0.802			
DEV	6	0.824			
JUS	9	0.729			

Measurement Model for Goal Orientation. For goal orientations, factor loadings were in the range of 0.600-0.822, greater than the recommended value of 0.6 (Teker, 2011). Similarly, the higher values Cronbach's alpha, *CR* and *AVE* values confirmed the convergent validity (Hair 2006). Table 4.3 shows details of these values.

Table 4.13

Construct Reliability and Validity of Goal Orientation

Subscale	**Item Code**	**Loadings**	**Cronbach's Alpha**	**CR**	**AVE**
Mastery goal	G1	.806			
	G4	.754			
	G7	.747	0.77	0.70	0.69
	G10	.656			
	G16	.555			
Performance goal	G2	.768			
	G5	.728	0.72	0.73	0.72
	G8	.697			
	G14	.653			
Avoidance goal	G3	.680			
	G6	.719	0.70	0.71	0.73
	G9	.598			
	G15	.684			

Measurement Model for Implicit Theories of Intelligence. For implicit theories of intelligence, factor loadings were in the range of 0.659-0.821; greater than the recommended value of 0.6 (Chin 1998). Similarly, higher values Cronbach's alpha, *CR* and *AVE* values confirmed the convergent validity (Hair 2006). Table 4.4 shows details of these values.

Table 4.14

Construct Reliability and Validity of Implicit Theories of Intelligent

Item Code	Loadings	Cronbach's Alpha	CR	AVE
I1	.659			
I2	.664			
I3	.661			
I4	.694	0.72	0.81	0.72
I5	.675			
I6	.753			
I7	.838			
I8	.821			

Measurement Model for Self-efficacy. For self-efficacy, factor loadings were in the range of 0.617-0.790, greater than the recommended value of 0.6 (Chin 1998). Similarly, higher values Cronbach's alpha, *CR* and *AVE* values confirmed the convergent validity (Hair 2006). Table 4.5 shows details of these values.

Table 4.15

Construct Reliability and Validity of Self-efficacy

Subscale	Item Code	Loadings	Cronbach's Alpha	CR
Self-efficacy	EF1	.617		
	EF2	.790	0.81	0.89
	EF3	.771		
	EF4	.627		
	EF5	.753		

Measurement Model for Learning Approach. For learning approach, factor loadings were in the range of 0.611-0.785, greater than the recommended value of 0.6 (Chin 1998). Similarly, higher values Cronbach's alpha, *CR* and *AVE* values confirmed the convergent validity (Hair 2006). Table 4.6 shows details of these values.

Table 4.16

Construct Reliability and Validity of Learning Approach

Subscale	Item Code	Loadings	Cronbach's Alpha	CR	AVE
Deep	LA4	.679			
	LA7	.785			
	LA12	.690			
	LA15	.689			
	LA16	.721	0.85	0.93	0,92
	LA19	.681			
	LA20	.617			
Surface	LA7	.611			
	LA11	.613			
	LA12	.646			
	LA15	.641	0.82	0.91	0.87
	LA16	.611			
	LA19	.653			
	LA20	.677			

Discriminant Validity

Discriminant validity or divergent validity used to test whether concepts or measurements that are not supposed to be related are, in fact, unrelated. Campbell and Fiske (1959) introduced the concept of discriminant validity within their discussion on evaluating test validity. They stressed the importance of using both discriminant and convergent validation techniques when assessing new tests. A successful evaluation of discriminant validity shows that a test of a concept is not highly correlated with other tests designed to measure theoretically different concepts.

Although there is no standard value for discriminant validity, a result less than .85 tells us that discriminant validity likely exists between the two scales. A result greater than .85, however, tells us that the two constructs overlap greatly and they are likely measuring the same thing. In Table 4.17, the figures across the diagonal in bold represent the square root of the AVE values for the individual constructs. Other values represent the correlations some of the constructs. Discriminant validity for a specific construct is present if the diagonal value for that construct is greater than the strength of correlations the construct has with other constructs. The data in Table 4.17 imply that all the constructs satisfied this criterion, indicating that discriminant validity was satisfactory for all constructs.

Table 4.17
Discriminant Validity of Whole Model Constructs

Construct	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
ACH	**1.000**								
AVO	**0.119**	1.000							
DEE	0.203	0.478	1.000						
EFF	0.341	0.229	0.420	1.000					
EPIS	0.131	0.363	0.533	**0.523**	0.875				
IMP	-0.030	-0.020	0.288	**0.164**	0.224	0.890			
MAS	0.246	0.493	0.588	0.561	0.560	**0.203**	1.000		
PER	0.281	0.513	0.477	0.518	0.391	-0.004	**0.588**	1.000	
SUR	-0.095	0.073	0.035	0.007	0.155	0.148	0.025	**0.246**	**1.000**

Structural Model Assessments

The measurement models of epistemological beliefs, goal orientations, self-efficacy, implicit theory of intelligent and learning approach were examined in terms of reliability and validity. Second-order reflective - reflective construct was also validated by providing and comparing the second order construct with the alternative models. After the assessment of the measurement models, the next step was to evaluate the structural model (overall model).

The evaluation of the structural model which is also called the inner model, showed the hypothesized predictive or causal relationship between the latent variables in the study (Tenenhaus et al., 2005). The predictive relationships between the exogenous and endogenous latent variables were represented through the single-headed arrows. Variables that have arrows pointing towards them are called endogenous variables while variables that do not receive any arrows are called exogenous variables. Hair et al. (2013) recommended the criteria for the evaluation of the structural model in PLS-SEM. It includes an estimation of the significance of the path coefficients, level of R^2, f^2 effect size, predictive relevance Q^2, and q^2effect size. The details of each criterion are provided in the section below.

Significance and the Relevance of the Structural Model Path Coefficients. The assessment of the structural model requires the execution of bootstrapping. Using bootstrapping option, the results of path coefficient, t-value, and significance level were calculated for the current study. After bootstrapping, the t-value obtained was compared with the critical t-value at a certain selected level. If the t-value is higher than the critical t-value then the coefficient is significantly different from zero. The recommended critical t-values for two tailed tests are 1.65 (α=0.10), 1.96 (α= 0.05), or 2.58 (α= 0.01) (Hair et al., 2014). Figure 4.12 illustrates the results of path coefficient, t-value and significance level for all constructs.

An evaluation of the significant relevance of the proposed model was carried out after evaluating the significance of the relationships between the constructs. The relevance of the structural model relationship is essential for the interpretation of results (Hair et al., 2013). A significance of path coefficient using values was calculated for all variables to test the structural estimates.

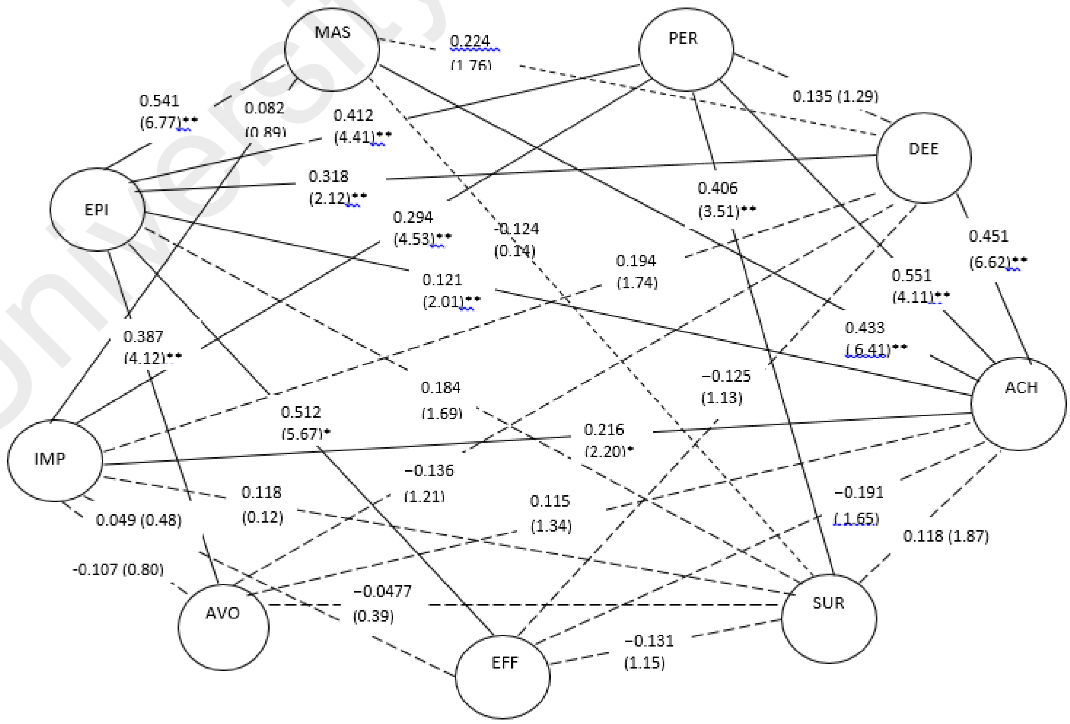

Figure 4.12. Results of path coefficient, t-value, and significance level for all constructs

Table 4.18

Significance Testing Results of the Structural Model Path Coefficients

Path	Path Coefficients	T-Values	P Values	Significance Level
AVO -> ACH	0.16	1.34	0.09	P > 0.05
AVO->DEE	-0.14	1.21	0.28	P > 0.05
AVO -> SUR	-0.05	0.39	0.69	P > 0.05
DEE -> ACH	**0.45**	**6.62**	**0.00**	**P <0.01**
EFF -> ACH	0.19	1.65	0.07	P>0.05
EFF-> SUR	-0.13	1.13	0.26	P > 0.05
PER -> ACH	**0.55**	**4.11**	**0.00**	**P < 0.01**
EFF->DEE	-0.16	1.13	0.26	P > 0.05
MAS -> ACH	**0.43**	**6.41**	**0.00**	**P < 0.01**
IMP->EFF	0.05	0.48	0.23	P> 0.05
EPIS ->AVO	**0.39**	**4.12**	**0.00**	**P < 0.01**
EPIS->SURF	0.18	1.69	0.29	p> 0.05
EPIS -> DEE	**0.32**	**2.12**	**0.00**	**P < 0.01**
EPIS ->EFF	**0.51**	**5.67**	**0.03**	**P < 0.05**
IMP -> DEE	0.19	1.74	0.08	P > 0.05
IMP -> MAS	0.08	0.89	0.37	P > 0.05
IMP -> PERF	**0.29**	**4.53**	**0.00**	**P< 0.01**
MAS -> DEE	0.22	1.76	0.08	P > 0.05
MAS -> SUR	-0.12	0.14	0.84	P > 0.05
IMP ->AVO	-0.11	0.80	0.20	P > 0.05
IMP-> SUR	0.12	0.12	0.82	P>0.05
EPIS->PERF	**0.41**	**4.41**	**0.00**	**P < 0.01**
EPIS->MAS	**0.54**	**6.77**	**0.00**	**P < 0.01**
EPIS-> ACH	**0.12**	**2.01**	**0.04**	**P <0.05**
IMP->ACH	**0.22**	**2.20**	**0.03**	**P < 0.05**
PER ->DEE	0.14	1.29	0.20	P > 0.05
PER -> SUR	**0.41**	**3.51**	**0.00**	**P <0.01**
SUR -> ACH	0.12	1.87	0.32	P>0.05

The epistemology beliefs showed the highest contribution (β = 0.54, t-value (6.77 >1.96, $p<.01$)) to review the influence of variables on science achievement followed by deep approach (β = 0.45, t-value 6.62>1.96)) and mastery goal (β = 0.43, t-value 6.41>1.96)). It was also revealed that among the remaining constructs, performance goal (β = 0.22, t-value (3.52>1.96)), and implicit of intelligence (β = 0.21, t-value (2.20>1.96)) had relatively a greater influence on science achievement compared to the avoidance goal and mastery goal.

Regarding the influence of exogenous variables, the implicit of intelligence (β = 0.29, t-value (4.53>1.96)) and epistemology beliefs (β = 0.41, t-value (4.41>1.96)) showed a significant direct effect on the performance goal. Epistemological beliefs (β = 0.54, t-value (6.77>1.96)) showed a direct significant effect on mastery goal, whereas, the implicit of intelligence did not show any direct significant effect towards mastery goal. Results also revealed that in order to avoid the goal, both epistemology beliefs and implicit of intelligence did not show a significant direct path.

Analysing the direct path towards the learning approach, it was observed that epistemology beliefs (β = 0.32, t-value (2.12>1.96)) and implicit of intelligence (β = 0.42, t-value (6.03>1.96)) had shown significant path coefficients to the deep approach, whereas, the remaining paths were not significant towards the surface approach.

Coefficient of Determination R^2. The corrected R^2 value in the figure refers to the explanatory power of the predictor variable(s) on the respective construct. The coefficient of determination, R^2, was used to analyse how differences in one variable can be explained by a difference in second variable. The coefficient of determination is similar to the correlation coefficient, R. The correlation coefficient formula will show a strong linear relationship between the two variables in this study. Thus, the coefficient of determination R^2 is considered as a measure of the predictive accuracy of a model and calculated as the squared correlation between the dependent construct and the predicted values (Hair et al., 2013). The coefficient of determination will take a per cent in this study. With regards to model validity, Chin et al. (2010) classified the endogenous latent variables as substantial, moderate or weak based on the R^2 values of 0.67, 0.33, or 0.19, respectively. The R^2 value gives an idea of how many data points fall within the results of the line formed by the regression equation. The higher the coefficient, the higher percentage of points the line passes through when the data points and line are plotted. The values of 1 or 0 would indicate the regression line that represents all or none of the data respectively. A higher coefficient is an indicator of a better goodness of fit for the observations.

For the current study, the R^2 value for science achievement construct was 0.50 (moderate) which indicated that 50% of the variance in this construct was explained by factors such as epistemology beliefs, implicit intelligence, mastery, performance, avoidance goal, learning approach, and self- efficacy.

Further analysis revealed that both the mastery and performance goals with R^2 value 0.692 and 0.662 were of the high effect, while avoidance goal and surface contributed a very small percentage (10.6% and 1.3%) representing the weak effects. Furthermore, the R^2 value for deep was 0.425 representing the moderate effects. Overall, the model explained that 50% of the variance for achievement, which was described as nearer to substantial endogenous latent variable.

Table 4.19

Systematic Evaluation of PLS-SEM Results

Construct	AVE	R^2	GoF=$\sqrt{(AVE*R^2)}$
Achievement	1.000	0.500	
Avoidance goal	0.5558	0.106	
Deep	0.5828	0.425	
Self-efficacy	0.5704	0.232	
Surface	0.7101	0.013	0.5317
Mastery goal	0.6024	0.692	
Performance goal	0.5033	0.662	
Epistemological	0.7566		
Implicit of intelligence	1.000		

Goodness of Fit (GoF). Goodness of Fit (GoF) index is defined as the geometric mean of the average communality and average R^2 for all endogenous constructs (Tenenhaus et al. 2005). It can be used to determine the overall prediction power of the large complex model by accounting for the performance of both measurement and structural parameters. According to Chin et al. (2010, p. 680), "The intent is to account for the PLS model performance at both the measurement and the structural model with a focus on overall prediction performance of the model". Though the index is suitable for evaluating reflective indicators, however it can be applied for formative indicators knowing the fact that it would increase the productiveness of the inner model at the cost of the outer model (Chin 2010).

As such, in this study, GoF index is applied for both reflective and formative latent variables in a complex case as it provides a measure of overall fit (Vinzi et al. 2010). This index is suggested by Tenenhaus et al. (2005) for assessing the global validity of PLS based complex models. As Tenenhaus et al. note (p. 173), "As a matter of fact, differently from SEM-ML, PLS path modelling does not optimize any global scalar function so that it naturally lacks an index that can provide the user with a global validation of the model (as it is instead the case with χ^2 and related measures in SEM-ML). The GoF represents an operational solution to this problem as it may be meant as an index for validating the PLS model globally".

The GoF index is bounded between 0 and 1. Because of the descriptive nature of GoF index, there is no inference based criteria to assess its statistical significance (Vinzi et al. 2010). However, Wetzels et al. (2009) suggest using 0.50 as the cut off value for communality (Fornell and Larcker 1981) and different effect sizes of R^2 (Cohen 1988) to determine GoF_{small} (0.10), GoF_{medium} (0.25) and GoF_{large} (0.36). These may serve as baselines for validating the PLS based complex models globally.

For the model depicted in Fig.4.3, this study obtains a GoF value of 0.5317, which exceeds the cut-off value of 0.36 for large effect sizes of R^2 (Cohen 1988). It indicates that the model has a better prediction power in comparison with the baseline values (GoF criteria). This finding adequately validates the complex PLS model globally. It may be noted that GoF index can be estimated for PLS path modelling.

Henseler and Sarstedt (2012) show that the GoF may be useful for a PLS multi-group analysis (PLS-MGA) when researchers compare the PLS-SEM results of different data groups for the same PLS path model. GoF provides an operational solution to this problem to validate the PLS model globally. Several other researchers also recommended the calculation of goodness of fit (GoF), prior to the structural model estimates (Anderson et al., 1988). PLS cannot generate itself overall goodness of fit indices. Therefore, in this study, a diagnostic tool known as the GoF is normally used to assess the model fit (Tenenhaus et al., 2005).

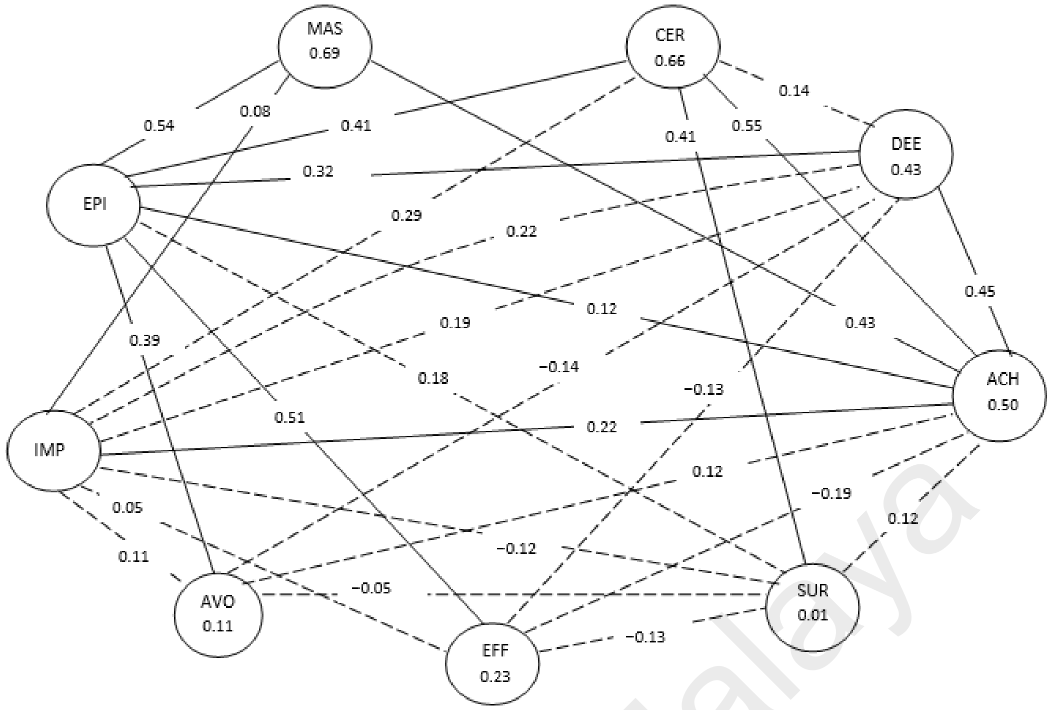

Figure 4.13. Overall structural model showing path coefficients and R^2values

The GoF is typically measured using the geometric mean of the average communality (AVE) and the average R^2 (for endogenous constructs). The equation represents the GoF.

$$GoF = \sqrt{AVE \times R^2}$$

Predictive Relevance. In addition to the size of R^2, the predictive sample measure technique (Q^2) can effectively be used as a criterion for predictive relevance (Stone 1974; Geisser 1975; Fornell and Cha 1994; Chin 2010). Based on the blindfolding procedure, Q2 evaluates the predictive validity of a large complex model using PLS. While estimating parameters for a model under the blindfolding procedure, this technique omits data for a given block of indicators and then predicts the omitted part based on the calculated parameters. Thus, Q^2 shows how well the data collected empirically can be reconstructed with the help of model and the PLS parameters (Fornell & Cha 1994).

Q^2 can be obtained using two different types of prediction techniques, that is, *cross* validated communality and cross validated redundancy. The first one is obtained by predicting data points using latent variable score, whereas the latter one is obtained by predicting the questionable blocks using the latent variables used for prediction. Chin (2010) suggests using the latter to estimate the predictive relevance of a large complex model.

Q^2 is generally estimated using an omission distance of 5-10 under existing PLS software packages. The rule of thumb indicates that a cross validated redundancy $Q^2 > 0.5$ is regarded as a predictive model (Chin 2010). For illustrative purposes, this study estimates cross validated redundancy Q^2 of a large complex model depicted in Fig. 4.12.

In this model, Science achievement is predicted by 8 latent variables. Among all the latent variables, deep, self-efficacy, performance, mastery were found significant. The study obtains a Q^2 of 0.636 which is indicative of a highly predictive model (see Fig.4.12) This finding indicates that prediction of observables or potential observables is of much greater relevance than the estimation of what are often artificial construct parameters (Geisser 1975).

In addition to it, the predictive sample reuses technique that was also used for predictive relevance (Q^2) (Akter et al., 2011; Chin, 2010). Based on the blindfolding procedures, Q^2 evaluates the predictive validity of a complex model by omitting data for a given block of indicators and then predicts the omitted part based on the calculated parameters. The blindfolding procedure can be regarded as a re-sampling process that specifies and deletes data points of the indicators in a systematic way to predict the measurement model of reflective dependent constructs (Hair et al., 2013). Since Q^2 value can be extracted and calculated for reflective dependent constructs only, that is the reason why the researcher used the blind folding to specify the omission distance of (D= 7).

$$f^2 = \frac{R^2}{1 - R^2}$$

For this study, Q^2 was obtained using cross-validated redundancy procedures as suggested by Chin (2010). As shown in Q^2values for avoidance goal, mastery goal, performance goal, deep, self-efficacy and surface were 0.106, 0.547, 0.717, 0.542, 0.636 and 0.213 respectively.

Earlier, Fornell et al. (1981) suggested that a Q^2 value greater than 0 means the model has predictive relevance, whereas a Q^2 value less than 0 means otherwise. Comparing current study values with Fornell et al. (1981) guidelines, this study revealed that all of these values were above zero; indicating acceptable predictive relevance.

Besides evaluating the magnitude of the R^2 values as a criterion of predictive accuracy, it can also examine Stone-Geisser's Q^2 value (Stone, 1974; Geisser, 1974) as a criterion of predictive relevance. The Q^2 value is obtained by using the blindfolding procedure. The blindfolding procedure is only applied to latent constructs with a reflective measurement model specification.

Blindfolding is a sample re-use technique that starts with the first data point and omits every d-th data point in the endogenous construct's indicators. Then, the procedure estimates the PLS path model parameters by using the remaining data points. The omitted data points are considered missing values and treated accordingly when running the PLS-SEM algorithm (e.g., by using mean value replacement). The resulting estimates are then used to predict the omitted data points. The difference between the true (i.e., omitted) data points and the predicted ones is then used as input for the Q^2 measure.

Blindfolding is an iterative process. In the next iteration, the algorithm starts with the second data point and omits every d-th data point and continues as described before. After d iterations, every data point has been omitted and the model estimated. When PLS-SEM exhibits predictive relevance, it accurately predicts the data points of indicators in reflective measurement models of endogenous constructs and endogenous single-item constructs (the procedure does not apply for formative constructs). In this structural model, a Q^2 value larger than zero for a certain reflective endogenous latent variable indicate the path model's predictive relevance for this particular construct.

Estimation of Effect Size (f^2). As the dependent variable is continuous, an effect size in the *d* family of standardized mean differences might be considered first. This effect size measure has been used elsewhere in the context of multivariate mixed-effects regression models using repeated measures of subjects, for example mean differences in an outcome across groups (Friedmann et al., 2008); however, it is inadequate for the current research question for the following reasons. First, it is a comparison of groups and thus requires the independent variable of interest to be categorical. While effect sizes of different assessment waves may be of tangential interest to the research topic, the primary question relates to the continuous variables of smoking quantity and nicotine dependence. Second, standardized mean differences cannot determine local effect sizes, that is, individual effect sizes of particular variables within a multivariate model that includes other categorical and continuous independent variables.

Cohen's f^2 (Cohen, 1988) is appropriate for calculating the effect size within multiple regression model in which the independent variable of interest and the dependent variable are both continuous. Cohen's f^2 is commonly presented in a form appropriate for global effect size:

However, the variation of Cohen's f^2 measuring local effect size is much more relevant to the research the effect size (f^2) is the assessment of R^2 in a case when a particular independent construct is removed from the model. It evaluates the impact size of the removed independent construct on the dependent construct (Hair et al., 2013). Since in the present model, dependent/endogenous variables were predicted by more than one predicting/exogenous variable. In such a situation, effect size was important.

According to Cohen (1988), a f^2 value up to 0.02 shows a small effect, a f^2 value of 0.15 shows a medium effect and a f^2 value of 0.35 shows a large effect. In the current model, the predicted f^2vales for the achievement were 0.002, 0.004 (which were lower than .02), 0.046, 0.013, 0.141, 0.112, 0.020 and 0.118 for avoidance goal, deep, self-efficacy, surface, mastery goal, performance goal, epistemology beliefs and implicit intelligence respectively. From the f^2 values it was revealed that mastery and performance goal has the medium effect while the self-efficacy, surface, epistemology and implicit intelligence effect is nearer to medium effect and the avoidance goal and deep have relatively very small effects.

Goodhue et al. (2007) suggested that small f^2 does not necessarily imply an unimportant effect. If there is a possibility of occurrence for the extreme moderating conditions and the resulting beta changes are meaningful, then it is important to take these situations into account. Similarly, when the f^2 values of epistemology beliefs and implicit theories of intelligence towards the mediating variables (mastery goal, performance goal and avoidance goal) were considered. It was revealed that in predicting mastery goal and performance goal, the high effect of f^2 values are 0.409 and 0.103. However, in the case of avoidance goal, the small effect of science achievement was observed (0.06).

Similarly, implicit theories of intelligence has contributions of 0.178 towards mastery. Moreover, medium size contributions were observed from implicit theories of intelligence towards performance and avoidance goals (0.010 and 0.013). Likewise, implicit theories of intelligence and epistemology beliefs have relatively medium effects on learning approach (0.139, 0.142).

In the next step, a recommended bootstrapping with 5,000 iterations was performed to examine the statistical significance of the weights of sub-constructs and path coefficient (Chin 2008). Details of the model is provided in the figures below. It was noticed that all direct paths were significant. These results have already been discussed in the previous section. After investigating direct effect, mediation path was analysed. Details of indirect or mediation path are provided below.

Table 4.20

Predictive Relevancy (Q^2) and Effect Size (f^2)

Constructs	Q^2	f^2 (MAS)	f^2 (PER)	f^2 (AVO)	f^2 (EFF)	f^2 (LA)	f^2 (ACH)
AVO	0.106	-	-	-	0.001	0.004	0.002
DEE	0.542	-	-	-	-	-	0.004
EFF	0.636	-	-	-	-	-	0.046
SUR	0.213	-	-	-	0.011	-	0.013
MAS	0.547	-	-	-	-	0.043	0.141
PER	0.717	-	-	-	0.027	0.078	0.112
EPI	-	0.409	0.193	0.066	0.345	0.139	0.020
IMP	-	0.178	0.010	0.013	0.003	0.142	0.118
ACH	0.636						

Table 4.21

Structure Estimates for Direct Paths of the Complete Model

Path name	**β**	**SE**	**T Values**	**P Values**
EPI ->ACH	0.14	0.02	2.01	0.04
IMP ->ACH	0.47	0.08	6.22	0.00
MAS ->ACH	0.43	0.10	6.41	0.00
PER ->ACH	0.32	0.06	4.11	0.00
AVO ->ACH	-0.12	0.05	1.98	0.04
EFF ->ACH	0.19	0.05	2.65	0.00
DEE ->ACH	0.45	0.09	6.62	0.00
SUR->ACH	-0.03	0.02	0.36	0.01

Table 4.22

Structural Estimates (Hypothesis Testing) for Mediation Model 1

Mediation	**β**	**SE**	**T Value**	**P VValue**	**Findings**
EPI -> MAS-> ACH	0.23	0.02	2.56	0.01	Partial Mediation
EPI -> PER-> ACH	0.14	0.01	2.07	0.00	Partial Mediation
EPI ->AVO-> ACH	0.08	0.01	3.43	0.03	Partial Mediation
IMP ->PER -> ACH	0.09	0.03	2.48	0.01	Partial Mediation
IMP -> MAS -> ACH	0.57	0.07	5.84	0.04	Partial Mediation
IMP ->AVO-> ACH	-0.02	0.00	-0.86	0.39	No Mediation

Table 4.23

Structural Estimates (Hypothesis Testing) for Mediation Model 2

Mediation	β	SE	T Value	P Value	Findings
EPI ->DEE-> ACH	0.10	0.01	2.14	0.03	Partial Mediation
EPI ->SUR->ACH	-0.02	0.01	-0.77	0.44	No Mediation
IMP ->DEE-> ACH	0.09	0.03	2.48	0.01	Partial mediation
IMP->SUR-> ACH	0.01	0.02	0.63	0.42	No Mediation

Table 4.24

Structural Estimates (Hypothesis Testing) for Mediation Model 3

Mediation	β	SE	T Value	P Value	Findings
EPI ->EFF-> ACH	0.25	0.07	3.00	0.00	Partial Mediation
IMP ->EFF-> ACH	0.02	0.01	0.05	0.13	No Mediation

Table 4.25

Structural Estimates (Hypothesis Testing) for Mediation Model 4

Mediation	B	SE	T Value	p value	Findings
PER->DEE-> ACH	0.05	0.07	1.99	0.04	Partial Mediation
PER ->SUR->ACH	0.06	0.07	0.99	0.32	No Mediation
MAS ->SUR -> ACH	0.01	0.02	0.61	0.54	No Mediation
AVO->DEE ->ACH	0.10	0.01	1.53	0.13	No Mediation
AVO ->SUR-> ACH	0.05	0.06	1.86	0.04	Partial Mediation
MAS ->DEE->ACH	0.10	0.08	1.41	0.16	No Mediation

Table 4.26

Structural estimates (hypothesis testing) for mediation model 5

Mediation	**β**	**SE**	**T Value**	**p value**	**Findings**
EFF -> DEE -> ACH	0.07	0.09	**2.07**	**0.05**	**Partial mediation**
EFF ->SUR -> ACH	0.03	0.23	0.70	0.63	No mediation

Mediation Models

The full mediation model was run using Smart PLS software Version 3.2.4 and the parameters were predicted by using performing a method called bootstrapping. Before calculating, the estimates on the usage of the programme, 'Bootstrap' in the 'Analysis Properties' was modified. This was done by setting the 'Number of bootstrap samples' to 5000 and the 'Bias-corrected confidence interval' to 95% in the user-interface of the Smart PLS software Version 3.2.4. Before attending to the research questions and hypotheses and direct and indirect relationships; some of the variables in the full structural equation model had been examined to get an expertise of the mediating relationships among them. Figure 4.5 shows the path coefficients (standard regression coefficients) within the complete structural equation model, highlighting the paths that are statistically significant at $p<.05$ level. The two-path specific indirect effects in the full structural model were calculated using Sobel's (1986) formula while the indirect effects of the overall path were calculated using a biased-corrected bootstrapping approach.

Estimates and predictions of the overall structural model were highly encouraging. However, the model was quite complex due to the various latent variables representing the mediating role. To examine the in-depth effects of each mediator, the following mediating models were considered and evaluated.

1. Epistemological beliefs and implicit of intelligence → Goal orientations → Science achievement
2. Epistemological belief and implicit of intelligence → learning approach → Science achievement
3. Epistemological belief and implicit of intelligence → self-efficacy → Science achievement
4. Self-efficacy → learning approach → Science achievement

5. Goal orientation → learning approach → Science achievement

The details of each mediating model are provided in the following sections.

Mediation model 1: Epistemology Beliefs and Implicit Theories of Intelligence to Science Achievement via Goals Orientation. To investigate the mediating role of goal orientation between epistemological beliefs and science achievement and implicit of intelligence, the structural estimates for mediation effects were calculated. Table 4.12 illustrates the estimation results of indirect path between epistemological beliefs to science achievement via goal orientations. It was observed that mastery goal (β = 0.23, t = 2.56, p<0.01), performance goal (β= 0.14, t = 2.07, p<0.01), and avoidance goal (β= 0.08, r=0, 34, p<0.05) played a partial mediation role with respect to science achievement. Furthermore, mastery goal (β = 0.57, t = 5.84, p<0.05) and performance goal (β= 0.09, t = 2.48, p<0.01) also had a partial mediation role with respect to implicit of intelligence. Regarding avoidance goal, no significant mediation role was observed in the implicit of intelligence. Figure 4.15 illustrates the mediation model involving the epistemological beliefs, goal orientations, and science achievement.

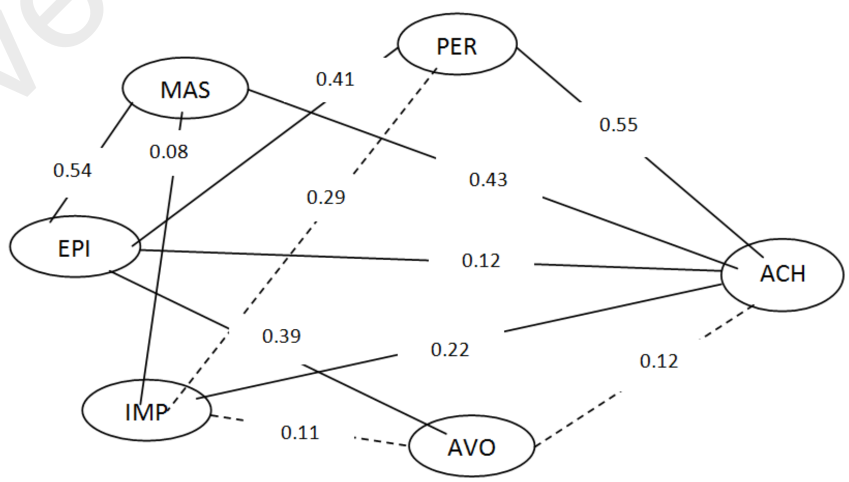

Figure 4.14. Structural estimates (hypothesis testing) for mediation model 1

Mediation model 2: Epistemological Belief and Implicit of Intelligence to Science Achievement via Self-efficacy. To examine the mediating role of self-efficacy, mediating model estimations were calculated. This model comprises epistemology beliefs and implicit theories of intelligence, self-efficacy to science achievement. Table 4.14 illustrates the estimation results. It was observed that self-efficacy played partial mediation role with respect to epistemology beliefs (β= 0.057, t= 2.10, p< 0.05) only, No such effects were observed from implicit theories of intelligence. Figure 4.7 illustrates the mediation model involving epistemological beliefs and implicit theories of intelligence to science achievement via self-efficacy.

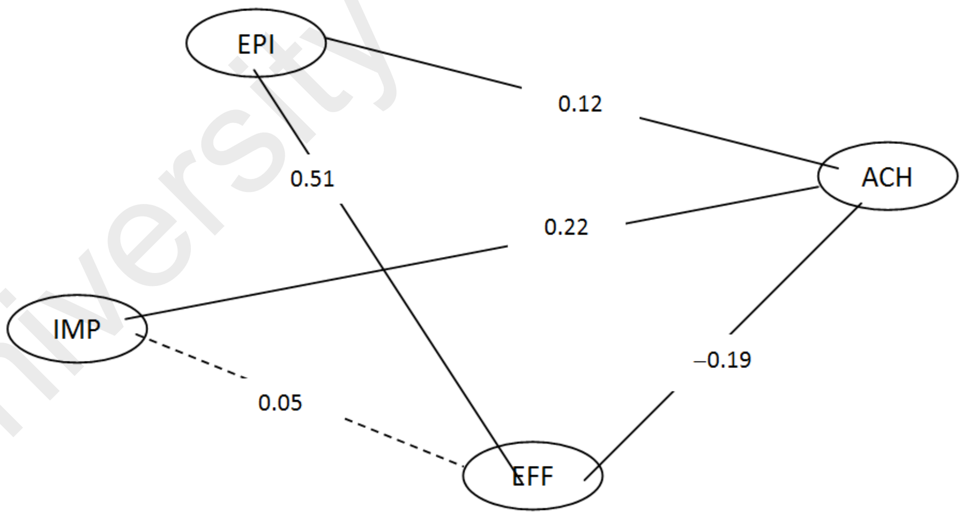

Figure 4.15 Structural estimates (hypothesis testing) for mediation model 2

Mediation model 3: Epistemological Belief and Implicit Theories of Intelligence to Science Achievement via Learning Approach. To examine the mediating role of learning approach, mediating model estimations were calculated. This model comprises epistemology beliefs, implicit theories of intelligence, learning approach and science achievement. Table 4.13 illustrates the estimation results. It was observed that learning approach and deep approach only played partial mediation role with respect to epistemology beliefs ($\beta = 0.098$, $t = 2.14$, $p < 0.05$) and implicit theories of intelligence ($\beta = 0.09$, $t = 2.48$, $p < 0.05$). No such effects were observed from surface approach. Figure 4.14 illustrates the mediation model involving epistemological beliefs and implicit theories of intelligence to science achievement via learning approach.

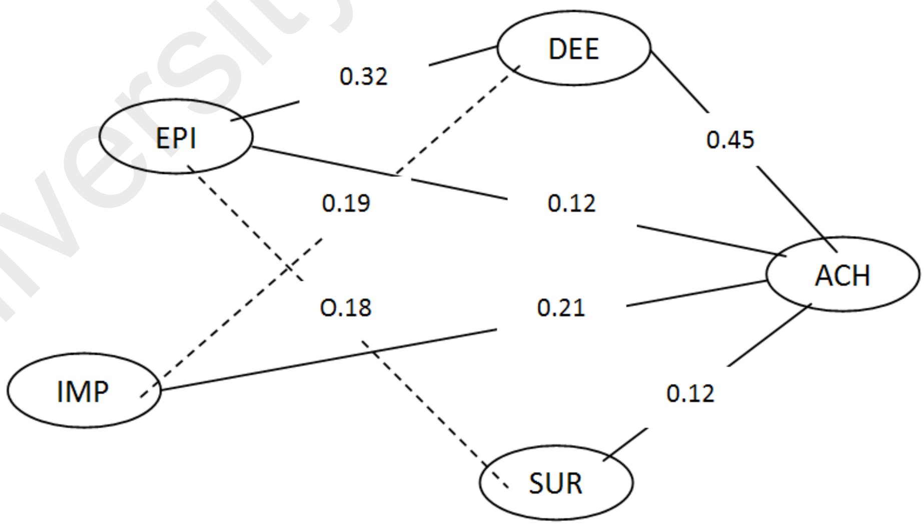

Figure 4.16. Structural estimates (hypothesis testing) for mediation model 3

Mediation model 4: Goal Orientation to Science Achievement via Learning Approach. To examine the mediating role of learning approach, mediating model estimations were calculated. This model comprises goal orientation, learning approach and science achievement. Table 4.15 illustrates the estimation results. It was observed that deep approach played a partial mediation role with respect to performance goals ($\beta = 0.47$, $t = 1.99$, $p < 0.05$) and surface also played partial mediation role to avoidance goals ($\beta = 0.05$, $t = 1.86$, $p < 0.05$). No such effects were observed from other parts. Figure 4.16 illustrates the mediation model involving goal orientation to science achievement via learning approach.

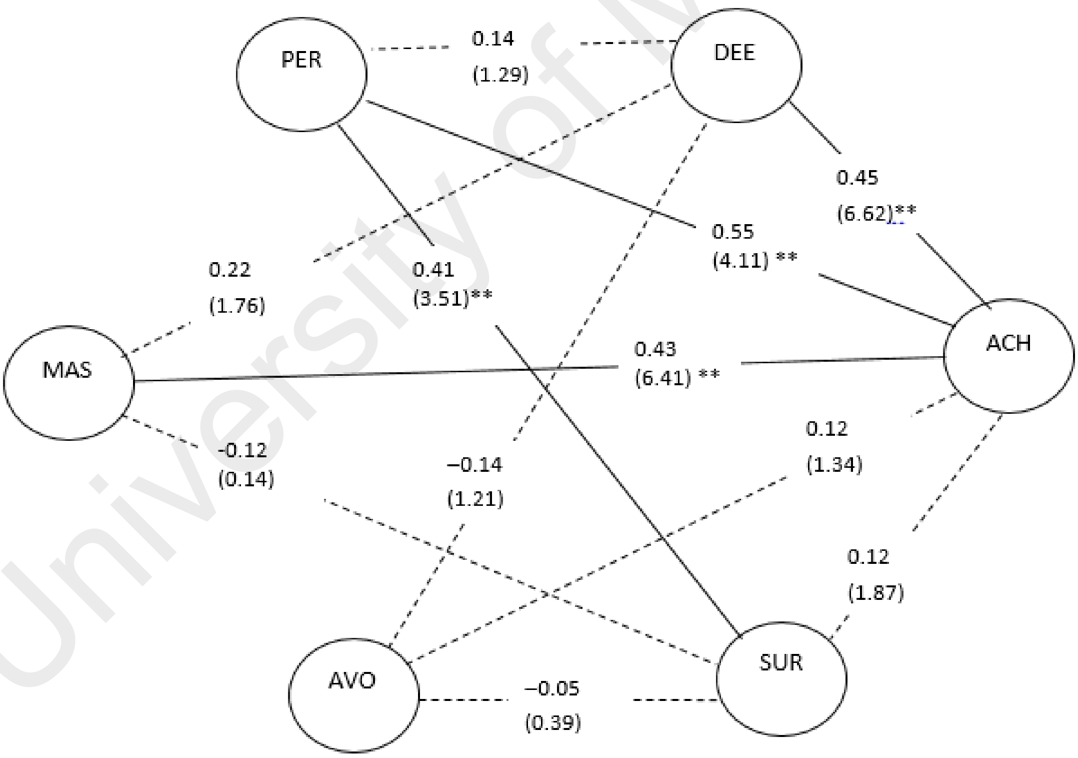

Figure 4.17 Structural estimates (hypothesis testing) for mediation model 4

Mediation Model 5: Self-efficacy to Science Achievement via Learning Approach. To examine the mediating role of learning approach, mediating model estimations were calculated. This model comprises self-efficacy, learning approach and science achievement. Table 4.16 illustrates the estimation results. It was observed that deep approach, played a partial mediation role with respect to self-efficacy (β= 0.07, t= 2.07, p< 0.05). No such effects were observed from surface approach to self-efficacy. Figure 4.17 illustrates the mediation model involving self-efficacy to science achievement via learning approach.

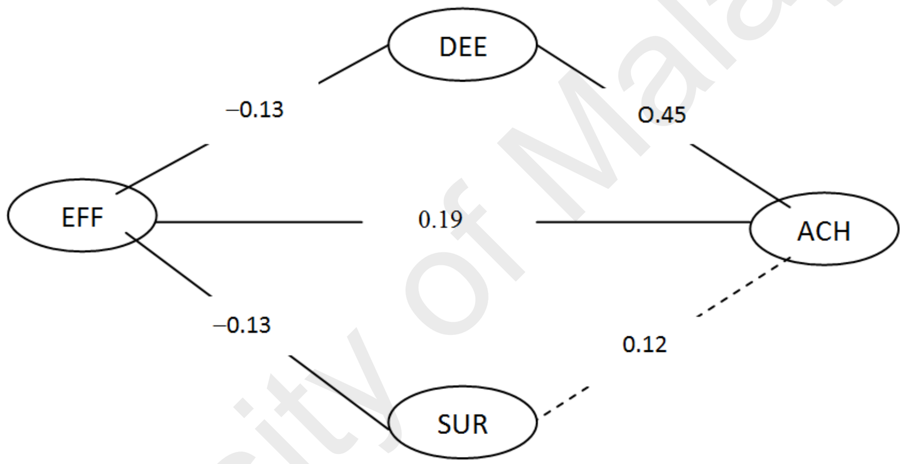

Figure 4.18. Structural estimates (hypothesis testing) for mediation model 5

Summary

The findings of this chapter were further compared and discussed briefly with literature reported values and results. Based on these findings, implications were furnished. The detail are provided in chapter 5.

CHAPTER 5

SUMMARY, IMPLICATION AND CONCLUSION

INTRODUCTION

This chapter include the introduction, the research hypotheses , limitations of the study, theoretical and practical contributions of the study's findings, directions for future research and main conclusions drawn from the present study. This chapter presents evaluation and discussions of the results and their relevance with hypothesized research objectives. The present study has five main research objectives: 1) to examine whether epistemological beliefs, self-efficacy, implicit intelligence, and learning approach are related to students' science achievement. 2) To examine whether goal orientations play a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement. 3) To examine whether self-efficacy plays a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement. 4) To examine whether learning approach plays a mediating role between epistemological beliefs, implicit theories of intelligence, and science achievement. 5) To examine whether learning approach plays a mediating role between goal orientation and science achievement. 6) To examine whether learning approach plays a mediating role between self -efficacy and science achievement.

Evaluation & Discussion of the Findings with respect to Research Questions

Research question 1 : Do Epistemological Beliefs, Implicit Theories of Intelligence, Self-Efficacy, Goal Orientations and Learning Approach Directly Affect Science Achievement.? To evaluate the first question, eight hypotheses "Epistemological beliefs, implicit theories of intelligence, self-efficacy, goal orientations and learning approach directly affect Science achievement" were divided into the following sub-hypothesis.

H-1.1 Epistemological beliefs have positive direct effects on Science achievement

H-1.2 Implicit theories of intelligence have positive direct effects on Science achievement

H-1.3 Mastery goal has positive direct effects on Science achievement

H-1.4 Performance goal has positive direct effects on Science achievement

H-1.5 Avoidance goal has negative direct effects on Science achievement

H-1.6 Self-efficacy has positive direct effects on Science achievement

H-1.7 Deep approach has positive direct effects on Science achievement

H-1.8 Surface approach has negative direct effects on Science achievement

Findings and discussion of first and second sub hypothesis. The findings of the first and second sub hypothesis (H-1.1 and H-1.2) revealed that both epistemological beliefs and implicit theories of intelligence strongly affected Science achievement. Details of these results are provided in table 4.24. It was observed that implicit theories of intelligence had relatively large effects on Science achievement as well as epistemological beliefs. Current results confirmed that students with positive perceptions of implicit theories of intelligence and epistemology beliefs have higher Science achievement.

The findings of the first sub hypothesis (H-1.1) well supported both of the concerned theories and literature. Several researchers have investigated the influence of epistemological beliefs about knowledge and learning on educational process (Schommer- Aikins et al., 2005; Schommer-Aikins et al., 2003; Schommer-Aikins et al., 2002; Schommer, 1994 , 1993b). For example, students who believe in certainty of knowledge probably generate absolute conclusions (Schommer, 1994), whereas, students holding uncertain believes admit multiple perspectives and willingly revise their thinking (Schommer-Aikins et al., 2002). In addition, strong believers in quick and fixed beliefs do not employ study strategies and are expected to believe that mistakes expose their inadequacy (Schommer- Aikins et al., 2005). Consequently, these students feel troubled and are more likely to give up when faced with difficult problems, because strong believers in fixed ability are anticipated to believe that mistakes expose their inadequacy. As a result, they may feel more perturbed and more probable to give up in the face of difficulty (Schommer, 1994).

The findings of the second sub hypothesis (H-1.2) were also well supported by Theory of Dweck's (1999) motivation model, in which implicit theories of intelligence and goal orientations are related. These findings are also consistent with research that has been conducted in a performance-oriented learning environment (e.g., Shih, 2007) about the relationship between implicit theories of intelligence and achievement goals. Implicit theories of intelligence, incremental views were positively related to both mastery and performance goals, while entity beliefs were positively related to predict avoidance goals.

Implicit theories of intelligence have also been used more narrowly in academic subject areas including Science (Chen & Pajares, 2010). Present study supported that by using Dweck's (1999) implicit theories as a basis for predicting students' beliefs , it can be predicted that students with entity views of ability think that their ability remains the same throughout their lifespan, and that hard work does not improve their knowledge. In contrast, students with incremental views of ability believe that they can increase and develop their ability by studying, which in turn is related to their ability to perform well in the Science domain. Students who believe Science ability is malleable through effort and hard work tend to expend more effort in Science and achieve better outcomes than students who believe Science ability is fixed or unchangeable (Middleton & Spanias, 1999). However, the role of beliefs in Science achievement across studies were participants drawn from different educational levels. Therefore, the present study confirmed the role of students' beliefs in their Science ability.

Findings and discussion of third, fourth and fifth sub hypothesis. Similarly, evaluating the third to fifth sub hypothesis, it was noticed that both mastery and performance goals positively affected science achievement. It was observed that mastery goal, had relatively larger effect as compared to performance goal. Similarly, avoidance goal also had significant but negative estimates towards Science achievement.

According to achievement goal theory, goal orientations provide a frame work for interpretation and reaction to tackle a situation or event(Dweck & Leggett, 1988). This framework assumed that people's differences in selecting various goals are related to their achievement behaviours that lead to different emotional, motivational, cognitive and behavioural outcomes. Within this framework, an approach goal further comprises the achievement motivation and active avoidance characteristics. Learners influenced by their achievement motivation are able to learn and complete a task due to their willingness to outperform. Whereas, active avoidance mediates learners simply to withdraw from learning in order to avoid revealing their inability in front of others.

Therefore both mastery and performance goals represent positive motivational factors that swift learners use to invest consistent efforts, while avoidance goal is a part of active avoidance and it represents an impassive and negative motivational attitude that may impose destructive effects on learning (He, 2004).

The present study aligned with the theory of initial goal theory suggests that there are two general goal orientations and, although there are slight theoretical variations between authors in the definition of these labels, they will be referred to here as mastery and performance goals for clarity. A mastery goal orientation reflects an emphasis on learning and understanding, whereas a performance orientation focuses on demonstrating competence in relation to others. Nonetheless, for several years some authors have reported that the effect of performance goals differs according to self-perceptions and research has shown that mastery and performance goals are not necessarily mutually exclusive. In fact, the desire to reach a high level of achievement is not always incompatible with the pursuit of high levels of master and performance goals, which can have some positive functions.

Results of current study were well aligned with the study of Wolters et al. (1996), who reported that the adoption of mastery goals positively related to achievement. In addition, these results were also well supported by several others researchers (Kaplan et al., 2002; Midgley et al., 2001), in which mastery goals are thought to be most beneficial for all students across socio-emotional, cognitive, and achievement outcomes. However, the findings of a few studies were opposite to this study (Elliot et al., 1997; Skaalvik, 1997). Authors have reported a null relationship between mastery goal and achievements. The reason might be the conjunction of performance and mastery goals had resulted into some positive outcomes such as cognitive engagement but it might not be beneficial for other outcomes (e.g., help seeking). Similarly, the present study revealed that performance goals had positive effect on the science achievement. The previous findings of several researchers were well supportive of the findings of the present study, claiming that performance goal-oriented students can perform well(Elliot et al., 1997; Middleton et al., 1997). However, few studies also exist, which reported no relationship between performance goals and performance (Butler, 1993; Button et. al.,., 1996; Coutinho, 2007). In the case of avoidance goals, the direct effect was observed significant but negative. Findings also contradicted few studies, reporting a null relationship between these variables (Elliot et al., 1997; Kingir et al., 2013).

Findings and discussion of sixth sub hypothesis. In the findings of H1.6, it was noticed that self-efficacy positively affected the science achievement. In line with the theory, self- efficacy beliefs affected students" academic attainment due to the effects they produce through four "psychological processes (Bandura, 1993) namely, the cognitive, motivational, and affective and selection processes.

Current literature supports self-efficacy, as predictors of academic success (Bandura, 2002, 2006; Coutinho & Neuman, 2008; Hodges, Stackpole-Hodges, & Cox, 2008; Zimmerman & Schunk, 2003). In line with the theory, self- efficacy beliefs affect students' academic attainment due to the effects they produce through four "psychological processes (Bandura, 2003) namely, the cognitive, motivational, and affective and selection processes. These findings might bear significant implications for both teaching and learning: if one assumes that students' self-beliefs constitute a critical force in their academic achievement, might it not be that enhancing the quality of learning would necessarily go through understanding the nature of self-related epistemological beliefs that students develop about their learning in a given discipline and developing remedial strategies to correct distorted and narrow learned self-beliefs.

Following this thread of thought, might it not be also that the wide scope of low-quality outcomes recorded in some learning situations in education results from some negative, self-limiting ideas that students might hold about their abilities.

The current result is also supported by Bandura's (2006) social cognitive theory which provides the self-efficacy potential factors of learners' academic success in the current study. Bandura's (2006) key component of successful learning is self-efficacy, which refers to learners' confidence in their ability to call upon the necessary meta cognitive behaviours to complete a given learning task.

Findings and discussion of seventh and eighth sub hypothesis. Similarly, evaluating the seventh sub hypothesis, it was noticed deep approach also had positive effects on Science achievement as well as surface approach. Strategies as such reflects surface learning which somehow is an indication of students' ability to demonstrate academic competency. In Malaysia, the tendency to adopt surface learning among university students can be related to the continuity of the learning approach commonly practiced at the secondary school level which is predominantly characterized by memorizing and repeating procedures for the purpose of examinations. Malaysia as in most countries, places a lot of emphasis on academic qualifications. (Md. Yunus et al. 2006)

These results were also seen consistent with the study of Fadlelmula et al. (2015), who have claimed that learning strategies is significantly related to achievement. Authors also explained that applying limited sets of learning strategies might contradict the previously reported findings. Therefore, the present study, (Ablard et al. 1998) reported that some high-achieving students succeed without the use of learning strategies.

According to the theory of development, students should be able to deploy meaningful learning strategies and use a deep approach to learning. A crucial question is then, what student perceptions of the curriculum, teaching methods, and assessment procedures, in other education systems, as well as teachers, bring about such a drop in deep-approach scores? The answer to this question, which may imply a criticism of our education systems, lies outside the scope of this study, but is addressed in numerous other investigations. Although the student usually has predominant or preferred learning approaches, these may be influenced by features of the learning context, such as course contents, assessment, or the teacher's conceptions of teaching (Entwistle & Ramsden, 1983; Entwistle et al., 2001). In consequence, learning approaches deployed by students may well reflect the quality of the education they are receiving (Biggs, 2001), which in many countries appears to leave much to be desired.

Overall, it was confirmed that students applying learning approaches showed higher ability to achieve better results in science achievement.

Research question 2: Do Goal Orientations Play a Mediating Role among Epistemological Beliefs, Implicit Theories of Intelligence and Science Achievement?

To evaluate the second research question, the second hypothesis "Epistemological beliefs, implicit theories of intelligence and Science achievement" was divided into the following sub-hypothesis;

H-2.1 Mastery goals play a mediating role between epistemological beliefs and Science achievement.

H-2.2 Performance goals play a mediating role between epistemological beliefs and Science achievement.

H-2.3 Avoidance goals play a mediating role between epistemological beliefs and Science achievement.

H-2.4 Mastery goals play a mediating role between implicit theories of intelligence and Science achievement.

H-2.5 Performance goals play a mediating role between implicit theories of intelligence and Science achievement.

H-2.6 Avoidance goals play a mediating role implicit theories of intelligence and Science achievement.

The second set of research hypotheses investigated the mediating role of goal orientation among epistemology beliefs or implicit theories of intelligence and Science achievement. The findings revealed that epistemological beliefs and implicit theories of intelligence strongly affected Science achievement via mastery and performance goals. However, the effect of avoidance goals in both variables were noticed non-significant and negative.

As per first sub-hypothesis, mastery goals played a mediating role between epistemological beliefs and Science achievement. The mastery goals results were quite significant and confirmed that mastery goal-oriented students had better Science achievement. The findings revealed that one of the clearest, most consistent patterns to emerge from the achievement goal literature is the positive relationship between mastery goals and intrinsic motivation (Furner & Gonzalez-Dehass, 2011).

From the previous findings, mastery goals have been linked to a number of cognitive and metacognitive study strategies presumed to enhance performance (Burgress, 2010). Mastery goals seem as likely to prompt the perusal of interesting but peripheral material as they are to induce intensive study of information central to course objectives; optimal processing of peripheral material is of little benefit at examination time.

Similarly, results of performance goals confirmed the mediating role of performance goals between epistemological beliefs and Science achievement. Studies in which all of the items in the performance goal assessments are positively framed, (i.e., performance-approach measures) tend to document null or positive relationships for Science achievement (Ciani & Sheldon, 2010). Findings showed that performance-approach goals are presumably undergirded by both achievement motivation and fear of failure, and it is likely that intrinsic motivation would be facilitated by performance-approach goal processes emanating from achievement. It is similar with a number of achievement theorists that have portrayed fear of failure as an inhibitor of effort and performance when unaccompanied by achievement motivation but a facilitator of effort and performance when accompanied by achievement motivation (Clayton & Auld, 2010). Given that performance-approach goals are presumably undergirded by fear of failure coupled with achievement motivation (as well as a high competence expectancy), it is likely that they would promote rigorous and persistent study behaviour that eventuates in high levels of achievement. Furthermore, like mastery goals, performance-approach goals (i.e., those assessed with positively framed items) have been linked to study strategies presumed to facilitate performance (Barvarz & Ahmadi, 2014), and the focus on normative outcomes inherent in this form of regulation should keep study efforts channelled toward (testable) material that will yield performance dividends.

Therefore, in the present study we expected performance-approach goals to have a positive influence on science achievement and the results which are also based on that.

Regarding avoidance goals, conversely, non-significant estimates were found for avoidance goal between epistemological beliefs and Science achievement. As the theory explained avoidance goals are presumed to be grounded in fear of failure and low competence expectancies. As such, these forms of regulation are likely to elicit threat appraisals, evaluative anxiety, and vigilant attention to failure-relevant information (Burgress, 2010), processes that exude self-protection concerns and avoidance tendencies antithetical to the very nature of intrinsic motivation (Deci, 1975; White, 1959). In this context, Science academic performance is also likely to be undermined by these and other self-protective and avoidance-based processes emanating from fear of failure, such as strategic withdrawal of effort, self-handicapping, and procrastination (Furner & Gonzalex, 2011). In the present study, it is expected that avoidance goals have a uniformly negative effect and graded performance.

Overall, mediations results were well supported by related literature. The literature provided evidence that epistemology beliefs, achievement goals orientation, and implicit theories of intelligence as predictors of academic success are contributing factors of academic success (Elliot & Harackiewicz, 1996; Harackiewicz, Barron, & Elliot, 1998; Meece, Blumenfeld, & Hoyle, 1988) . However, there is a gap in the literature that identifies and links implicit theories of intelligence, epistemology beliefs, and achievement goals orientation to students' academic performance (Dweck & Leggett, 1988; Elliot & Harackiewicz,, 2002). In the present study, students who believed they could attain competence in an achievement situation would orient towards the possibility of success and adopt approach achievement goals (mastery and performance-approach), whereas individuals with low expectancies would orient towards the possibility of failure and adopt a performance-avoidance goal.

The findings of the hypothesis “H-2.4 and H-2.6” were partially supported by several studies. In mastery goal playing a mediating role between implicit theories of intelligence and Science achievement, previous research has shown that incremental ability of implicit theories of intelligence predict mastery goals (Shih, 2007; Was, 2003).

In the case of implicit theories of intelligence, a partial mediation was observed via mastery and performance goals. Results showed that mastery goals had relatively more significant mediation results as compared to performance goals, whereas, no mediation was observed via avoidance goals illustrating the mediation model involving goal orientations and science achievement.

The present study supported that, students higher in learning goal orientation set goals that reflect a desire to master material, gain knowledge, and develop skills. Students higher in prove-performance goal orientation set goals to demonstrate their ability to others. Finally, those higher in avoid-performance goal orientation set goals to avoid negative judgments from others. Prior research has shown that learning goal orientation tends to have the most beneficial effects on performance outcomes whereas avoid-performance goal orientation tends to have the most detrimental effects on performance outcomes (e.g., Payne et al., 2007). In examining goal orientation as two dimensions, Button et al. (1996) found learning goal orientation to be positively related to performance whereas performance goal orientation was unrelated to performance. After separating performance goal orientation into two dimensions, research has found avoid-performance goal orientation to be negatively correlated with performance outcomes (Payne et al., 2007). This supports Dweck’s (1999) idea that learning goals, regardless of a person’s confidence in his or her own ability, should encourage a person to seek challenges and persist in the pursuit of these challenges.

Thus the study initially hypothesized that entity and incremental theory if intelligence will have distinct effects on a specific achievement goal orientation while the use of achievement goals like mastery goals results in better achievement. However, the results did not support all hypothesized effects especially in avoidance goal. From the results, we can see in the academic setting, implicit theories of intelligence influence how students approach their learning and achievement, the goals student adopt, and the effort student expend in their work (Dupeyrat & Marine, 2005).

Research Question 3: Does Self-efficacy Play a Mediating Role among Epistemological Beliefs, Implicit Theories of Intelligence and Science Achievement?

To evaluate the third research question, the proposed third hypothesis "Epistemological beliefs, implicit theories of intelligence have positive indirect effect on science achievement via self- efficacy" was divided into the following two sub-hypothesis;

H-3.1 Epistemological beliefs have positive direct effect on Science achievement via self-efficacy

H-3.2 Implicit theories of intelligence have positive direct effect on Science achievement via self-efficacy

The findings of this study revealed that epistemological beliefs were strongly affected via self-efficacy. However, with implicit theories of intelligence no significant effects were observed.

This result supports the previous findings like Zimmerman (2000) who claims that self-efficacy of students and their self-confidence associated with learning and performance are crucial for their educational achievement. Some authors believe that students with higher self-efficacy achieve higher level and attempt to focus on mastery goals. Hsieh, Sullivan, & Guerra, 2007), perceive their learning as challenges/tasks that are interesting and valuable and apply reasonable learning strategies (Greene et al., 2004). These results were also aligned with previous studies like McIlroy et al. (2015) relying on results of researches that consider self-efficacy the strongest predictor of academic results and its direct influence on academic achievement. The authors agreed on a uniform naming of that phenomenon – academic self-efficacy basically because of a wide scope of the concept of self-efficacy and its specific focus precisely on education. Detailed information about this aspect of self-efficacy are provided by Schunk & Pajares (2002) who indicate that academic self-efficacy reflects a student's perception of own competences with respect to tasks within the academic environment.

The findings showed that students are not insensitive to the outcomes of their learning which are some implicit assumptions they hold about the nature of knowledge and learning. (Phan, H.P, 2013) Knowing the type of outcomes that students expect from their results would be telling since it is often the case that students regulate the level and the distribution of their effort in accordance with the effects and the impacts they believe will accrue from their performance.

Therefore, teachers should help them develop positive explanations about their academic results in science since the way students react or feel about their performance and the kind of evaluative interpretation they develop about it influence the level of their academic attainment in the future. They should help them to be more reliant on self-efficacy on the one hand, to avoid what leads to irrational thinking (Pintrich & Schunk, 2003) and on the other hand, to develop in training them to assess their outcomes in reference to their own personal targets rather than comparing their results with those of their classmates. (De Andrés, V., 1999; Pajares, 2003; Pajares & Schunk, 2001)

Tesearch Question 4: Do Epistemological Beliefs and Implicit Theories of Intelligence Play a Mediating Role to Science Achievement via Learning Approach?

To evaluate the sixth question, the fourth hypothesis "Epistemological beliefs and implicit theories of intelligence to Science achievement via learning approach" was divided into the following sub-hypothesis.

H-4.1 Epistemological belief has positive indirect effect on Science achievement via deep learning

H-4.2 Epistemological belief has positive indirect effect on Science achievement via surface learning

H-4.3 Implicit theories of intelligence has positive indirect effect on Science achievement via deep learning

H-4.4 Implicit theories of intelligence has positive indirect effect on Science achievement via surface learning

It was observed that learning approach and implicit theories of intelligence had effects on science achievement ($\beta = 0.09$, $t = 2.48$, $p < 0.05$). No effect was observed from surface approach. The findings of this study revealed only deep approach played partial mediation role with respect to epistemology beliefs and implicit theories of intelligence. It was observed that deep approach played partial mediation role with respect to epistemology beliefs and implicit theories of intelligence while surface approach does not mediate the relationship between epistemology beliefs or implicit theories of intelligence.

It can be drawn from the study that epistemological beliefs and implicit theories of intelligence are not only influenced by the learning context, but are also closely connected to various pedagogical approaches and to the different teaching goals of teachers. For example, if teachers think that "knowledge is simple", they will tend to conceive of learning as a repetition and rehearsal of isolated pieces of information

(Brownlee et al., 2009). Whereas, if teachers think knowledge is uncertain and evolving, and does not encourage deep learning approach, then it is more likely that they will carefully assess what they read and learn for meaning, which will then influence how they solve problems. In general, before secondary students enter university; their epistemological beliefs are influenced in school by experience with (mostly) traditional teaching and instruction, in which teachers provide explanations or solutions to problems instead of guiding students to solutions and understanding on their own terms. A possible reason for the less adequate epistemological beliefs held by teachers at the beginning of their training might be that their own teachers also held these beliefs. It was surprising to find that greater experience in scientific methods and thinking seemed to bear no consequence on their beliefs. It is not clear whether this might have been also due to the influence of traditionally orientated teachers or if the experiences gained in the advanced science courses were not strong enough to have an influence.

Research question 5: Does Learning Approach Play a Mediating Role among Goal Orientation and Science Achievement? To evaluate the fourth research question, the proposed fourth hypothesis "goal orientations have positive indirect effect on differential equation problem solving via self-regulated learning (SRL)" was divided into the following six sub-hypothesis;

H-5.1 Mastery goals have positive indirect effect on Science achievement via deep learning

H-5.2 Mastery goals have positive indirect effect on Science achievement via surface learning

H-5.3 Performance goals have positive indirect effect on Science achievement via deep learning

H-5.4 Performance goals have positive indirect effect on Science achievement via surface learning

H-5.5 Avoidance goals have negative indirect effect on Science achievement via deep learning

H- 5.6 Avoidance goals have negative indirect effect on Science achievement via surface learning

The findings of this study revealed that deep approach had a mediation role for both mastery and performance goals. However, no such effect was observed for avoidance goals. The detailed results of mediation effects for this model are provided in Table 4.28. Findings of the current study showed that deep learning approach partially mediate the relationship between goal orientations in mastery goal and performance goal results. Surface approach does not mediate the relationship between performance, mastery or avoidance goals.

In the findings for mastery goals, the present study in line with He (2004), empirically proved that mastery goals contributed to learning strategies. Recently, Fadlelmula et al. (2015)also investigated the interrelationships among students motivational beliefs such as achievement goal orientations, self-efficacy, perception of class room goal structure), use of learning strategies and achievement. Among achievement goals only mastery goals was significantly related to use of learning strategies and science achievement. Hence, it could be concluded that when students value learning for its own sake and focus on expanding their skills, they tend to use more learning strategies and hence became successful in science. Several other researchers also reported that only mastery goals predicts deeper level strategies (Elliot et al., 2001; Elliot et al., 1999 ; Yumusak et al., 2007). In contrast to literature, the current study results showed that performance goals were also linked to learning approaches. Students, who tried to outperform others, used more strategies to achieve better results in studying science. These findings are in line with the study of Kadioglu et al. (2014), where performance goals linked to learning approaches.

Hence, it can be concluded that students who are taught and attempt to make sense of it, connect information and thinking into the topic. They look for the overall meaning and attempt to process information in a holistic way. The students manage to develop their own interpretation of the content by integrating it with their existing knowledge. It helps to develop students' critical analysis and encourages long term retention of concepts. The results also showed that students with performance goals look at the significance of what they are being taught and attempt to make sense of it, connecting information and thinking into the topic. They look for the overall meaning and attempt to process information in a holistic way. The students develop their own interpretation of the content by integrating it with their existing knowledge. They develop critical analysis and long term retention of concepts. Deep learning is valued and fostered by educators.

The findings for avoidance goal was consistent with Fadlelmula et al. (2015) research findings. The authors reported that students who avoid looking incompetence may not use more learning strategies nor get achievement in science. Kadioglu et al. (2014) also claimed that avoidance goals is not a significant predictor of learning strategies. Goal theorists posited that once learners adopt an avoidance goal, they became passive and pessimistic about their learning and tend to withdraw from learning and as a result, learning approaches do not happen (He, 2004).

The present findings concluded that students in Malaysia focus upon details and only parts of the information were deemed important. They emphasized upon memorizing individual details or pieces of information in a way to signify enough comprehension to complete the assignment. For them, tasks are treated as an imposition or a hurdle to be gotten over. They focused on 'what do I need to do to pass?' Learning may be more superficial and not promote understanding. Students may focus on unconnected facts that they believe they will need to reproduce later in an assessment such as an examination.

Science educators have considered the importance of these motivational factors, and hence suggested that these factors alone are not enough for fostering students' science achievement. Rather, it is the use of deep learning strategies which mediate the association between motivational factors and science achievement. Furthermore, regarding indirect relation, Barron et al. (2001) suggested that optimal achievement outcomes may occur when students pursue both mastery and performance goals together, because when they have the option of pursuing both types of goals they can better negotiate their achievement experiences by focusing on the achievement goal that is more relevant at a particular time.

Research Question 6: Does Learning Approach Play a Mediating Role among Self-Efficacy and Science Achievement? To evaluate the fifth question, the hypothesis "learning approach play a mediating role among self-efficacy and Science achievement" was divided into the following sub-hypothesis:

H-6.1 Self-efficacy has positive indirect effect on Science achievement via deep learning

H-6.2 Self-efficacy has positive indirect effect on Science achievement via surface learning

The findings of this study revealed that deep approach has a mediation role for self-efficacy and no such effect was observed for surface approach.

It can be drawn from the study that studies on self-efficacy and student learning approaches have confirmed that perceived self-efficacy have impacts on students' achievement. Similar with the works done by (Weber et al., 2013), Bandura and others (Bandura, 1989) confirmed the influence of academic self-efficacy on academic success and persistence with the mediation of learning approach. Many previous studies examined the influence of academic climate and some individual variables, for example, academic self-efficacy in the educational institutes in order to determine what main factors may affect both students' performance and achievement level. Overall, we can see that self-efficacy beliefs also motivate students' use of learning strategies (Weber et al., 2013).

In the findings for self-efficacy and student approach, the present study in line with Bandura (1997) described both general, stable aspects and task-specific, malleable aspects of self-efficacy. Generalized self-efficacy reflects a person's beliefs about his or her capabilities across situations. Thus, this aspect of self-efficacy is stable and trait-like; it is neither specific to a task nor likely to change quickly. Task-specific self-efficacy reflects an individual's beliefs about how likely it is that he or she will be able to perform a specific task at a specific level. This aspect of self-efficacy is state-like and is subject to change as one practices and learns the task. With stable self-efficacy, students treated the study materials as a structure of meaning, try to understand the content critically and look for its implications and underlying concerns. Therefore, students who adopt deep learning approach tend to relate new facts to their previous knowledge and link them to known concepts and principles.

Prior research has shown that people with higher self-efficacy for a given task set more difficult goals and perform better on that task than those lower in self-efficacy (e.g., Zimmerman, Bandura, & Martinez-Pons, 1992). In general, research has shown that self-efficacy is positively related to performance (e.g., Judge, Jackson, Shaw, Scott, & Rich, 2007; Stajkovic & Luthans, 1998). Self-efficacy is important to goal-setting in several regards, one being that individuals who are lower in self-efficacy might not pursue certain goals. That is, the lack of belief that one can accomplish something will prevent an individual from setting a difficult goal or being committed to the goal (Locke & Latham, 2002). Another aspect is that when individuals set their own goals, goal level varies as a function of self-efficacy. Those higher in self-efficacy will naturally set more difficult goals for themselves (e.g., Zimmerman et al., 1992). Those lower will set more easily attained goals. Further, those higher in self-efficacy are more committed to the goals that they set, they discover and use better task strategies to accomplish these goals, and they respond more positively to negative feedback than do those who are low in self-efficacy (e.g., Zimmerman et al., 1992). In support of the idea that people with different goal orientation levels might choose to set different difficulty goals depending on their confidence in their own ability to complete a task, VandeWalle, Cron, and Slocum (2001) found that self-efficacy and goal level mediated the effects of goal orientations on performance.

Limitation of the Study

This study was conducted in view of the following limitations: This study is concerned with the linear relationship among constructs related to student achievement. The objective of the research endeavour is to create a prediction equation. However, it is important to interpret the findings based on some limitations associated with the study. It is vital to recognize weaknesses that are associated with this study to avoid interpreting beyond the data.

The first limitation is related to the measurement of the independent variables. One weakness of the current study is that it relies on questionnaires in order to gather data. Unfortunately, directly observing motivational constructs in this study is impossible therefore necessity requires that the data collection method of this study involves the use of self-report instruments to measure the constructs of interest. Based on this limitation, a critical stage in this research is a discussion of the psychometric properties of these instruments. Ensuring that instruments utilized in this research are reliable and valid is of vital importance. While the instruments have some limitations, they were carefully chosen based upon the selection criterion of having advantageous psychometric properties. For example, reliability and validation studies have been performed on instruments utilized in this study.

A second limitation of the current study involves how the dependent variable was operationally defined. The research utilizes motivational variables in order to predict grade point average. However, some readers may consider GPA to be a rather narrow view of academic achievement. Those readers may be interested in or advocate a broader view of academic performance involving dimensions such as: how individuals make use of academic material in real world settings, how active the learning is in the environment, and how the individual applies the learning to new school settings.

The third limitation with regards to the method of the research revolves around the inability to make causal conclusions from the results of the study. A multiple-regression approach is utilized in this study. This method is advantageous because it allows the constructs of interest to be studied in the naturalistic environment in which the behaviour occurred. This method allows researchers to study the linear relationships between variables while this statistical analysis allows for prediction; it is important recognizing that this study had a critical limitation. The limitation of correlational methods is that they do not allow researchers to make causal statements regarding the variables of interest in the study.

The fourth limitation with regards to the method of the research is generated from the random nature of the sample utilized in the study. This random sample restricts what types of statistics can be discussed in the current research. Because of the limitation, this study reports descriptive statistics and not inferential ones. Therefore, confidence intervals (which estimate parameters), p values, and statistical significance are not cited in the results or discussion section of this document.

Fifth, this correlational study does not infer causal relationships and the independent variables were not manipulated. The intent of this study is to examine the relationships between the variables to the Science result to identify the predictors of' academic success.

Sixth, survey responses may not accurately reflect learners' intended responses due to misinterpretation of questions, indecisiveness or halo effect. The researcher made every effort to ensure that the survey consisting of three pre-existing instruments was clearly written in understandable and clear language. However, one of the instruments used in the survey contained an ambiguous term, which resulted in inaccurate responses due to misinterpretation. Although the participants were encouraged to honestly self-report their Science scores and responses, this does not guarantee the prevention of intentional or unintentional inaccurate responses.

Seventh, this study is limited in that the student sample size which was relatively small. Since student performance was measured by GPA, students who participated in the study were required to identify themselves by name. Some were not willing to do this, and thus caused a number of non-respondents in each group. This study examined only four dimensions within the academic climate, as these dimensions play a vital role in the education system of Malaysia. Other dimensions, which were not covered within this study include: exam structure and teaching approaches. This research relied on a questionnaire as a measurement tool. There is some debate on whether questionnaires can be depended on as effective measures in the field of organizational behaviour.

Eighth, A suitable choice of sample size and cluster sampling from from urban and rural areas would enable to generalize the findings of this research to most of the Malaysia students, studying at secondary level. In addition, by comparing and confirming the demographic information with the institutional data about participants may be helpful to delimitate the error in self-reporting data.

Contributions of Study

The results of applying structural linear equation analysis to the proposed model make few clear contributions to work carried out to date in this area. It reflects results encountered by other authors and sheds new light onto this field of investigation. A major contribution of this study was the empirical test of the theoretical-conceptual model combining variables derived from the expectancy-value theory, social-cognitive model, SD theory and attribution to predict the science achievement.

The results indicated that epistemological beliefs, self-efficacy, implicit theories of intelligence, learning approaches and goal orientation strongly affected students' achievement in Science. In the second phase of the study, mediation roles were identified and the findings revealed that epistemological beliefs strongly effected Science achievement via mastery performance, but the effect of avoidance goal was non-significant and negative. While considering the mediation effect of self-efficacy, results revealed that self-efficacy played partial mediation role with respect to epistemological beliefs, but no such effect was observed from implicit theories of intelligence. In learning approach, deep approach only played a partial mediation role with respect to epistemological beliefs, implicit of intelligence, performance goals and self-efficacy while surface approach played a partial mediation role to avoidance goal only. On the whole, it can be concluded that epistemological beliefs, goal orientations (both mastery and performance goals) and deep approach can be effectively employed to boost the students' Science achievement and to ensure that teaching and learning of science may become more effective and excellent. The data of this study provided support for the hypothesized model, in that the fit statistics were satisfactory although some of the hypothesized relations among variables were found to be not significant.

Findings showed that learning approaches also significantly influence science performance. In keeping with conclusions reached in other investigations, students who study with a surface approach to learning tend to perform poorly, while with deep-approach students, the opposite is generally the case. These results enable to extend to all secondary education and academic performance in general, the results concerning specific subjects reported by other researchers. However, deep approach does not mediate mastery goals and achievement. Two facts may explain this: (1) this factor was the last to emerge in the factor analysis, that is, it accounted for the lowest percentage of the variance; and (2) it obtained the lowest reliability coefficient, where high reliability is an essential requisite when analysing variables using AMOS.

The initial learning approach students used in their past classes seems to have a strong impact on how they approached learning in their present courses .Students with successful experiences with assessments focusing on surface (Gijbels, Segers, & Struyf 2008) approaches earlier in their education might not be able to adapt to deeper learning strategies (Gijbels et al., 2008). In addition, our results appear to indicate that the assessment did not strongly motivate the evolution of belief structure, nor did experience and knowledge have an effect on beliefs. The beliefs held seemed to work as a "reference frame" (Helmke, 2003) through which the pre-service teachers filtered all input that did not match their beliefs. Further, it may be the case that beliefs are not challenged enough to provoke a conceptual change. That said, it is almost impossible to 'change a teacher'; they can only change themselves on the basis of the needs and interests they experience (Huibregtse, Korthagen, & Wubbels, 1994), with their beliefs becoming more stable the longer they are part of the pre-service teachers belief system (Pajares, 2001). Teacher education at university seems to also not support a trend toward more adequate beliefs. Past experiences pre-service teachers may have had before university seem to have a greater impact on their belief system than the knowledge gained and experienced at university (Kagan, 1992, *Brauer, H., Wilde, M.* Gustafson & Rowell, 1995).

Researchers in science education have taken a social-constructivist approach to belief change that accounts for the development of science beliefs in terms of socio science (Yackel et al., 1996). They argue that if classroom practices are a major factor in the development of beliefs, it is plausible that significantly altering those environments can foster positive science-related beliefs. Hence, Verschaffel et al. (1999) recommended teachers to implement more constructivist-oriented classroom environment.

There is a crucial aspect which has not yet been thoroughly considered in research on epistemology beliefs that situational demands are the initiating factors that shape students' individual perceptions which, in turn, form the adoption of different goal orientations or goal orientations finally lead into variance in students' use of learning strategies. These arguments are critical because they illustrate the dynamic interplay between social, motivational, and cognitive factors that influence learning behaviour (Somuncuoglu & Yildirm, 1999). The findings of this study explained that students' achievement goal orientations and learning strategies use are context-specific traits rather than general traits.

The findings also revealed that the education department has to work directly to try to enhance the depth of learning approaches and the complexity of epistemological beliefs, as a way of improving academic achievement (a proactive strategy). In practice it would probably need to put into practice aspects of both strategies. If teachers enhance learning, teachers must not lose sight of the fact that approaches are not simply student characteristics.

Approaches are influenced by the whole teaching–learning system, and inextricably related to three of its components: aims, teaching, and assessment. To bring about improvements in learning, naturally it will not be enough to tell students what they should believe or what approach they should adopt. The author agrees with those authors who assert that the three abovementioned components should all be aligned in the same direction for the improvement of academic practice. Biggs (2001, p. 93) writes that, 'It is easy to see why aligned teaching should encourage deep learning. The curriculum is stated in the form of clear objectives, which include the level of understanding required. The teaching methods are chosen that are likely to realize those objectives and assessment should be criteria on referenced optimizing the likelihood that students will engage the appropriate learning activities'. Entwistle et al. (2001) state that in order to improve academic practice, both students and staff, as part of the teaching–learning system, should be encouraged to match the meaning of concepts (e.g. approaches in learning and teaching) to their everyday 'experience in ways that promote reflection' (p. 133). In our opinion, one of the results of our study, that is, the change in students' metacognition as they progress through secondary education, could also favour this alignment and reflection in teaching and learning. Teachers and educators in general could tap into this meta-cognitive change in order to facilitate students' constructive learning processes, thereby reducing the institutionalization of learning.

As Braten, I., & Stromso, H. I.(2005) suggested, epistemological beliefs should be included in models of learning. Based on these findings, researchers have sought to integrate a multidimensional model of epistemological beliefs with other cognitive and affective models of learning (Hofer, 2004; Hofer, B. & Pintrich, P., 1997; Muis, 2007;

Schommer-Aikins, 2004). Similar suggestions were also projected by Schommer, M.(1994). The author linked these beliefs with motivational and cognitive factors (Schommer, 1994 ; Schommer, M., Crouse, A., & Rhodes, N. 1992). Students who hold more availing epistemological beliefs are more likely to adopt a mastery goal orientation to learning and engage in material more deeply (Schutz, P., Pintrich, P., & Young, A. 1993). The study of Hofer, B.K. (2004) also showed that students' beliefs were related to cognitive, motivational, and achievement factors. There is a positively correlation between beliefs and with intrinsic motivation, self-efficacy, and goal orientations, learning approaches as well as with science achievement.

Implications of the Study

The findings of the present study have provided several important implications for curriculum designers and teachers, particularly in science education. These implications may provide insight into the following aspects:

Implications for Curriculum. The Ministry of Education and institutions may refer to the findings of this study in adding motivational variables in terms of science learning. It is researcher's contention that the concern for student's intellectual development should not be dissociated from concern for their social and psychological well-being. Indeed, one of the major objectives of education, in this area of tremendous development in motivation of learning science, should be thus developing student's self-efficacy.

This study contributes empirically in terms of the addition of five motivation variables in science achievement. The variables introduced in this study was epistemology belief, implicit theories of intelligent, goal orientation, self-efficacy as well as learning approach The inclusion of the new contextual variables to be the moderator in the relationship between science achievement resulted from the finding from the previous study highlighted at the earlier stage of the study. This is as well in response to a Ministry of Education (MOE) Malaysia's Conference, which pointed out many dimensions of motivational and items included in the existing literature were not being tested in a structural context.

This research developed and empirically tested the motivational variables and secondary school students' science achievement in the Malaysian context. The existing and new variables, as well as new paths, which have been proposed. As such, this study expands the existing theoretical understanding of the relationships of the motivation variables in a single model. This study offers new insights of research through the analysis of the model of factors affecting. Unlike previous studies, this study's impact is not limited to a single context but rather advances the literature more broadly the impact of the continuous motivational development and the contextual constrains in a single study.

Besides course content, teaching style and instructional approaches, perceptions about science, learning strategies, purpose or goal of learning also affect teaching and learning of science (Biza, I., Giraldo, V., Hochmuth, R.,Khakbaz, A., & Rasmussen, C. 2016). Findings of the current study also confirms that epistemological beliefs and implicit theories of intelligence, self-efficacy and learning approaches influence science achievement. Therefore, teachers and educators must design their instructional strategies by incorporating the students' epistemological and motivational beliefs as well as learning approaches for the effective learning of science. Science teachers can utilize the findings of this study in assessing the students' science ability.

In addition, education department may apply these findings for assessing the students' 'science ability' in other parts of calculus or science. The adaption of beliefs particularly motivational beliefs in studying science is neither easy nor automatic. Many students may have little motivation for science tasks or to pursue a goal, while others' depend only on extrinsic motivation. Therefore, differential class room practices should be changed to facilitate adaptive science, promote interest and appreciation of task and also foster the adoption of motivation and of learning approaches. To enhance students' motivation and interest and utilization of learning approaches, class environment should be interactive and self-motivated, and also have an atmosphere of inquiring, exploration, and discovery.

The findings provided qualified support that students' epistemologies have effect on cognition effect, and ultimately student achievement and learning, because they are effect on how individuals comprehend, monitor their comprehension, solve problems, and persist in the face of challenging tasks. The present study showed that epistemological beliefs are one of the most critical components of understanding students learning because they deeply influence and mediate the learning process and the learning outcome. These epistemological beliefs are like an invisible hand, deeply hiding behind an individual's behavioural expression, cognitive processes and emotional experience.

The findings of the study will also help the ministry and higher institutions in identifying new teaching and learning skills needed by both course instructors and students in managing teaching and learning activities. Appropriate policies could then be drafted aligned in formal education; for instance students are not insensitive to the outcomes of their learning but rather assess their academic results and try to understand their causes. They develop epistemological theories about their learning which are some implicit assumptions they hold about the nature of knowledge and learning. Knowing the type of outcomes that students expect from their results would be telling since it is often the case that students regulate the level and the distribution of their effort in accordance with the effects and the impacts they believe will accrue from their performance.

This study provided reliable and valid instruments in the context of the Malaysia to measure epistemology beliefs, goal orientation, self-efficacy, implicit theories of intelligent and learning strategies in the science domain. These instruments could be used to conduct similar studies in science, and could be easily adapted for studies in disciplines other than science education. Education of department could conducted more programs or workshops for higher secondary students to cultivate an incremental view of intelligence and ability. Similarly, praising and rewarding students' hard work, effort, or the effectiveness of the tasks they do rather than their ability or intelligence when they have performed well in an examination (Kamins & Dweck, 1999) can help them to cultivate a growth-mind-set. Finally, teachers and educators should refrain from comparing and favouring students' based on their grades, instead, they could place emphasis on increasing knowledge and improving skills in the subject, and encourage them to work hard and use effective strategies such as deep learning strategies.

Implications for Teaching and Learning. The findings proposed that teachers are supposed to attend to the learning processes of their students.. They therefore should take into account students' knowledge construction and utilization as they help students to improve their learning strategies (Bolhuis & Voeten, 2004). In order to support this process, it is necessary to help pre-service teachers develop adequate epistemological beliefs as a factor that influences their behaviour in the classroom. Epistemological beliefs are beliefs about the nature and acquisition of knowledge (Bruning, Schraw, Norby, & Ronning, 2004).These beliefs are important to the learning process because they direct and constrain learner assumptions about content (Bromme, Pieschl, & Stahl epistemological, 2009).

From the teaching point of view, teachers should emphasize activities that encourage students to explore differential equation topics, develop and refine their own ideas, strategies, and techniques. Furthermore, challenging activities should be created to avoid comparison among students so that students can actively participate in the whole activity. The role of the teacher should be that of a facilitator rather than a dispenser of information. Additionally, skills and reasoning should be emphasized more in secondary school science instead of rote manipulations section. For this purpose, connections, applications, verifications, and related differential equation problems must be given priority over rehearsing algorithms. In addition to it, teachers must give attention to non-routine based problems, related to some specific type and area to give students in-depth understandings. Also, these non-routine problems must be balanced with graphics of the involved functions to assess and enhance student's science ability. They should educate and smartly trained their students during transition from algebraic to graphical mode or vice versa to avoid mistakes.

Moreover, an alternative teaching approach is needed towards a reduction of traditional lecturing model. There is a need to implement a flipped learning approach in which students attend the short instructions in videos or online courses while face-to-face time is devoted to classes for exercise, activities or discussions. Alternatively, students can assist other students in the development of study skills, in peer assisted learning environment (PAL) through the flipped learning approach. This will not only enhance their skills but also boost their motivation as well as interest for science.

The present research is in line with the observation that beliefs can be stable and therefore difficult to change (Richardson, 1996). For experienced teachers, as Richardson concluded, professional development opportunities, such as real class teaching, were likely to impact beliefs. Other aspects that may have had an impact on beliefs are emphasizing teaching strategies and their underlying rationales (Holt-Reynolds, 1994). It may also be supportive in helping teachers to become aware of their own epistemological beliefs (Kang, 2008). It appears, however, that pre-service teachers' experience in teaching was too short to have any lasting impact (Richardson, 1996). As such, if teacher training at the university level could also offer opportunities for more teaching experience, the development of an adequate belief structure might be more successful.

Teachers are now supposed to attend to the learning processes of their students and to listen and respond to the substance of students' thinking (Levin, Hammer, & Coffey, 2009). But they can only function in this capacity when they are aware of their students' knowledge construction and utilization. To this end, they must develop a belief system that directs and constrains learners' assumptions about content (Bromme et al., 2010). It is possible that teachers with less adequate beliefs may fail to reach these science education goals. Teachers may, as a result, monitor and develop programmes, such as mentorships and feedback which may help teachers to develop more adequate epistemological beliefs, self-efficacy and learning approach during their academic training.

In guiding students to the science career, school counsellors may help their clients to find careers that suit them and careers that are suitable for students. As for aptitude and skills, a student's aptitude and skills refer to his ability to do something. Career counsellors may interview and test clients to determine where his strengths lie, and therefore, which careers he would be good at. Career counsellors take in a client's education level - or desired education level - when attempting to help him find the right career, since many careers require a certain amount of education. These counsellors might also consider whether or not a client continuing his education is possible or advisable. Counsellors may also take their clients' interests in science into account when advising them on the best career options for them. Counsellors may identify a student's personality in determining the best career for him, since different personality types usually excel at different types of careers.

Directions for Future Research

The findings of the present study have important implications for improving both the educational process quality and its outputs. Educational administrators should realize that students' academic performance and achievement are affected by several factors like learning approach, epistemology beliefs, implicit theories of intelligence and self-efficacy.

Results demonstrated that perceived epistemology beliefs, implicit theories of intelligence, goal orientation, and self-efficacy and learning approach have significant effects on students' Science achievement. Administrators, therefore, would benefit from obtaining student opinions on this matter to ensure their institutions are better able to provide an appropriate environment tailored to students' needs.

Moreover, conscious efforts should be made to raise the students' level of academic self-efficacy, particularly for students enrolled in theoretical Science classes. Students' academic performance can also be enhanced by exposing them to academic self-efficacy intervention programs. This can be accomplished by counselling and having educational psychologists working in the school setting.

This study sought to add a modest contribution to a growing body of educational institute's literature. This study also emphasized the important role that academic self-efficacy - as one of the individual variables - plays on the relationship between academic climate and students' academic performance. It is a beginning not an end. The findings of the present study have provided several important implications for curriculum designers and teachers, particularly in Science education.

Future research could focus on longitudinal studies that could be undertaken to allow for a deeper examination of the relationships between epistemological beliefs, implicit theories of intelligence and learning approaches over time, and within individual students. In view of the observed impact of beliefs about learning and knowledge, and approaches to learning, teaching procedures could be designed to foster reflection and heighten awareness about learning, thereby guiding students towards deeper approaches, greater academic success, and enhanced personal development.

Conclusion

Malaysia's vision to become a developed nation by the year 2020 has placed science and technology as important subjects to excel in. Reports on performance in science learning, especially those that highlighted students' lack of interest has sparked much concern about the ability to achieve the targeted goals. Experts highlight the fear of STEM subjects as being 'too difficult', only meant to be taken by the exceptionally brilliant and being seen as a 'less glamorous' field of studies as among the most likely causes. Send educators out to current Malaysian students at secondary and tertiary levels to find out more about the actual situation on the ground by asking them to share with our readers their real experience on taking up STEM-related subjects.

The identification of students with the potential to excel in science is crucial as the educational need to ensure the country's human capital growth is in line with the targeted vision and mission of the nation. The practice of 'open system' in the Malaysian education system at the upper secondary level in particular have resulted in the enrolment of students taking arts-based subjects (such as economics, accountancy, Quranic studies, commerce and language-related courses, just to name a few) surpassing those who opted to pursue the science-based subjects despite the fact that a significant number of them are actually qualified to do so. Part of the reason why this happens is due to the claim that art-based subjects are supposedly 'relatively easier' to manage and score. And by taking 'easier' subjects, the students are more likely to ace exams and get good results, allowing them to gain an easier path for university entrance. Meanwhile there are, on the other hand, students who are ambitious in pursuing science, technical and vocational courses although they do not fulfil the requirements.

Oakes (1986) claim that performance indicators help evaluate and monitor the quality of learning; they provide general indication of current learning and schooling conditions. By outlining the profile of performance indicators, students may be helped to improve their science performances in numerous ways or those uninterested in science could be persuaded to show interest and even love the subject. For example, students with specific learning strategies and learning styles could be exposed to other approaches that would complement their learning; poor attitudes towards the subject could be rectified; perceptions toward individual ability and talent – depending on whether they are positive or negative - either reinforced or corrected; and language proficiency enhanced. Previous studies have shown that the understanding of how students attribute failure and inability to perform well in science subjects will be helpful for teachers when trying to motivate their students. In those studies, students do become demotivated and lose interest in a subject when they attribute poor (science) performance to internal locus of control when in fact the source of difficulty is elsewhere (Weiner, 2010 ; Hicks & Nabilah, 1998).

The Malaysian education department had to reform needs to be addressed at the root back in the early education years by ensuring qualified STEM teachers, sufficient educational support and relevant syllabus in a multi-pronged approach. Science educators had to evaluate the way math and science subjects were thought in schools, especially at the primary school level. They had to figure out how to make teaching these subjects more interesting for the children by revamping the syllabus and encouraging teachers to have more interactions with the students.

The Malaysian Education Department and secondary teachers, especially career counsellors, should make their students aware of the fact that students' motivation is a factor that provides an incomplete explanation about science academic attainment.

Motivation although is basic to initiating action , might not always be rewarding unless it is sustained by the use of learning approaches. Thus, a successful academic performance does not merely require a high motivation on the part of the students to study but it also needs a strong will to control their learning from all potential distractions.

The study initially hypothesized that epistemology and implicit theories of intelligence will have distinct effects on a specific achievement goal orientation while the use of achievement goals like mastery goals and performance goals relate to better achievement. However, the results did not support all hypothesized effects, especially in avoidance goals. The findings showed that the students' achievement goal orientation in mastery and performance significantly predict their achievement.

The results in the non-significant correlations initially showed the implicit theories of intelligence and achievement goal orientation with the academic achievement as measured through the GPA are not linear as it was proposed. Academic achievement may not be as easily derived at by the chain of constructs such as epistemology beliefs and goal orientations. Previous studies suggest that some specific competence variables allow one's achievement goals to predict academic achievement. There are also some studies indicating the lack of potency of achievement goals in predicting student's achievement (see Gialamas & Leondari, 2002). The quality of action and strategies an individual utilizes greatly influences the fulfilment of his goals and the birth of his achievement. Related literature strongly indicate that achievement goal orientation has a direct effect on academic achievement when mediated by deep processing approach (Dupeyrat& Marine, 2005; Blackwell, Dweck, & Trzesniewski, 2007). In the case of the study's findings, it is not only epistemology beliefs and implicit theories of intelligence that determines the goal that one sets for himself in the academic workplace. There is also academic self-efficacy and learning approach required. Intelligence is a multidimensional construct and students view some aspects of their intelligence such as in Science or verbal and together with achievement goals could not serve as a stable predictor of general academic achievement such as GPA. Among Asian learners, aside from beliefs about constructs of intelligence and the intelligence one has, other factors such as priorities, family roles, and other environmental factors also have a hold in determining students' academic achievement.

What is notable in the results is that performance approach was consistently predicted by implicit theories of intelligence and epistemology beliefs. This became meaningful in the model considering the social nature of the performance approach goal. The performance approach goal is focused on wanting to be perceived by others as competent but not to improve oneself. The performance of the individuals depend on others perception. Given ones' beliefs about intelligence, the expected perception is not differentiated between both entities and incremental. Both beliefs regardless whether it is fixed or changing, make individuals see the importance of others in shaping their performance on a task. However, this goal does not actually translate and facilitate into ones' academic achievement.

On the other hand, the results also showed that individuals with knowledge about implicit theories of intelligence adapts mastery orientation will also use deep approach in studying. In other words, when incremental beliefs learners view intelligence as changing and improving, it allows them to focus on mastering and learning tasks. Mastery approach goal is adapted by individuals who exert effort in learning for the sake of learning and not comparing themselves with others.

It can be drawn from the study that when individuals subscribe to the belief that intelligence can be developed, it does not necessarily mean that they are limited to endorsing goals that are mastery-oriented and intelligence-developing in nature. This results also showed that self-efficacy can set up goals that allow them to exhibit their skill sets and to perform normatively well. However, only surface learning was a significant predictor of performance avoidance. This implies that since an entity theorist is convinced that his intelligence is only up to a certain point; they will avoid situations wherein they will perform poorly. For them, the intelligence they have can no longer be improved or built upon.

In the educational setting, this affirms the importance of teaching or encouraging students to uphold a personal belief that they can improve and always build on whatever knowledge that they have. Moreover, informing students of the repercussions that come with endorsing surface learning approach and performance avoidance goals at the same time may enable them to be more cautious of responding to academic challenges with a helpless response rather than a learning response.

The distinction between entity and incremental theory of intelligence are further distinguished by the achievement goal orientation that they produce. This further extends the theory on the implicit theories of intelligence, especially how each belief leads to a specific achievement goal. This perspective further supports the link between implicit theories of intelligence and achievement goals.

Therefore, Malaysian educators are called to extend their craft to prepare students for the challenges of life beyond university through developing learning approaches. This might underline the importance for teachers to critically examine the components of enhancing student motivation which would enable students to be more effective in organizing, rehearsing and encoding information and to be more successful in controlling their motivation, setting up a productive work environment and using social resources. (Kerlin, 1992; Wongsri et al., 2002)

The present study advanced researchers' understanding of student's motivation in a number of ways. It provided a test of the theoretical model combining variables derived from motivational theories. It also provided evidence for the adaptive or maladaptive patterns of a performance-approach goal in relation to learning approach, self- efficacy and goal orientations. The present study proved evidence of the applicability of motivational constructs based on the theories largely developed in Western outcomes to Malaysia context.

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