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Measuring academic motivation to achieve for high school students using a Rasch measurement model

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Measuring Academic Motivation to Achieve for High School Students Using a Rasch Measurement Model

by

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ABSTRACT

Many models have been offered on students' motivation to achieve academically. However, most studies on motivation of students to achieve academically are called into question because they do not use an interval level scale, based on a good theoretical model, where attitude items are connected to behaviour items, even though motivation is defined as linked to behaviour. On the other hand, many researchers do not use qualitative methodologies as a preferred method to validate and triangulate data obtained from the questionnaire so as to add scope and breadth to the study. Most researchers have only used either qualitative or quantitative methods but not both. This study uses both the questionnaire and the interview format so as to allow for flexibility and the opportunity to clarify questions and responses with the subjects in order to understand more about students' motivation to achieve academically.

The study had two phases. The first phase involved completing a questionnaire on motivation to achieve academically. In this phase, a person convenience sample of 522 high school students of senior (A-level) classes (Years 12 and 13) was used. The sample was taken from three high schools in Kota Kinabalu, Sabah state in Malaysia. The sample consisted of 294 girls (56%) and 228 boys (44%). The stem-item sample was initially 50, and was written in ordered-by-difficulty patterns.

Phase one involved testing a conceptual model of academic motivation involving attitudes and behaviours in relation to three main aspects (striving for excellence, desire to learn, and personal incentives) and 12 sub-aspects. The motivation scale created in this study supports the view that nine out of 12 sub-aspects form the structure of motivation for years 12 and 13 students in Malaysia. The supported structure involves striving for excellence (standards, goals, tasks, effort, and ability) (but not values), desire to learn (interest and learning from others) (but not responsibility for Learning), and personal incentives (extrinsic, intrinsic) (but not social rewards). A unidimensional, linear scale of academic motivation was created with 20 stem-items (30 were discarded) using the Extended Logistic Model of Rasch (Andrich, 1988a, 1988b; Rasch, 1980/1960) with the computer Program Rasch Unidimensional Measurement Models (RUMM - 2010) (Andrich, Sheridan, Lyne & Luo, 2000). The

structures, patterns and the psychometric properties of the scale were analysed to understand the meaning of the results.

Twenty Motivation items fitted the model and were 'easier' than their corresponding behaviour items, as conceptualised. They formed an excellent scale in which the proportion of observed variance considered true was 0.92. There was good agreement amongst students to the different 'difficulties' of the items on the scale and there was a good fit to the measurement model. A good scale of academic motivation to achieve for high school students was created, and the data for the 20 stem-items were valid and reliable. The structure of motivation that was created is based on three 1st order orientations, striving for excellence, desire to learn and personal incentives and nine 2nd order orientations. These are standards, ability, goals, tasks, effort as part of striving for excellence; interest, and learning from others as part of desire to learn and intrinsic rewards, extrinsic rewards as part of personal incentives.

In the second phase of the study, semi-structured face-to-face interviews were conducted, using a sample of 45 students, who had participated in answering the questionnaire. This was done to validate and triangulate data obtained from the questionnaire, and to add scope and breadth to the study. The interviews explored students' opinions, experiences, and perceptions of motivation to achieve academically. The interviews were based on validating, clarifying, and seeking further information, on issues identified in the questionnaire. Participation in the interviews was on a voluntary basis, and interviews were conducted in the students' schools. Twenty-five of the student participants were boys and the other twenty were girls.

Students' responses suggest that students have different perceptions of academic motivation, have different levels of motivation, and are motivated to achieve academically for various reasons. The results also show that students lack motivation to achieve academically because they make faulty attributions and do not recognise the importance of the aspects of their own motivation to achieve academically. Fear of failure is a way for students to protect their self-esteem and is also common among students. The findings of this research project have implications for high school teachers, administrators, teacher educators, Rasch measurement models and future research on motivation.

DECLARATION

I certify that this thesis does not to the best of my knowledge and belief:

(i) incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education;

(ii) contain any material previously written by another person except where due reference is made in the text; or

(iii) contain any defamatory material.

Signature 

Date 30 JAN. 2004

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When I began a quest for more knowledge, my family encouraged me. As I continued to discover my own potential, my Mum, Julieta Ngima and Dad, Elijio Njiru Kanjuki, kept me grounded in reality, but also provided the free space for inquiry, and I am deeply indebted to them. My initial encouragement also came from Monika Lajumin (Sabah, Malaysia), Athanas Makundi (Nairobi, Kenya), Dr. Russell F. Waugh (Perth, Western Australia), Manfred George Kaiser (Germany), and Br. John O'Neill, FSC (California, USA) who encouraged me to embark on this learning journey.

I gratefully acknowledge the support and encouragement of my principal supervisor and advisor, Dr Russell F. Waugh, who has been central to the completion of this research. I thank him most sincerely for dispensing his wisdom, critical to the consummation of my studies, regarding Motivation to Achieve Academically and Rasch measurement. His expertise in Educational Psychology and Rasch Measurements has been invaluable and his ongoing support and critical comments have been very much appreciated. He provided me with detailed feedback promptly which I highly appreciate.

I thank all the students who took part in this study. This study involved 522 student participants. They generously gave their time to participate in the study through pilot tests, and the main data collection through completing the questionnaire, and interviews. Their honesty was vital to get accurate and valid data that subsequently fostered my own critical thinking and introspective reflection with regard to this research. I also thank the School Principals and parents for allowing their students to participate.

Last but not least, I wholeheartedly thank all my family members and friends for their enduring support, understanding and extended forbearance.

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CHAPTER I

INTRODUCTION

This chapter starts by introducing motivation in general and then moves on to explain motivation to achieve academically. In this section, the way motivation is connected to attitude and behaviour is shown. Immediately following the introduction, the background to the study and its relevance is discussed. Next, the research questions and aims are presented. Terms used in this study are then defined. Finally, the structure of the thesis is outlined, providing a brief overview of each chapter.

Background to the Problem

Motivation, that which energises and directs behaviour toward a goal (Eggen & Kauchak, 1994), could certainly be perceived as one of the most important psychological concepts in education. It is an inner desire and drive required for successful performance. A complete definition of motivation should include its relationship with concepts such as behaviour, attitudes, learning and choice, but simple definitions abound. Reeve (1996, p.2) defines motivation as the "internal processes that give behaviour its energy and direction". This is aligned to Beck's (1990) definition that "motivation is broadly concerned with the contemporary determinants of choice (direction), persistence and vigour of goal-oriented behaviour" (Beck, 1990, p.32). These simple definitions exemplify the quintessence of motivation, even if one considers them incomplete.

According to Meece (1994), current educational problems go beyond declining achievement scores because many schools today face a crisis in student motivation. Student motivation is critical for learning, and several researchers have found a positive and robust correlation between motivation and achievement (Tuckman, 1993, 1999; Vallerand & Senecal, 1993). For example, Tuckman (1993) did a study with college students in USA using factor analysis and identified three correlated factors of

motivation that influence outcome attainment. They are: (1) attitude or belief about one's capability to attain the outcome; (2) drive or desire to attain the outcome; and (3) strategy or techniques employed to attain the outcome. Pintrich and De Groot (1990), in a correlational study of 7th graders' school achievement in America, identified the following five variables as predictive: (1) self-efficacy, (2) intrinsic value, (3) test anxiety, (4) strategy use, and (5) self-regulation. Abry (1998) found metacognitive strategies (planning, monitoring, and utilisation of feedback) and attitude (self-efficacy, locus of control) to predict achievement. Specifically, Abry found these academic motivational factors to predict educational achievement.

The concept of motivation has been studied according to a variety of perspectives since the beginning of the twentieth century (Overton, 1984; Weiner, 1992). Such perspectives include the theory of expectancy and efficacy beliefs, needs theory, attribution theory, social cognitive theory, goal theory and intrinsic motivation. In the last thirty years, many models, approaches and theories have inspired researchers studying motivation and education. For example, Deci and Ryan (1985, 1991) have developed a model of motivation that emphasises the dynamic relationship between the individual and his or her environment (Vallerand, Blais, Brière & Pelletier, 1989). Their model of self–determinism is based on cognitive evaluation (Deci & Ryan, 1991), which proposes that students' motivation is mainly determined by their needs for self-determination and competence. These theories (as described more in detail in chapter II in this study) are a result of modern conceptions of human beings and of the way in which they learn (Pintrich & Schunk, 1996).

Motivation to achieve academically is an important component in a successful educational journey. It is of practical concern to teachers and parents, and of great theoretical concern to researchers. This is because academic achievement is strongly influenced by motivation. Teachers and students need to understand how motivation works, and more importantly, how it is linked to behaviour and attitude. One of the greatest challenges and opportunities of our time is to get schools to focus on assisting students to become motivated, in order for them to achieve academically and succeed in school.

There is increasing agreement that improving students' academic motivation is needed for appropriate reformation in classroom learning and academic achievement (Vallance, 2003; Urdan, Midgley & Wood, 1994; Maehr & Midgley, 1996). Vallance (2003, p.74) urges that the time has come to "construct motivation in a more nuanced fashion than has been previously understood". Schools are very important in tapping, developing and sustaining academic motivation (Eccles, Wigfield, Midgley Reuman, MacIver & Feldlaufer, 1993; Wentzel, 1996; Watt 2000). Further, it is now accepted that academic motivation is pivotal and essential for successful learning and achievement (Meece, Blumenfeld & Hoyle, 1988; Meece, 1994; Wentzel, 1996, 1998). Undoubtedly, a positive psychology of academic motivation (Pajares, 1995; Hicks, 1997) that can be linked to achievement will be a noteworthy contribution.

In various educational institutions and psychological research centres, motivation has been used as an essential variable in group and individual achievement. However, many of the studies done on this aspect have not been based on a good theoretical model (Waugh, 2002). A recent evaluation of research on motivation, Leo and Galloway (1996, p. 45) called for researchers to approach the study of motivation in a way that will tap the 'phenomenology of the construct' and stated that "research in motivation has yielded no consistent understanding about the nature or relevance of the construct" (p.44) (by 'construct', they mean model of motivation). Many researchers have not used a good multi-aspect model of motivation and shown these aspects to be linked to behaviour (Waugh, 2002).

There are many scales used to measure or assess motivation. Ray (1986) reported over 70 scales. Many of these do not give an all-inclusive examination of motivation and most involve a moderately simple range of aspects and items. These scales have all been analysed with traditional measurement techniques and not with modern-interval-level models, such as the Rasch measurement model (Rasch, 1980; 1960). Many of these scales are not based on a satisfactory model of motivation itself, and they are not connected to behaviour which is often part of their definition (Beck, 1990; Waugh, 2002).

Many educational institutions in South East Asia desire to have their students achieve academically, so as to be competitive in their 'fast moving' contemporary

society, after they complete their studies. Administrators and teachers desire to get their students to be highly motivated in order to achieve academically, but many do not know how motivation works. For example, there is little available literature based directly on Malaysian students that links motivation to achieve with attitudes and behaviour. Rather, nearly all the research on academic motivation comes from western countries.

Although much research has been done in the western countries examining student motivation, not many parallel studies have been done in Africa and Asia. Hsiao (2003) presents a model of motivation in learning for Taiwanese children in which he mentions that parallel studies in a different cultural context would be informative. The lack of research in this field in South East Asia means that there is less exposure to the use of modern measurement models, such as a Rasch Unidimensional Measurement Model. Despite this shortcoming, many educators in South East Asia, including Malaysia, desire to understand how motivation can be increased for high school level students (anecdotal evidence from living in Malaysia as a teacher). Many students in these regions often have a predetermined attitude about their ability to achieve or fail, not just academically, but in other areas, such as sport and business, as well.

It was considered that there was a need to study academic motivation in Malaysia, because there is lack of motivation research available. It was decided that the way forward was to identify the main aspects and corresponding sub-aspects of motivation in order to develop a model of motivation in which attitudes and behaviours of students are connected. This research study thus attempts to develop a multi-aspect model to measure motivation for high school students in Malaysia, using items that were devised and conceptually ordered by difficulty, with a direct link between attitudes and learning behaviour. This study uses the latest modern, interval-level measurement model of Rasch (Rasch 1980/1960; Andrich, Sheridan, Lyne & Luo, 2000), and a motivation model involving 12 sub-aspects taken from the ten models reported in the literature, together with attitudes and behaviours.

Aims

This research project has five aims. They are to:

(1) Construct a conceptual model of academic motivation involving attitudes and behaviours in relation to three main aspects. The three aspects were selected from the literature review: (a) Striving for excellence (standards, goals, tasks, effort, values, ability and resources); (b) Desire to learn (interest, learning from others and responsibility for learning); and (c) Personal incentives (extrinsic, intrinsic and social rewards).

(2) Create a questionnaire based on the conceptual model of academic motivation and collect data from high schools in Malaysia using the questionnaire.

(3) Create a unidimensional, linear scale of academic motivation using the Extended Logistic Model of Rasch (Andrich, 1988a) with the computer Program Rasch Unidimensional Measurement Models (RUMM) (Andrich, Sheridan, Lyne & Luo, 2000) and test the conceptual model of motivation.

(4) Investigate the psychometric properties of the data used to form the scale and to interpret the meaning of the scale of academic motivation.

(5) Interview students in high schools in Malaysia about their concept of academic achievement.

Research Questions

1. How might a model of academic motivation be operationally defined to include attitudes and behaviour and based on three main aspects: (a) Striving for excellence (standards, goals, tasks, effort, values, ability and resources; (b) Desire to learn (interest, learning from others, and responsibility for learning); and (c) Personal Incentives (extrinsic, intrinsic and social rewards)?

2. To what extent does the measure of academic motivation represent a linear scale?
3. What is the relationship between attitudes and behaviour in academic motivation?
4. What is the relationship between the three aspects of academic motivation - striving for excellence, desire to learn and personal incentives?
5. What are Malaysian high school students' conceptions of academic motivation in terms of attitudes and behaviour, striving for excellence, desire to learn and personal incentives?

Importance of the project

Any study that helps to understand the concept of motivation to achieve academically is important in the field of education. This research project focuses on students' academic motivation using a sample of students at high school education level in Malaysia. The study improves on previous studies done in this field (e.g., Waugh 2002; Deci, Vallerand, Pelletier, & Ryan, 1991; Connell, & Ryan, 1984; Mills, 1991; Csikszentmihalyi, 1990). This research links attitudes to behaviours, which is not usually done by many researchers studying motivation. The research also uses twelve aspects of motivation together. Many researchers study motivation using three or four aspects only. Unlike other research done on motivation, this research orders the items of the twelve aspects conceptually from easy to hard.

This research sought to construct a linear measure of academic motivation in which motivation measures were calibrated on the same scale as the item difficulties. This has not been done in other motivation studies in Malaysia, and rarely in western countries. This study also measures academic motivation for school children at high school level (Years 12 and 13) in Malaysia. There has been no research done on this topic in South East Asia, including Malaysia.

The item wording of the questionnaire was revised and simplified from the study of Waugh (2002) to make the questionnaire applicable to high school students in Malaysia. This research tests a conceptual model of academic motivation and, potentially, improves the theory of motivation.

Definition of terms

In the context of this research study, terms have been defined to have the following meanings.

Motivation – is the internal process that energises, directs and sustains individual behaviour. In a school setting, students need motivation in order to achieve academically. The fundamental nature of motivation in education is to show interest in learning and mould one's academic behaviour, to take a proactive attitude to achieve, and learn from others.

In this study, motivation to achieve is defined as a response to academic tasks that is enhanced by (a) Striving for excellence (standards, goals, tasks, effort, values, and ability; (b) Desire to learn (interest, learning from others, and responsibility for learning); and (c) Personal Incentives (extrinsic, intrinsic and social rewards).

Academic Achievement - is the evidence of knowledge acquisition, literacy, and learning. In a school environment, this achievement is normally assessed through student assignments, class participation, test scores in examinations, and individual cumulative grades.

Attitude – is a mental orientation, a psychological tendency to act in certain ways. In lay-man's language, it is that which determines likes and dislikes. Attitudes signify what people *think* of, how they *feel* about, and how they *tend or intend to behave,* toward an object. Attitude is affected by beliefs, values, opinion and feelings. Without a positive attitude, a student cannot be capable of taking the necessary action to achieve. Restructuring attitudes to create positive behaviour can empower students to set appropriate goals for success.

Attitude influences the students' actions, that is, what they actually do. It determines the students' desire to learn and the effort they put in academic tasks in order to achieve.

Behaviour – is the manner of conducting one's self, whether good or bad. It involves the way people act. Students need to cultivate and nurture good learning behaviour that involves striving for excellence, and a desire to learn. This academic behaviour requires an understanding of related issues which include standards, goals, tasks, effort, values, ability, interest, learning from others, responsibility for learning, extrinsic, intrinsic and social rewards.

Performance – refers to academic achievement. This is usually to demonstrate ability, out-perform other students, attain certain grades or marks, and to obtain tangible rewards associated with academic performance and to better oneself.

Limitations

This study involves 522 students from Year 12 and 13 in Sabah, Malaysia. So, strictly speaking, the results are only applicable to Sabah, not to the rest of Malaysia or South East Asia, although they may be. The results are not applicable, strictly speaking, to primary students or ECE students (only to Year 12 and 13 students).

This research uses the Rasch measurement model because the Rasch model uses strict measurement criteria so that only items that fit the criteria can be ordered from "easy" to "hard" to form an interval level scale. These are considered as the valid items forming the scale. A check is made to see that persons respond to the valid items in a logical and consistent manner to form a scale. Secondly, the Rasch method creates an interval scale where items are ordered from easy to hard on the same scale as the Motivation measures. Thirdly, it enables motivation items and behaviour items to be calibrated on the same scale simultaneously and hence for an authentic link to be made between individual motivation items and their corresponding learning behaviour. This study uses three aspects of academic motivation - striving for excellence, desire to learn

and personal incentives, and so a limitation is that if motivation contains other aspects, then the measure in this study is not the 'whole story'.

Motivation to achieve academically is internalised in each child's mind. We can't see it. We infer it, in this study, from what students answer on the questionnaire, and what they say in the interviews. We assume that the responses they give are true. While the researcher encouraged the students to answer truthfully and honestly, some students may still not have done so. It is possible, too, that some students really don't know what motivates them. They can't 'see' into their minds to know what their motivations are. We can only assume about their motivation from answers on the questionnaire, and from responses in the interviews.

Structure of the Thesis

This research project focuses on the motivation of students to achieve academically at school and reviews some recent developments in this area. It begins with an introduction in Chapter I, which introduces the reader to the concept of student motivation, then more specifically, student motivation to achieve academically. It shows how motivation is connected to attitudes and behaviour. The background to the study, and its relevance, are also discussed in this chapter. Next, the research questions and aims are presented. Terms used in this study are then defined. Finally, the structure of the thesis is outlined, providing a brief overview of each chapter.

Chapter II is a review of the relevant literature. It begins with an introduction in which motivation is defined, followed by the current debate about motivation. Next is a presentation of some of the existing models of motivation. This chapter shows that if students are to be successful in achieving their academic goals, and if teachers are to strengthen students' motivation in order to improve on their academic performance, they need to know that motivation influences behaviour. This chapter then discusses the current system of education in Malaysia where the data were gathered. This is followed by a discussion of the motivational patterns of Asian students. It then discusses the measurement, and, more specifically, the Rasch Measurement Model. The Chapter ends with a summary.

Chapter III explains the methodology. It starts by describing the model of motivation to be tested and, following this, the questionnaire is described and explained. Next, measurement is discussed, beginning with the problems of measures based on True Score Theory, followed by an explanation of Rasch Measurement. The sample for the questionnaire is explained. After that, the ethics approvals from Edith Cowan University and approvals from Malaysia are described. The data collection and data analysis section follows. This section explains the administration of questionnaire, and the preliminary data analysis, and how the final data analysis was done. The chapter concludes with a summary.

Chapter IV presents the results from the Rasch analysis. The chapter begins with the results of the analysis of the data using the computer program Rasch Unidimensional Measurement Models (RUMM-2010) (Andrich, Lyne, Sheridan & Luo, 2000). In this section, the Rasch data reliabilities and the fit statistics to the model for the 20 stem-items (effectively 40 items) Motivation scale (N=522) are presented. Then, a scale of Motivation to Achieve Academically in Malaysia is presented and discussed. This is followed by an explanation of the content valid, but non-fitting items. The category curves are then presented and discussed. The chapter concludes with a summary.

Chapter V presents the Results (Part B): Data analysis for interviews. This chapter reports the students' understanding of motivation through their stated reasons for striving to achieve academically and their perception of their sources of academic motivation. Forty-five students were interviewed about their academic motivation and, in particular, about their reasons for striving to achieve, their sources of motivation, and their incentives. The chapter then presents the responses of students about their desire to learn. Next, the value of incentives as expressed by students and the role of teachers in students' academic motivation are discussed. This is followed by their perception of the role of testing and examinations in students' motivation. Following this, the chapter then examines the lack of motivation by some students. In this section, students' responses about their attributions of success or failure are presented and analysed. The chapter ends with a summary.

The final chapter (Chapter VI) is the Summary, research questions and discussion, and implications. This chapter begins with a summary of the study, drawing together the major findings both from the results of the Rasch measurements and the qualitative results. The findings are drawn together in the framework of addressing the research questions proposed in chapter I. Next, implications are outlined for administrators, high school educators, and for further research.

CHAPTER II

LITERATURE REVIEW

This chapter begins with an examination of the current debate about motivation. In this section, readers are introduced to some different sides of the debate, their arguments and variations, in relation to the aspects and composition of motivation posed by different motivation researchers in an attempt to understand motivation to achieve. The discussion helps us to understand why there are various theories of motivation. Twelve motivation theories that have been proposed by psychologists and researchers are presented in this section. The deficiencies of each model are also explained. Next is a discussion of the current system of education in Malaysia where the data were gathered, followed by a discussion of the motivational patterns of Asian students. Measurement is then explained and Rasch Measurement is discussed in the context of measuring motivation. The chapter ends with a summary.

The Debate about Motivation

Motivation has been an area of great theoretical concern and debate among psychologists and researchers. One major line of research on motivation focuses on the need for achievement. Need for achievement involves striving for success, mastering difficult challenges, and meeting high personally generated standards of excellence (McClelland, 1985). There is a large amount of other research on different lines which has been done in the area of motivation (see Ames & Ames, 1989, 1985, 1984; Anderman & Maehr, 1994; Brophy, 1987; Covington, 1992; Graham, 1994; Jacobs & Newstead, 2000; Maehr & Ames, 1989; Maehr & Pintrich, 1997, 1995, 1993; Zimmerman, Bandura & Martinez-Pons, 1992; Mansfield & Vallance, 2003; Waugh, 2002, 2003).

There is a debate among many scholars on motivational aspects and ideas that purport to explain why people act at all, why they select the actions that they do, and

why some people have high motivation, while others have low motivation, and yet others have no motivation at all. In this debate, no single model of motivation seems to fully satisfy the question as to why the motivated students succeed academically, while others less motivated, or with no motivation at all, yet with similar talent and academic ability, fail.

The major debate is about the various aspects and dimensions of motivation. There is disagreement about the specific composition of those dimensions (Donohue & Wong, 1997) (see also the special section on Motivation and Efficacy in the Journal of Educational Psychology, 82, 1, Special Editor, Schunk, 1990). For example, Tuckman (1999) proposes a motivation model to achieve based on a combination of three dimensions. He argues that motivation requires a combination of attitude, strategy, and drive. On the other hand, Borkowski and his colleagues (Borkowski et al., 1990; Day & Borkowski, 1987) have proposed an integrated model of achievement motivation, focusing on two distinct dimensions: metacognition and affective factors. Metacognition encompasses self-knowledge of learning strategies and the ability to use this knowledge in an efficient and effective manner. The affective component focuses on feelings of self-efficacy with factors of motivation, locus of control, and personal attributions (Borkowski et al., 1990). There is a bidirectional correlation between low perception of self-efficacy and negative attributions which often undermine academic achievement (Butler, 1999; Butler, Elaschuk, & Poole, 2000).

Weiner (1990) claims that motivation is the product of interdependence between and amongst many variables. These variables include locus of control (Duke & Nowicki, 1974), the need for affiliation, impulsiveness and planfulness (Friis & Knox, 1972), personal achievement, social achievement, academic achievement (Maehr, 1984; Piedmont, 1989), mastery, work orientation, competitiveness and personal concern (Helmreich & Spence, 1978; Donohue & Wong, 1997).

Some researchers have called attention to the role of dispositions and volitional processes in models of motivation (e.g. Kanfer, 1990). For example, according to Snow (1986), students achieve their optimal level of performance when they have an intermediate level of motivation to achieve success and to avoid failure. Jagacinski and Nicholls (1987) suggest that intrinsically motivated students engage in the task more

intensively and show better performance than extrinsically motivated students. However, studies by Frase, Patrick and Schumer (1970) showed opposite results.

Others point out that there exists a variety of motivation theories that have no unifying theme and are not authenticated well by research (e.g., Locke & Henne, 1986). In an effort to address these theories, some researchers have turned to self theory as an alternative explanation for motivation towards behaviour. Specifically, social identity theory (Stryker, 1980, 1986; Tajfel & Turner, 1985), self-presentation theory (Beach & Mitchell, 1990; Schlenker, 1985), and self-efficacy theory (Bandura, 1982, 1986), are all fundamentally rooted in the concept of self.

Mansfield and Vallance (2003) have argued that academic motivation to achieve needs to be constructed in a more nuanced fashion. They have argued that literature and research on academic motivation has lost sight of traditionally successful practices and that the samples employed by recent research have mis-directed research findings to the detriment of boys' education. Further, they have recommended that research on motivation needs to combine both qualitative and quantitative methodologies. They have argued that the synergy developed by employing multiple methods in academic motivation study will drill down to the complexities of the matter and develop models of motivation which are of benefit to the field of knowledge and those interested in education.

In an evaluation of research on motivation, Leo and Galloway (1996) called 'for approaches to the study of motivation which tap the phenomenology of the construct' (p. 35). They stated that 'research in motivation has yielded no consistent understanding about the nature or relevance of the construct' (p. 44) (by 'construct', they mean model of motivation). Many researchers in the area of motivation have not used a reliable multi-aspect model of motivation nor shown these aspects to be linked to behaviour (see Waugh, 2002; Leo & Galloway, 1996).

Models of Motivation

Many educators have been principally keen on models of motivation that enhance students' achievement in academic tasks. Much of the research on motivation has concentrated in the area of achievement motivation. According to Mansfield and Vallance (2003, p.75), the term achievement motivation distinctively refers to "the motivation that individuals have to succeed". For example, students may be motivated to achieve due to a perceived purpose for engaging in that achievement-related behaviour and the meaning they ascribe to that behaviour. This motivation is related to a goal theory perspective (Patrick, Anderman, Ryan & Midgley, 2001).

The existing literature shows that there are at least twelve models of motivation, each emphasising different aspects. Some of these models are interconnected. The 12 aspects of motivation presented earlier were derived from review of the 12 models of motivation described in this section. It is likely that there is a certain amount of truth in each of them, for different individuals, at different periods of time, and in different academic circumstances (Waugh, 2002).

1). **Arousal and Anxiety Model.** (Covington & Omelich, 1987; Naveh-Bejamin, 1991; Tobias, 1985). This model states that people perform better when they are alert and optimally aroused and that anxiety decreases our motivation to learn.

Arousal entails both physical and psychological reactions. When we are aroused, there are changes in brain wave patterns, heart rate, blood pressure, and breathing rate. We are alert and attentive, wide awake, or even excited. Research shows that there is an optimum level of arousal for most activities (Morris, 1988). In general, a higher level of arousal is helpful on simple tasks, like narrating a story that one knows very well, but lower levels of arousal are better for complex tasks, like solving complex mathematical questions. It is up to the teachers to know how to raise or lower arousal levels in their students' classes, depending on students' needs and task expectation.

Anxiety plays a significant part in academic motivation according to this model of motivation. Students who are nervous because they are worried that they will not be able to complete a task satisfactorily often end up with a feeling of anxiety. Hansen,

(1977) defines anxiety as "an experience of general uneasiness, a sense of foreboding, a feeling of tension" (p. 91). These feelings may raise their sense of despondency and feeling of foreboding associated with school. In the second case, students will probably succeed but will miss the sense of satisfaction that could encourage greater effort, ease their fears about school work, and nurture a sense of self efficacy. Anxious students may need a good deal of guidance in choosing both short-term and long-term goals. They also may be in need of help on how to work at a moderate pace, especially when taking tests. Either these students work too quickly and make many careless errors or they work too slowly and are never able to finish the tasks. Since anxiety appears to interfere with both attention and retention (Wittrock, 1978), highly anxious students (at least those of average or high ability) benefit most from instruction that is very structured and allows for repetition of parts of the lesson that are missed of forgotten (Wigfield & Eccles, 1989).

This model does not explain why some individuals are aroused and excited to study in certain subjects and not in others. For example, some students are motivated to study mathematics while other students are motivated to study a different subject such as geography or languages. From general classroom experience, it is clear that some students are motivated to study one, or a few subjects, and not others. The model also does not explain why, given a similar learning environment, some students are motivated to study a particular subject and others in the same grade are not motivated to study the same subject.

2). **Needs Model.** (Darley, Glucksberg, & Kinchla, 1988; Maslow 1970). According to Darley, Glucksberh and Kinchla (1998), a need is a "biological or psychological requirement; a state of deprivation that motivates a person to take action towards a goal" (p. 743). Our needs are seldom satisfied completely and perfectly; improvements are always possible. For this reason, people are motivated by their needs or by the tensions the needs create. Their behaviour can be seen as a movement toward goals they believe will help satisfy their needs.

This model is based on the humanistic theory of motivation that describes five levels of human needs proposed by Maslow (1970). He suggested that humans have a

hierarchy of needs. These are physiological needs, safety needs, social needs, esteem needs and self actualisation needs. Lower-level needs for survival and safety are the most essential. These basic needs must be fulfilled before people work to satisfy higher-level needs. Once we are physically comfortable and secure, we are stimulated to fulfil needs on the next level- social needs for belonging and love and need for self esteem. And when these needs are more or less satisfied, we turn to higher-level needs for intellectual achievement, aesthetic achievement and finally self-actualisation. Self-actualisation is the realisation of one's personal potential and self-fulfilment.

This model, however, is a heuristic abstraction because the theory is weak on exact points of transition. This is because there isn't a test which provides a quantified measure of gratification across needs. Again, the model has been criticised because people do not always appear to behave as the theory would predict. Most of us move back and forth among different types of needs and may even be motivated by different needs at the same time.

Despite the above criticisms, Maslow's theory does give us a way of looking at the whole person, whose physical, emotional, and intellectual needs are all interrelated. In a school setting, students who come to school hungry, sick or hurt are not likely to be motivated to seek knowledge, understanding, and achievement. If the classroom is a frightening, unpredictable place and students seldom know where they stand, they are likely going to be more concerned with safety measures and less with learning.

3). **Achievement and Social Goal Model.** (Bandura, 1986; Maehr, 1984; McClelland, 1985; Urdan & Maehr, 1995; Wentzel, 1991). According to this model, the goal is the source of motivation to achieve. A goal, as a motivation model, is based on the social learning theory (Bandura, 1986) that students are motivated to achieve academically because of their desire to master the task (performance goals). When the goal is a performance goal, students focus on how they are judged by others. The evaluation of their performance, not what they learn or how hard they try, is what matters. On the other hand, when the goal is a learning goal, the students will aim at improving, no matter how many mistakes they make or how awkward they appear. Students desire to appear competent in performance amongst their peers and social

grouping. Thus, in this model, one major motivation of students to achieve academically is their desire to win the approval of others (social approval).

According to Bandura (1986), the active setting of goals is a source of motivation. The goals we set become the standards for evaluating performance. As we work toward our goals, we imagine the possible positive outcomes of succeeding and the negative outcomes of failing. We tend to persist in our efforts, until we meet the standards we have set. Upon reaching our goals, we may be satisfied for a short time but then tend to raise our standards and set new goals.

Evidently, the types of goals we set influence the amount of motivation we have to reach them. Goals that are specific, moderately difficult, and likely to be reached in the near future tend to enhance motivation and persistence (Schunk, 1991a, 1991b). Specific goals provide clear standards for judging performance. If the performance falls short, we keep going. Goals that can be reached fairly soon are not likely to be abandoned or pushed aside by the day-to-today business of coping. But good intentions for distant goals are often overshadowed by more immediate concerns.

The Achievement and Social Goal Model is not an all-inclusive model that can fully explain the motivation of students to achieve. The literature review shows that motivation to achieve is comprised of many aspects. For example, this model does not include aspects of motivation to achieve that are related to rewards and desire to learn, yet these aspects do influence academic motivation.

4). **Behavioural Motivation Model.** (Boggiano & Barret, 1992; Butler, 1988; Cameron & Pierce, 1994; Heckhausen, 1991; Lepper & Hodell, 1989). This model involves rewards, reinforcement and intrinsic motivation. It advocates that individuals are primarily motivated by an intrinsic process and will only engage in activities which they consider enjoyable and rewarding. In this way, students would be motivated to achieve if they believe that the behaviours they engage in are enjoyable and will lead to certain outcomes, such as such as praise and rewards. Research shows that students perform less well and are less interested in what they are doing when being graded than when they are encouraged to focus on the task itself (Butler & Nissan 1986; Butler 1988, 1989).

This model is deficient because it does not explain why students may engage in learning activities in which they have no interest, or which they consider boring. For example, this model does not explain why high achievers in the classroom engage in academic tasks, and strive to achieve in activities which they would regard as boring. Such students do not only strive to achieve in the subjects which they consider enjoyable and rewarding, but rather strive to excel in all subjects. The model thus cannot be applicable to all students.

5). **Attribution Theory.** (Maehr & Ames 1989; Weiner, 1985). This theory, when applied to students' motivation, hypothesises about students' beliefs and why they succeed or fail. This means that the degree of perseverance that students demonstrate in the face of failure and the degree to which they are willing to embark on similar tasks are influenced by causal attributions – that is, that attributions for behaviour play a central role as cognitive mediators of achievement behaviour (Heckhausen, 1991; Maehr, 1989) - and the causal attributions are the reasons students believe they succeed or fail. Feedback and reinforcement that students receive greatly influence self-perception of causes for success and failure, as well as the pride and shame, associated with task performance (Weiner, 1972).

Attribution theory rests on three basic assumptions. First, it assumes that people attempt to determine the causes of their own behaviour and that of others. In other words, people are motivated to seek information that helps them make attributions about their cause and effect, particularly in situations where the outcome was unexpected. Second, attribution theory assumes that rules exist to explain how people come to the conclusions they do about their behaviour. In other words, causes are not randomly assigned. Third, the causes attributed to certain behaviour will influence subsequent emotional and non-emotional behaviour (McInerney & McInerney, 1994).

Weiner's attribution theory of motivation gives four general causes to which people attribute their success and failure: ability, effort, luck, and task difficulty. Ability refers to a person's perceived performance capacity in a particular activity – for example, some students feel they are good at humanities, others at sciences, others at drama and so on. Effort refers to the energy expended on a task (whether that effort is

general and typical, or specific to the task). There are times when students put a lot of effort into completing a task, or achieving a goal. At other times, students put little effort into their academic tasks. Luck refers to the variables that lie outside the control of person but still affect behaviour. Things like sickness at a period near the exam could affect a student's performance. Task difficulty refers to the parameters of the task. Tasks that most people can do are labelled easy, while tasks that few people can master are labelled difficult (McInerney & McInerney, 1994).

These attributions are divided into four categories: internal and external, and stable and unstable. Internal attributions (ability and effort) are generated from within the person, while external attributions (luck and task difficulty) originate from outside the person. Stable attributions (ability and task difficulty) are perceived to be unchangeable, while unstable attributions (effort and luck) are believed to vary with each attempt at a task.

In achievement tasks, students attribute the success or failure in previous performance to causes that will positively motivate future performance, and not to dysfunctional ones that will discourage further involvement. It has been found through a number of research programs (Dweck & Repucci, 1973; Kukla, 1972; Nolan & Nicholls, 1993; Weiner, 1972; Weiner & Kukla, 1970) that people high in achievement motivation generally attribute their success to ability and effort (internal causes) and failures to luck of effort or external factors, while those low in achievement motivation generally attribute their successes to external causes (such as ease of the task and luck) and, thereby, discount the extent of their ability and effort as responsible for their success. Hence, this group experience less pride for their successful performance. These students also attribute their failures to lack of ability rather than external factors, or lack of effort (Bar-Tal, 1978). Weiner suggests that the major differences between individuals high and low in achievement needs are that individuals in the high motive group are more likely to initiate achievement activities; work with greater intensity; persist longer in the face of failure; and choose more tasks of immediate difficulty than persons low in achievements needs (Weiner, 1972). Among the variables that have been found to influence achievement motivation and attribution are: sex differences,

achievement needs, self-esteem, emotional state, reinforcement schedules and internal/external control perceptions (Bar-Tar, 1978).

In achievement and attribution theory, there is a conception that individuals always act to preserve their sense of self worth and competence (Covington, 1992). Many goal structures such as individualistic, competitive and cooperation have implications for establishing and maintaining a child's sense of worth and competence (McInerney & McInerney, 1994).

Research in attribution theory indicates that the attributions which an individual makes influence task choice, need for and type of feedback sought, persistence and performance outcomes (Heckhausen, 1991; Weiner, 1979, 1984). Success motivated students will strive for information about their proficiency and prefer moderately difficult tasks, while failure avoidant individuals try to avoid that information and therefore choose tasks that are too easy or too difficult. McInerney and McInerney (1994) have cautioned that ascribing inappropriate attributions with the intention of improving students' motivation is detrimental to students. For example, teachers may inappropriately attribute a student's poor performance to lack of ability. If the task is restructured so that it is appropriate to the student's ability, and encourages increased effort on the part of the student, success may be achieved.

6). **Self-fulfilling Prophecy Model.** (Good & Brophy, 1990; Rosenthal, 1973). Self-fulfilling prophecy is a situation in which people's expectations about future events steer them to act in precise ways that, on occasion, can cause the anticipated or desired event to happen. The model shows that people have a propensity to find what they are looking for and they may even be inclined, unwittingly, to create what they are searching for.

According to this model, self-fulfilling prophecies are expectations about a person that elicit behaviours that conform to the expectations. These resultant behaviours essentially work to confirm the original perception of the person and continue the prophecy. In the classroom, self-fulfilling prophecies can be helpful if the expectations are high and detrimental if the expectations are low (Tauber, 1997).

There is an implicit notion that the beliefs of students about themselves and the expectations they have for their academic performance are strong influences on their school motivation (McInerney & McInerney, 1994). One main source of these beliefs and expectations is the classroom teacher. Significant research has been done into teacher expectations and their effects on learning, attitudes, beliefs, attributions, expectations, and classroom conduct (see Brophy, 1983, 1985 for a review). An early study, *Pygmalion in the classroom*, by Rosenthal and Jacobson (1968; see also Rosenthal, 1973) demonstrated the effects of what has come to be known as the self-fulfilling prophecy in which initially false expectations held by teachers set in motion a chain of events that cause the expectations to come true (see also Brophy, 1985).

Rosenthal and Jacobson's 'Pygmalion' theory (1968) focuses on the effect of teacher-expectancies on a pupil's academic performance. It states that a teacher's expectations of a pupil's academic ability somehow cause the pupil to conform to these expectations, creating a 'self-fulfilling prophecy'. For example, if a teacher believes one of their pupils is a slow, difficult pupil, this leads them to expect low academic performance, and this somehow causes the pupil to perform poorly in academic assessments and tests. This theory did not suggest how teacher-expectancies were translated into pupil performance.

There are two models that have been proposed to explain the dynamics of the self-fulfilling prophecy. Rosenthal (1973) suggests four factors that produce the Pygmalion effect: feedback, climate, input and output. Teachers who have been led to expect good things from their students appear to be doing four 'things' The first involves climate – teachers create a warmer social-emotional mood around their 'special' students. The second involves feedback – teachers give more feedback to these students about their performance. The third involves input – teachers teach more material and more difficult material to their special students. The fourth involves output – teachers give their special students more opportunity to response and question.

In another study, Good and Brophy (1990) propose the following model to explain how teacher expectations become self fulfilling: 1) The teacher expects specific behaviour and achievement from particular students; 2) Because of these expectations, the teacher behaves differently towards different students; 3) This treatment by the

teacher tells each student what behaviour and achievement the teacher expects, and it affects the student's self-concept, achievement and level of aspiration; 4) If the teacher treatment is consistent over time, and if the student does not actively resist or change it in some way, it will shape the student's achievement and behaviour. High expectation students will be led to achieve at higher levels, but the achievement of low-expectation students will decline; 5) With time, the student's achievement and behaviour will conform more and more closely to that expected by the teacher (p. 445).

It appears from these two models of self-filling prophecy that students, in general, are passive elements in the process and teachers appear to be relatively inflexible once they have embarked upon an expectation "driven" course of action. Much research since the original Rosenthal and Jacobson study has indicated that the process is far more complicated than this (see Brophy, 1983; Goldenberg, 1992; Good, 1987). Good (1987) talks of both the self-fulfilling prophecy effect, in which an originally erroneous expectation leads to a behaviour that causes the expectation to become true, and the sustaining expectation effect, in which teachers expect the students to sustain previously developed behaviour patterns, to the point that teachers take these behaviour patterns for granted, and fail to see and capitalise on student potential. There are many examples of this latter effect, such as the class clown always being a typecast and the disinterested mathematics student not being actively encouraged to be involved despite his or her renewed interest (McInerney & McInerney, 1994). Good (1987) suggests that the sustaining expectation effect may be more pervasive than the self-fulfilling effect.

There are several sources of erroneous expectations that may influence teachers. McInerney and McInerney (1994) identify these expectations as being related to socio-economic status (students from rich homes are more motivated than student from poor homes); sex differences (girls are less interested and able in mathematics than boys, girls are better behaved than boys, boys are better in mechanical activities than girls); physical appearance (good-looking students are more motivated and better-behaved than unattractive students); racial grouping (*Bumiputra* – original inhabitants of Malaysia and its vicinities - students are lazy while the students of Chinese origin are hardworking and energetic; *aboriginal* - original inhabitants of Australia - students are

less academically motivated and less able than non-aboriginal students). Among other sources of expectations are student profiles passed on from teacher to teacher, the individual's demonstrated personality (e.g., introvert, extrovert), apparent achievement orientation and prior behaviour patterns (Broun, 1976).

In an important literature review, Dusek and Joseph (1983) examined whether or not expectations based on some of the above assumptions were, in fact, related to various indices of student academic performance and social/personality behaviours. Physical attractiveness (usually measured by facial attractiveness) was found to be a determinant of teacher expectations for both academic performance and social/personality attributes. Dusek and Joseph (1983) however, make the important point that while the expectation may initially be based on physical features in lieu of any other information, as other more academically pertinent information becomes available these expectations are modified. They also found out that student gender is not a basis of teacher expectations for classroom behaviour.

McInerney and McInerney (1994) concluded that the impact of inappropriate and inaccurate expectations of students is not as destructive as the theory of the self-fulfilling and self-sustaining prophecy. However they emphasise that the effect of expectation on student motivation and performance is quite pervasive, and at times detrimental to the effective learning of many students perceived by teachers to be low in motivation or low in ability because the expectations become associated with poor teaching. Expectations can affect the type of groups teachers establish, the type of questions asked and the wait time given for students to respond, the type of reinforcement and feedback, the different activities that students can be involved in, and the general quality of interaction (Broun, 1976). For example, if a teacher holds low expectations of a student, but nevertheless takes a strong corrective action, the chances of the student is success increase, despite low expectations. Conversely, if a teacher fails to teach effectively, even children for whom high expectations are held may perform poorly (Goldenberg, 1992).

The main weakness with Rosenthal and Jacobson's (1968) self-fulfilling prophecy model is that it gives no clue as to how teacher expectations are translated into pupils' behaviour and performance. Their reasoning implies that there is almost

something mystical about the 'Pygmalion effect' (Rosenthal & Jacobson, 1968). They also imply that the teacher is the exclusive decision maker and that the pupil is a passive agent, who somehow experiences the teacher's viewpoint and this somehow affects their academic performance. Good and Brophy (1984) devised a model of the teacher-expectancy effect which conceptualises both the teacher and the pupil as active agents. However, while Good and Brophy acknowledge the pupil's self-concept and motivational drives, they place relatively little focus on them.

7). **Expectancy X Value Model.** (Atkinson, 1964; Eccles *et al.*, 1983). This model is based on the theory that people are goal-oriented beings. What people do (behaviour) in response to their beliefs and values is undertaken to achieve some end. Thus behaviour is a function of the expectancies one has and the value of the goal toward which one is working. This theory assumes that motivation is a result of calculatively determined probabilities associated with different levels or types of behaviour and the valences of the outcomes associated with these behaviours.

The motivational process in the classroom settings has benefited a lot from the expectancy value model. Atkinson (1964), Atkinson and Feather (1966), and Atkinson and Raynor, (1974), in particular, highlighted the interaction of personality and environment in determining motivated behaviour, which has become an important focus for a number of contemporary theories of motivation. Atkinson proposes that each individual has a tendency to achieve success and a tendency to avoid failure. The tendency is moderated by the individual's expectation of success or failure on a particular task and the incentive value of the task. The disposition an individual has to seek success or avoid failure is considered to be relatively stable, but the actual playing out of this mix depends on the two variables that are subject to environmental variation – the value of the task to the individual and the individual's expectation of success (McInerney & McInerney, 1994).

There are two personality types proposed by Atkinson: the person for whom the need to achieve is greater than the fear of failure; and the person for whom the fear of failure is greater than the need to achieve. The first group are labelled as high need achievers and the second low need achievers. Situations of immediate challenge are the

most motivating for the high need achievers. On the other hand, for the low need achievers, tasks of intermediate challenge appear most threatening and the individual often chooses tasks that are far too hard, so that the failure can be excused because of task difficulty, or tasks that are so easy that success is guaranteed. Figure 2.1 below depicts the situation.

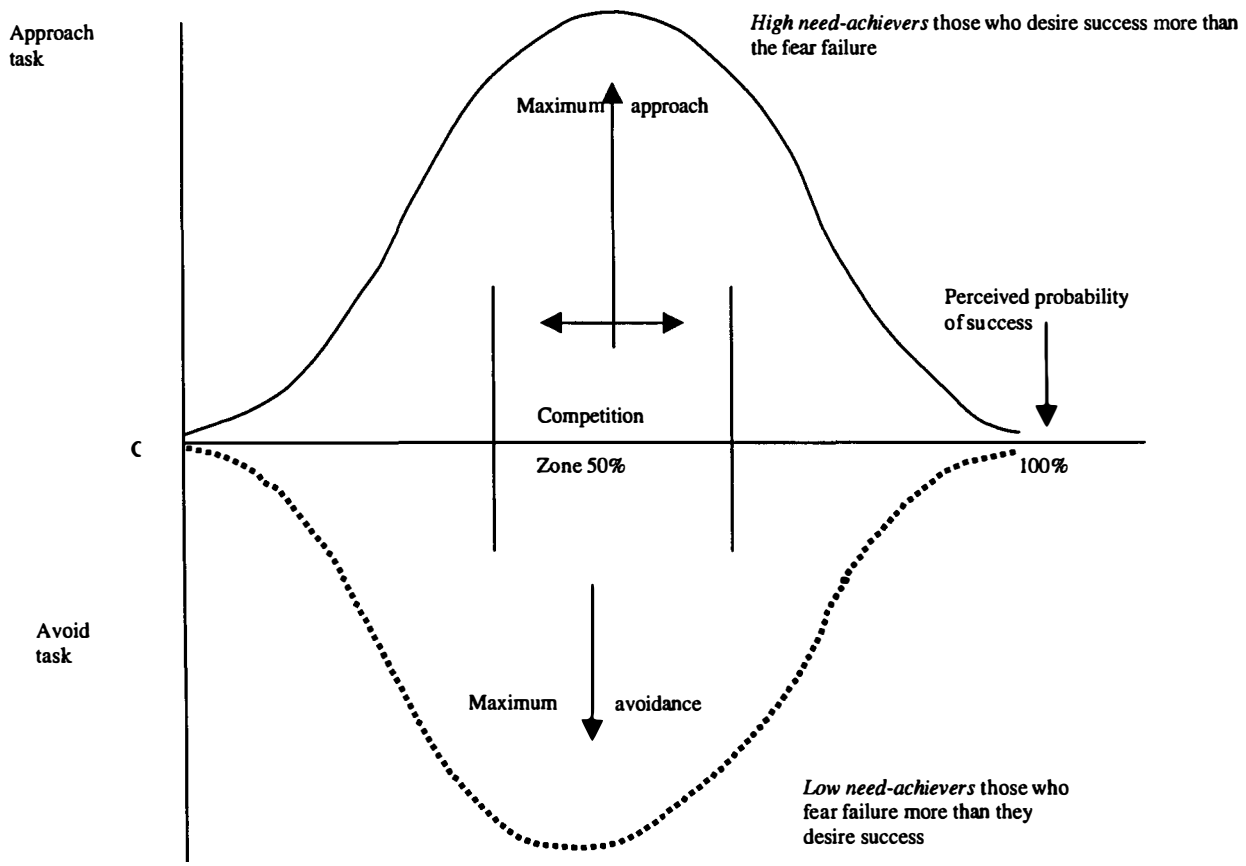

Figure 2.1 Probability of success, motive predominance and Task involvement (Reprinted from Biggs & Telfer, 1987)

According to Expectancy X Value theory, the subjective success or failure experienced by an individual will vary according to the individual's level of need achievement and this will then further influence later goal-setting behaviour. For

example, a high need achiever who perceives a task as easy, but fails, is likely the next time round, to reassess the task as of intermediate difficulty and persist with it. On the other hand, a low need achiever who perceives a task as easy, and fails, will assess it as of intermediate difficulty and withdraw from it completely. Even if the low need achiever succeeds in a task perceived as very difficult, he or she is still likely to withdraw from it, judging that in the future, failure is highly likely (McInerney & McInerney, 1994).

Snow (1986) cites recent research that indicates that the need to achieve success or avoid failure in individuals displays a curvilinear relation to educational achievement when the full range of each is studied. Thus, an immediate level of both kinds of need leads to optimal performance; too little or too much of either need is counterproductive.

Furthermore, according to this theory, in the classroom, children with low need for achievement faced with possible failure may adopt a range of coping strategies. They aim to minimise the effect of failure on their self-esteem, which Covington (1984, 1992; Harari & Covington, 1981) considers as either failure avoiding behaviour or success guaranteeing behaviour (see also Rohwer, Rohwer & Howe, 1980; Thompson, 1993). The basis of these techniques is to preserve one's sense of ego in competitive situations and each of them is commonly used by students in our classrooms.

This model is deficient because expectancy depicts a subjective not 'other-defined objective reality'. It is based on how individuals see the world around them. As such it cannot explain students' motivation to achieve with an objective view. Secondly, Expectancy X Value model probably reifies too much the thought processes that individuals go through when they decide to engage in a task or choosing a level of effort or performance. Furthermore, there are problems in trying to "prove the model" in research terms (Schwab, et al, 1979).

8). **Self-Regulated Learning Model.** (Corno, 1992; Reeve 1996; Schunk 1991; Wolters, 1998; Zimmerman, 1990; Zimmerman & Schunk, 1989; see also Waugh 2003c for a Rasch measure). In a recent study, Pintrich (2000) gave a good definition of self-regulated learning. He said that "it is an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their

cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in their environment" (p. 453). Thus, self-regulation of behaviour involves the active control of resources. This includes: time management; where students study; the study environment they create; the concrete resources such as books; and other people such as peers, tutors and teachers.

In this model, self-regulated learners view learning as a systematic and controllable process, and they accept greater responsibility for their achievement outcomes. Self-regulated learners approach tasks with confidence, diligence and resourcefulness, and proactively seek out information when needed and take the necessary steps to master it. Self- regulated students are metacognitively, motivationally and behaviourally, active participants in their own learning (Zimmerman, 1990). In terms of metacognitive process, self-regulated students plan, set goals, organise, self-monitor and self-evaluate at various points during the learning process. Because of this, they are self-aware, knowledgeable and decisive in their approach to learning. Self-regulated learners appear to be self-motivated and report high self-efficacy (belief in themselves as learners), self-attributions (i.e. they accept responsibility for successes and failures and value the importance of effort) and intrinsic task interest (Pintrich & Degroot, 1990).

Self-regulated learning means that individuals manage their cognitive abilities and motivational efforts, so that, learning is effective, economical, and satisfying (Paris & Oka, 1986). In other words self-regulated learners combine skill and motivational will in order to maximize their learning. As self-regulated learning may take a behavioural approach, or a cognitive approach (reflecting both information processing and social cognitive dimensions), the nature of the reinforcer may be tangible (such as material or social gain) or intangible (such as self-actualisation and self-efficacy). In this latter case, the motivator for the behaviour is the students' perception of the importance of self in determining appropriate goals for activity. In particular, there is an emphasis in the social cognitive derived theories on self-efficacy described in the next model of motivation.

Self-regulated learning has deficiencies because some students do not self-regulate. Some students rely on rules, teachers and parents to tell them what to do. They

may not be aware of proper study habits because they have never engaged in self-reflection in regards to their study strategies. For example, when some students are given a homework task, they forget to take it home. Others complete the task hastily while watching television or wait to start it until very late in the evening. Some may work on a task in an area where there are many distractions, etc. Similarly, teachers may ask students to take notes on important information assuming that the students know how to take notes effectively, but this is not always the case.

9). **Perceived self-efficacy model.** (Bandura, 1982; Schunk, 1989). This is a model of motivation that relates personal beliefs to actions to achieve (Bandura, 1982; Schunk, 1989). Self-efficacy is a concept that was originally developed by Albert Bandura (1982) in social cognitive theory (social learning theory) and refers to people's confidence in their ability to successfully perform an action. This model suggests that individuals who have high self-efficacy, regarding their ability, will eventually perform the task. In the self-efficacy model of motivation, students' beliefs in their capacity to perform certain actions successfully are the source of their motivation (Bandura, 1986; Schunk, 1991b). It would appear that people who have a low sense of self efficacy for a particular task will probably avoid doing it and those who feel competent would participate readily. Research by McInerney and Swisher (1995), with Aboriginal and Navajo children, suggested that self-efficacy for the task of school learning is one of the most important determinants of their school motivation. As a construct, self efficacy is related to a number of others that have been discussed, such as expectancy value motivation, attribution and self-concept.

It is believed that children base their appraisal of ability on a wide range of sources including their performances, feedback from others, and vicarious (observational) experiences, such as seeing others performing in a similar manner being praised, ignored or ridiculed. High self-efficacy for a particular activity, in and of itself, does not necessarily lead to motivated behaviour. The perceived value of the activity, and outcome expectations, also influence the level of motivation. However without a sense of self-efficacy, it is unlikely that children will engage in activities, irrespective of their perceived importance (McInerney & McInerney, 1994).

Schunk (1991b) points out that there are five important ways to help and maintain self-efficacy. They are: goal setting, information processing, use of models, attributional feedback and rewards. The setting of challenging, but attainable goals, and the achievement of these goals, enhances self-efficacy and motivation (Schunk, 1990; Zimmerman, Bandura & Martinez-Pons, 1992). Among the techniques suggested by Schunk in setting both proximal and distant goals are setting lower and upper limits on the student's goals and removing them when the student understands the nature of the task and their immediate capabilities, using games such as shooting for goals in basketball, and goal setting conferences where student learn to assess goal difficulty and present skills in collaboration with the teacher. However, the achievement of long-term goals is ultimately important for the development of self-efficacy, as they offer more information about developed capabilities.

If students are taught how to learn (that is, their metacognitive and the meta-learning skills are developed), they are more likely to feel efficacious in a range of learning situations and, therefore, more motivated to continue in these activities. Classroom models (involving both teachers and peers) may also be used to demonstrate that particular tasks lie within the range of ability of particular students. Observing others succeed can convey to the observer that they too are capable and can motivate them to attempt the task. Attributional feedback lies in the idea that we need to encourage students to see the relationship between ability, effort and success, and in particular to encourage children to attribute their failures to factors over which they have some control. When a student feels in control, motivation is enhanced. Indeed, even in the face of failure, effort attributions, for example, can encourage the student to try again. At other times attributing success to ability enhances self-efficacy and motivation. Rewards may be used to indicate that a goal has been achieved, and hence enhance self-efficacy and motivation.

A perceived self-efficacy model is deficient because it offers very few aspects of motivation. It does not explain all the aspects that constitute motivation to achieve. The research literature shows that motivation to achieve academically constitutes more than three or four aspects and motivation is not just about one's capability and feedback on achievement.

10). **Personal Investment Model.** (Maehr, 1984; Maehr and Braskamp, 1986). This model integrates a range of theoretical perspectives into a single, meaningful framework. The model is based on the theory that motivation is a function of three variables: goals, self-efficacy, and knowledge of action possibilities. These three variables are the product of experience and situational factors (e.g., the three factors outside - past experience, socio-cultural context, and teaching-learning situation).

Previously, Maehr and his colleagues reviewed models of motivation in the context of their cross-cultural applicability (Maehr, 1997a, 1997b, 1984; Maehr & Nicholls, 1980). From these reviews emerged a model that not only builds upon dimensions important in any explanation and analysis of motivation cross-culturally, but also effectively draws together many important features of the models of motivation discussed earlier. The personal investment model is concerned with why individuals choose to invest their energy, talent and time in some activities but not in others. It is a theory of human motivation based on how individuals of varying age and cultural background relate to differing situations (Maehr & Braskamp, 1986).

This model is essentially cognitive, as it assumes that the primary antecedents of choice, persistence and variations in activity levels are the thoughts, perceptions and beliefs that the person has which are imbedded in beliefs about the self in particular situations. Maehr (1984, p.12) puts it very well:

> Most practising educators are aware that students place different values on school tasks quite apart from their ability to perform. That this may be the critical feature in explaining cross-cultural variation in achievement patterns has been illustrated in a series of cross-cultural studies....Generally, it seems that individuals project different pictures of the nature of successful achievement. But the critical point is that, as events are interpreted as conforming to these pictures of achievement, they are associated with success. Simply, a performance outcome or any information that is perceived as indicating that we are becoming what we want to become is readily defined as success...Of course,

events, outcomes and information to the contrary eventuate in perception of failure.

According to Maehr (1984), in all cultures, tasks exist for which there are standards of excellence, level of challenge and the possibility of self-attribution of some sort. Whatever difference exists then between cultures in the demonstration of motivation would be related to tasks and situations specific to the culture or social-cultural group (Maehr, 1978). Three basic elements are critical in determining an individual's personal investment (or motivation) in a specific situation: sense of self, personal incentives and perceived alternatives.

Sense of self refers to an individual's more or less organised collections of perceptions, beliefs and feelings related to who one is. Sense of self is presumed to be composed of a number of components such as sense of competence, sense of autonomy, and sense of purpose, each contributing to the motivational orientation of the individual. The belief is that individuals are more likely to be motivated in activities and tasks for which they feel competent and confident, and can see the purpose in what they are doing. The completion of the task is seen as a goal with value.

Personal incentives of behaviour in a given situation refer to the motivational foci of the activity with an emphasis on what the person defines as "success" and "failure" in the situation. Maehr (1984) proposes for personal incentive systems: task motivation; ego motivation; social solidarity motivation and extrinsic reward motivation. Each of these four components of the personal incentive component is divided into two facets: Task involves task involvement (experiencing adventure than others) and striving for excellence; Ego involves competitiveness (doing better than others) and power (leading, or controlling others); Social solidarity involves affiliation (working with the group you like) and social concern (concern for the welfare of the group) and finally extrinsic rewards involves recognition (being praised by others) and token rewards (getting prizes and certificates).

Perceived alternatives for pursuing goals refer to the behavioural alternatives that a person perceives to be available and appropriate (in terms of social-cultural norms that exist for the individual) in a given situation. For example, a student may desire to

move on to high school after completion of middle school but the economic and family situation may prevent this.

This model is deficient because it offers very few aspects of motivation. It offers only three variables of motivation which are goals, self-efficacy, and knowledge of action possibilities. It does not explain all the aspects that constitute motivation to achieve. The Personal Investment Model of motivation gives very little attention to other aspects of motivation such as effort, standards, values, ability and tasks as part of striving for excellence. The model only recognises goals as part of striving for excellence. This research has shown that motivation constitutes more than three or four aspects by offering twelve aspects of motivation.

11). Achievement Goal Model. (Nicholls, 1984, 1989). In this model of motivation, the most important purpose of individuals in achievement contexts is the demonstration of ability. The way individuals judge and interpret this ability, and subsequently define successful goal accomplishment, provides the energising and critical antecedents to variations in achievement related cognitions, behaviours, and affective responses (c.f. Duda, 2001). Specifically, Nicholls (1984, 1989) contends that two conceptions of ability exist in achievement contexts, and that these manifest themselves through two distinct goal states of involvement, namely task and ego. An individual's dispositional tendency towards adopting task and ego involvement is referred to as their goal orientation. Achievement goal theory assumes that these goal orientations are not bi-polar opposites of the same construct, but orthogonal, meaning that an individual can be high or/and low in both orientations at any given time (Nicholls, 1984, 1989). While it is proposed that these dispositional orientations can be experienced simultaneously and fluctuate in terms of the degree to which they make task and ego involvement more likely, Nicholls (1984, 1989) refers to task and ego involvement as two distinct and independent states, concerning how we process activities. Specifically, Nicholls' writings suggest that these diverse states of involvement may fluctuate throughout an achievement activity (e.g., in a physical education class), but cannot be experienced at the same time (c.f. Treasure *et al.*, 2001).

People who are in a state of task involvement believe that ability is demonstrated through developing new skills, elevating levels of competence, and exerting maximum effort. Since task involvement is self-referenced, success is perceived when mastery is demonstrated (Dweck & Elliott, 1983; Nicholls, 1984, 1989). In contrast, an individual who is in a state of ego involvement believes that ability is demonstrated through favourable normative comparisons with others. In the case of the ego-involved individual, the focal concern is with social comparison, and thus, ability is demonstrated when his/her performance is perceived to exceed that of others, especially when this is achieved by exerting less effort (Nicholls, 1989). Given the proposed model of achievement goals (Nicholls, 1984, 1989), Fox, Goudas, Biddle, Duda, and Armstrong (1994) suggested that a truer representation of achievement goals, and their subsequent consequences, should derive from analyzing goal profiles. To this end, four profiles have been identified, namely high task and high ego (Hi-T/Hi-E), high task and low ego (Hi-T/Lo-E), low task and high ego (Lo-T/Hi-E), *Treasure (2002)* and low task and low ego (Lo-T/Lo-E). As Biddle (2001) indicates, results may differ when analysing goals separately compared to a combined goal profile. Moreover, an advantage of adopting a goal orientation profile approach is that this method accommodates two groups that are neglected by correlational studies, namely the high task/high ego and low task/low ego groups (White, 1998).

A limitation of the use of goal profiles, however, pertains to the somewhat arbitrary and rather crude scores of central tendency that have typically been used to generate the respective profile groups (i.e., usually median or mean scores have been used to create goal profile groups). This issue not withstanding, goal profiles based on more stringent criteria (e.g., extreme groups, cluster analysis, an ideographic approach) may offer an important insight into how these orientations function in 'real world' settings. It should be noted at this point that, due to disparities regarding age, gender, culture, and participation level in the extant literature, the critically needed group norms for goal orientations within the various physical activity domains remain unavailable to researchers, hence, goal-profile analyses remain highly sample-specific (c.f. Treasure & Harwood, 2000). Research that has employed a goal profile approach to the study of achievement goals and motivational responses in physical activity settings has generally

revealed that individuals high in task orientation, both singularly or in combination with ego orientation, display greater levels of adaptive responses than those low in task orientation (e.g., Dorobantu & Biddle, 1997; Goudas, Biddle, & Fox, 1994; Fox *et al.*, 1994; Roberts, Treasure, & Kavussanu, 1996; Vlachopoulos & Biddle, 1996).

12). Self-determination model of motivation. (Deci & Ryan, 1985, 1991). This is a model which is steadily increasing in acceptance and research (e.g., Brunel, 1999; Chatzisarantis, Biddle, & Meek, 1997; Ntoumanis, 2001a, 2001b). Self-determination theory is an organismic theory that encompasses both a needs-based and a multidimensional motive approach to understanding affective, cognitive, and behavioural responses. Self-determination theory assumes that individuals have three basic innate needs (autonomy, competence, and relatedness) which must be satisfied by social contexts in order to facilitate motivation, performance, wellbeing, and development. Thus, an individual's motivation is presumed not to be a direct function of social factors (i.e., perception of the physical education class climate), but rather the proposed motivational impact of social environments is mediated by these three innate needs. To examine the regulation of behaviour that results from the degree to which these needs are satisfied, research from this perspective adopts a multidimensional approach embracing three types of motivation, namely intrinsic motivation, extrinsic motivation, and amotivation. With this multidimensional approach in mind, Deci and Ryan (1985, 1991) have proposed a self-determination continuum to describe motivation types with varying degrees of self-determination. From greater to lesser self-determination these motivation types are intrinsic motivation, extrinsic motivation (integrated regulation, identified regulation, introjected regulation, external regulation) and amotivation. Moreover, in line with the self-determination continuum, the patterns of relationships among these motivational types are posited to conform to a simplex-ordered correlation structure (Ryan & Connell, 1989). Specifically, those motivation types adjacent along the self-continuum (i.e., intrinsic motivation, integrated regulation) are expected to be more positively correlated than those more distal (i.e., amotivation, intrinsic motivation).

Intrinsic motivation represents the most self-determined regulation and refers to the participation in activities for their own sake, namely for the feelings of pleasure and satisfaction that derive directly from participation (Deci & Ryan, 1985). For example, a pupil who participates in football because he/she enjoys the feelings of pleasure, fun, and satisfaction that arise from football would be said to be intrinsically motivated as their participation is self-endorsed and not underscored by external rewards (i.e., payment, threats).

In contrast to intrinsic motivation, extrinsic motivation refers to a variety of regulatory styles that range from external regulation to integrated regulation and are characterised by an individual's goal of action being directed by some separable consequence (i.e., reward, threat, punishment). Representing extrinsic motivation as traditionally defined, external regulation is the least self-determined extrinsic regulation, and refers to actions that are carried out in order to gain an external reward or avoid punishment (means to an end). For example, a child that partakes in Physical Education in order to receive praise from the Physical Education teacher (reward) and/or to avoid confrontation with their parents would be said to be externally regulated. Such motivation is therefore directed by separable outcomes, in this case, the pleasing or appeasing of others.

Located next on the self-determination continuum is introjected regulation. Like external regulation, introjected regulation represents a non-self-determined form of extrinsic motivation as an individual's behaviour is externally governed. With introjected regulation, however, the regulation of behaviour is characterised by a shift from external (i.e., rewards, threats, punishment) to self-imposed (i.e., self-guilt) sources of pressure. An example of introjected regulation would be a student that attends football practice during his lunch break, not because he enjoys football, but because he would feel a sense of guilt if he were not to attend. Identified regulation refers to behaviours that occur when individuals accept certain activities as important to their personal goals and values (e.g., 'I participate in physical education for health benefits'). With identified regulation the behaviours are autonomous as the initiation emanates from the self. However, this withstanding, the underlying motive to engage in activities is still external as the decision to participate is directed by external benefits

(e.g., 'I can lose weight from participating in physical education), rather than the pleasure and satisfaction inherent in the activity.

The final type of extrinsic regulation is termed integrated regulation. Integrated regulation occurs when identified regulations have been incorporated to the self, meaning that they have been assessed and brought into congruence with the individual's other values and needs (Ryan & Deci, 2000). Although this regulation shares many of the same characteristics of intrinsic motivation (i.e., it is autonomous), this regulation is still considered extrinsic as actions are directed, although coherently and harmoniously, by separable consequences (i.e., valued outcome), opposed to inherent feelings of joy which mark intrinsic motivation.

The least self-determined construct embedded in self-determination theory is coined amotivation, and represents a lack of intention and a relative absence of motivation (Vallerand, 1997). Amotivation can occur when an individual does not perceive contingencies between their behaviours and subsequent outcomes, lacks competence, and/or believe the activity to be unimportant (Ryan & Deci, 2000; Vallerand, 1997) (e.g. 'I participate in physical education, but I'm not sure it is worth it'). Amotivated individuals are neither intrinsically nor extrinsically motivated; they believe that because success is unachievable or highly unlikely there is little purpose in exerting unnecessary effort towards an uncontrollable outcome.

Essentially, self-determination theory asserts that intrinsic motivation and certain forms of extrinsic motivation (e.g. identified regulation) represent the highest levels of self-determination and lead to positive consequences. In contrast, motivational regulations low in self-determination (e.g. external regulation and amotivation) are hypothesised to lead to negative consequences. Recent empirical research has revealed that motivation types high in self-determination are predictive of positive outcomes in a variety of contexts including health care (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), sport (Kowal & Fortier, 1999), and education (e.g. Miserandino, 1996; Ntoumanis, 2001a, 2001b; Ryan & Connell, 1989; Vallerand & Bissonnette, 1992).

As Ryan and Deci (1989) state, both achievement goal and self-determination theories 'advocate the use of feedback and procedures that minimize ego involvement and facilitate a fuller, more task-involved engagement with academic endeavours'

(p.268) to foster intrinsic motivation. At the same time, both approaches recognise the potentially detrimental effect of ego involvement to achievement striving. Deci and Ryan (1995) contend that the adoption of ego involvement is likely to be associated with low levels of autonomy, and thus undermines one of the antecedents of self-determined motivation. Such theoretical reasoning is mirrored by Nicholls (1989) who proposed a negative relationship between ego involvement and intrinsic motivation. Specifically, individuals who are extrinsically motivated see the activity as a means to an end. As Ryan and Deci (1989) state, 'the views of ego involvement espoused by Nicholls and us are in many ways complementary and that additional efforts toward synthesis could be of great value' (p.267).

This model is deficient because it offers very few aspects of motivation. It does not explain all the aspects that constitute motivation to achieve. For example, this model of motivation puts a lot of emphasis on intrinsic motivation (which is part of desire to learn), and gives very little attention to other aspects of motivation such as striving for excellence and incentives. The model also gives little attention to social and extrinsic rewards which have been found to constitute to motivation (see Waugh, 2002).

The current system of education in Malaysia

This study of academic motivation to achieve is carried out in Malaysia, a country in South East Asia. Below is a brief description of the present educational system which is operational in Malaysia.

In Malaysia, administration of education is centralised at the federal level where major national policies and objectives of education are formulated. This is to ensure uniformity in the implementation procedures and to obtain similar results. The Ministry of Education is headed by a Minister who is an elected member of the Federal Cabinet. The minister is assisted by two Deputy Ministers of Education, a Parliament Secretary, a Political Secretary, a Secretary General, a Director-General of Education and two Deputy Director-Generals of Education who are senior education officers. Although the Ministry has a permanent basic administrative structure, it is adaptable to changes, if and when necessary, depending in part upon the volume of its functions (Wong, 2003).

The Government of Malaysia places a great faith in its national system of education in promoting national unity. The Malaysian Schools are expected to play a positive, constructive and creative role, as agents of social change rather than conservators of the multi-ethnic status quo. Besides this important role, another key role of the school is to form individuals with good character who can have a life-long career and economic independence, hence contributing towards the growth and wealth of the nation.

The national philosophy of education in Malaysia recognises that education is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious, based on a firm belief in God. The Ministry of Education thus places a great deal of emphasis on creating Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving a high level of personal well-being and able to contribute to the harmony and prosperity of the family, the society and the nation at large.

The objectives of the Malaysian Education systems are as follows:

1. To form Malaysians who will be patriotic and united;
2. To form Individuals who will be knowledgeable, assertive and with high moral values;
3. To prepare the future work force for the need of the nation; and
4. To give education to all Malaysian children.

The Mission Statement of the Ministry of Education in Malaysia is:

"To provide a world class education system for the development of the potentials of each individual in fulfilment of the aspiration of the Nation".

(Wong, 2003, p. 46).

Malaysia is trying to create a market-sensitive education system. Schools and universities are taking up the challenge of globalisation by changing not only the content of curriculum and programmes, but also the delivery systems. The country is

trying to race ahead to achieve a significant transformation in education in order to meet the next millennium, as a technologically competent and scientifically adept society.

The education system aims at enabling a build-up of a pool of well-educated, highly skilled and strongly motivated professionals. The nation's human capital is its most important economic and development resource.

In 2003, the government through the Ministry of Education introduced the learning of Science and Mathematics using the English medium. This is part of the government's endeavour to facilitate change and to seek innovative approaches to expand the education base. The fast developing Malaysia hopes to create a regional education hub and a centre for educational excellence.

Malaysian education involves six years in Primary school, after which students take a national examination called UPSM. This is followed by three year of junior school studies. In the final year of junior school, students take a national examination called the PMR. After PMR, students proceed for two years of secondary school after which they take the SPM national examinations. Following this, students proceed to high school (A-levels) for two years in which after which they take the STPM national examinations. Those who pass the STPM exanimations proceed to University. This study uses a sample of high school (A-level) students.

Schools are expected to help to accomplish the wide-ranging, ambitious educational goals for the immediate community and society at large. The accomplishment of such goals depends on the learning and actions of individual students (Wong, 2003). To achieve the national and individual goals in education, students will need to have a high motivation to excel. The following section will discuss the motivational patterns of Asian students.

Motivational Patterns of Asian Students

It has been argued that amongst many Asian students, there exists a culturally endowed focus on high value and effort. For example, Hung (1969, in Hess, Chi-Mei, & McDevitt, 1982) in depicting educational practices in china and the philosophy

underlying these practices, cites the pervasive influence of the Confucian doctrine. He provides evidence from many educational proverbs which serve to motivate students to achieve. Such proverbs include: "talent and will come first in study, will is the teacher of study and talent is the follower of study. If a person has no talent, it (achievement) is possible. But if he has no will, it is not worth talking about study" (Xu gan, Zhong Lun, cited in Salili, Chiu, & Hong, 2001, p. 207); and being diligent in study means devoting one's effort to it for a long time: (Confucius, Zi Zhang chapter, cited in Salili, Chiu, & Hong, 2001, p. 207). Similarly, there is a saying in Korea, *sugohaseyo,* which literary means "work harder". It is a phrase that is used after one has worked very hard on a task, and done very well because of their effort. It conveys the idea that no matter how hard you work, you can always work harder, and is used frequently in both academic settings and in the workplace (Kim, Grant, & Dweck, 1999).

Various researchers have demonstrated that Asian students are more likely to make effort attributions for academic setback than in America. Shikanai (1978), for example, found that Japanese college students who are led to believe that they had failed an anagram task were most likely to choose 'lack of effort' rather than 'lack of ability', 'task difficulty' or 'luck' as the most important cause. In a study of parental beliefs about their children's academic performance, Hess, et al (1982), found that Chinese mothers cited lack of effort as the predominant cause of their child's failure in mathematics, while American mothers were more likely to attribute failure to ability, training, luck, and effort, equally. Chinese children, in comparison to USA children, have also shown a comparatively stronger interest in increasing their level of competence in a subject, independent of their perception of the adequacy of their current level (Stingler, Smith, & Mao, 1985), indicating a willingness to expend effort, even when such expenditure is not, strictly speaking, necessary.

Performance goals also seem to be an important factor in relation to the motivation of Asian students. In many Asian countries, examinations determine permanent tracking or entrance into elite schools. More generally, parents and teachers in Asian countries often place a strong emphasis on the importance of academic outcomes and high achievement (Morris & Sweeting, 1995; Thomas, 1996). For example, Asian mothers have been shown to respond to their children's academic

success by focussing on the future high standards for performance, rather than bestowing substantial praise (Crystal & Stevenson, 1991).

According to Wilson and Pusey (1982), Chinese culture places a great emphasis on sharing the rewards of individual success with the group, and therefore Chinese students often emphasise the driving force of relevant social groups when explaining their motivation to achieve. Similarly, Suzuki (1980) writes that "Education in the Chinese family is associated with strong emphasis on collectivism, which defines the academic success of the child as an important source of pride for the entire family and academic failure is a stigma to the family".

Measurement

Measurement can be viewed as a process in which numbers are used to link concepts to indicators on a continuum (Punch, 1998). Traditionally, the most common means of measuring attitudes have been based on classical test theory with the use of Thurstone and Likert scales. However it is now recognised that these methods have deficiencies and that *latent trait theory,* also referred to as *item response theory,* is a more desirable model of measurement (Andrich, 1982; Hambleton & Swaminathan, 1985; Molenaar, 1995). Item Response Theory is based on the notion of the relationship between the observable responses to test items and the observable traits assumed to underlie responses to items on a test. A mathematical formula is used to describe this relationship (Hambleton & Swaminathan, 1985; Rasch, 1980/1960) and is the foundation of the measurement model. The attempt to obtain formal measurements through the use of such models should lead to a "greater understanding of the variables or trait in question" (Andrich, 1997, p. 878).

Andrich (1989) described five basic requirements for measuring social variables. The first centred on the notion of 'unidimensionality' and a continuum. In order to measure a trait, it must be possible to make such comparisons as there being 'more' or 'less' of the trait. Therefore, the instrument is required that allows the location of the items that measure the trait, and the people measures of the trait to be plotted on a linear

continuum, thus forming a scale which conveys meaningful measurement (see Andrich, 1989, p. 9 for the equation).

The second requirement is based on the need for formalising measurement with the use of statistical models. The use of statistical models means that the differences between item and person parameters can be determined, and checks made on the "consistency of the estimates", thus providing internal consistency for the scale (see Andrich, 1989, p. 9 for the equation).

The third and fourth requirements are related to the consistency of the item locations on the continuum. 'Additivity' must be met by the item locations whereby each item must hold a determined scale value (equal distance between locations) in relation to the other items, or it is rejected (see Andrich, 1989, p. 9 for the equation). Item locations should also be invariant across groups of people. It is a requirement that the same measures, or scale values, can be obtained regardless of which items are used to estimate the measures and regardless of which individuals are used to calibrate the items. In particular, the attitudes or opinions of those who constructed the scale should not affect the item measures. The fifth requirement of the measurement suggested by Andrich is that data must fit the criteria or requirements (ultimately contained within a measurement model) in order for valid measurement to occur.

One family of measurement models based on Item Response Theory that satisfies the requirements of measurement as suggested by Andrich (1989), is the Rasch models which have been hailed to be 'simple' yet 'very powerful' models of measurement (Hambleton & Swaminathan, 1985, p. 4). It has also been noted that Rasch models incorporate the best elements of the Thurstone and Likert approaches (Andrich, 1982; Wright & Stone, 1979). The following section will describe the measurement of motivation.

Measurement of Motivation

Motivation has been investigated in many studies, both qualitatively, and quantitatively using various scales (Ray, 1986, reported over 70 scales; see also Conoley & Impara, 1995, test numbers 226,244,245; Blankenship, 1987; Clarke, 1973;

Fineman, 1977; Harper, 1975; Lian-Hwang Chiu, 1997; Piedmont, 1989; Thibert & Karsenti, 1996). Many of these scales do not give good measures of motivation and often refer to the questionnaire as being valid and reliable, rather than the data. There is evidence that measures using True Score Theory are not good, and have poor reliability and validity (Ray, 1986).

Most of these scales involve a relatively simple range of aspects and items. As such they do not 'capture' most of the aspects of motivation. These scales have all been analysed with traditional measurement techniques and not with modern interval-level models, such as Rasch Measurement Models (Rasch 1980/1960), even though modern measurement programs are now available to create interval level measures in which item difficulties and student motivation measures are calibrated on the same scale (Wright, 1985, Waugh, 2002). Lian-Hwang Chiu (1997), for example, reported that reviews of the literature showed that the score reliability and validity of many of these scales varied from satisfactory to poor. In addition, many of the scales are not based on a sufficiently detailed model of motivation itself, nor linked to behaviour which is often part of their definition.

Waugh (2002, p.69) identified seven general aspects of many motivation scales that are called into question. First, most of the scales are not based on a 12 aspect model of motivation (many scales had 4-6 aspects only). Two, most motivation scales are not designed to measure the motivation of a student who is highly motivated in one subject only and, at the same time, measure the motivation of other students who are motivated to achieve in some or many subjects. Three, Likert (1932) response formats contain a discontinuity between the response categories of disagree and agree. That is, the response measurement format is not ordered from low to high and those who are undecided, don't want to answer, are unclear or just neutral, will answer the middle (neutral) category. If a neutral category is not provided, they will be forced to answer either agree or disagree. This means there is a consequent interpretation problem. Four, researchers rarely test the linkage of their motivation scales to behaviour, despite behaviour being linked to motivation by definition. Hence, both *What they aim for* (motivation) and *What they actually do* (behaviour), ought to be measured at the same time and calibrated on the same scale. Five, the items measuring motivation to achieve

academically are not always separated into their sub-scales on the questionnaires, so that it is not clear to the students what is being assessed. Six, positively and negatively worded items are often mixed to avoid the fixed response syndrome (a common procedure in traditional approaches). There is some evidence that this causes an interaction effect between items in modern measurement models (see Andrich & van Schoubroeck, 1989). Consequently, it is considered better to word all items in a positive sense when using modern measurement models, or to treat positively and negatively worded items as belonging to separate scales, unless they can be empirically shown to measure the same construct. Seven, the analysis of most motivation scales has been performed with only traditional statistical programs and ordinal level scales.

Modern measurement programs can test the conceptual structure of motivation, including its dimensional nature (see Andrich, 1988a, 1988b; Andrich, Lyne, Sheridan & Luo, 1998; Rasch, 1960/1980; Waugh, 2002, 1998a,b). Rasch measurement model analysis has been shown as appropriate to use in measuring variables like motivation (see Andrich, 1985, 1982; Waugh, 2001, 1999,1998a,b; Wright & Masters, 1982, 1981).

Summary

Twelve models of motivation to achieve have been discussed in this chapter. These models propose varying aspects of motivation. Many of these models are deficient and cannot explain all aspects of motivation. Other models are not well authenticated by research, while most models have used poor measures with few (3 or 4) aspects of motivation. Thus, the validity and reliability of such models have been called into question. This literature review shows that there is a need to create a more comprehensive measure of motivation on a proper linear scale, using all the twelve aspects of motivation, as described in this review. Little research has been done on motivation to achieve academically for high school students in Malaysia. A study, that encompasses 12 aspects of motivation which were derived from literature review and creates a comprehensive linear measure of motivation, could make a contribution towards developing a better understanding of motivation and show how motivation works for high school students. The twelve aspects are standards, goals, tasks, effort,

ability, values, interest, learning from others, responsibility for learning, extrinsic rewards, intrinsic rewards and social rewards. There is a need to make a linear measure of motivation using all the twelve aspects. This is the need that the present study attempts to fill, with respect to high school students in Malaysia. The next chapter explains the methodology used in this study.

CHAPTER III

METHODOLOGY

This chapter explains the methodology used in this study. It starts by describing the model of motivation to be tested and, following this, the model of the questionnaire is described and explained. Next, measurement is discussed, beginning with the problems of measures based on True Score Theory, followed by an explanation of Rasch Measurement.

The sample for the questionnaire is explained. After that, the ethics approvals from Edith Cowan University and approvals from Malaysia are described. The data collection and data analysis section follows. This section explains the administration of questionnaire, the preliminary data analysis, and the how final data analysis was done. The chapter concludes with a summary.

Model of Motivation

Model of Motivation to be tested

This study tested a model of motivation based on three aspects of academic motivation - striving for excellence, desire to learn and personal incentives. Striving for excellence was defined in terms of six second-order aspects: standards, goals, tasks, efforts, values and ability. Desire to learn was defined in terms of three second-order aspects: interest, learning from others, and responsibility for learning. Personal incentives were defined in terms three second-order aspects: extrinsic, intrinsic and social rewards. It was expected that students would form two perspectives of each aspect - an attitude (this is what I aim for) and which would in turn influence their behaviour (this is what I actually do). From the twelve second-order aspects, items were devised and conceptually ordered by expected difficulty. It was also expected that students would vary in their attitudes (and behaviour) for these twelve aspects for different academic subjects. The model allows for this variation by using responses relating to the number of subjects studied. The Rasch measurement computer program

calibrates the motivation measures and the item difficulties on the same linear scale, and this enables the motivation model to be tested.

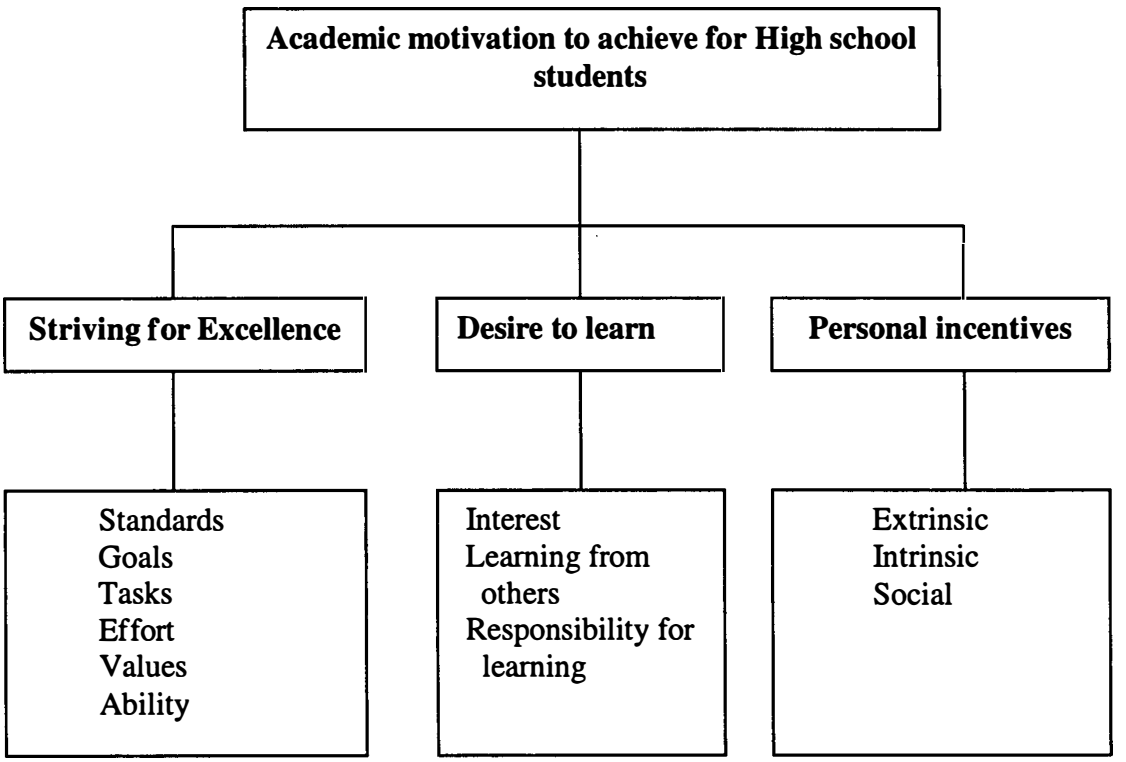

Figure 3.1 A model of academic motivation to achieve for high school students.

Source: Compiled by the author from the literature review (and from Waugh, 2002)

In other words, the motivation model tested in this study is based on the attitude and behaviour of students relating to striving for excellence (standards, goals, tasks, effort, values and ability), desire to learn (interest, learning from others, and responsibility for learning) and personal incentives (extrinsic, intrinsic and social). The items designed to measure these aspects were conceptually ordered from easy to hard in ordered-by-difficulty patterns. The model of academic motivation assumes that students form an attitude towards each of the twelve second second-order aspects for each of their academic subjects and that this attitude influences their behaviour towards each of the twelve aspects. This model attempts to account for the variety of attitudes (and

behaviours) towards the twelve aspects in relation to the variety of the academic subjects studied. It attempts to account for students who are highly motivated in only one subject, as well as those motivated to achieve in many, and to do this by allowing for variation in motivation amongst all twelve aspects. This model of motivation becomes clearer when one examines the model of the questionnaire.

Model of the questionnaire

The questionnaire in this study is based on the conceptual model stated above, where the items in their second-order aspects are organised according to their difficulty, in Guttman-like patterns, or ordered-by-difficulty patterns. These patterns can be seen in the questionnaire in table 3.1 and in the examples below.

Each item addressed two perspectives, *what I* aim *for* and *what I actually do*. It was expected that *what I aim for* will be 'easy' on average and *What I actually do* will be 'harder' on average. *What I aim for* was expected to be stated by the students in terms of the number of subjects to which it applies. It was expected that this would reflect the students' needs, expectations, cognitions and desires, all internally and covertly contained within the students' minds, but now generally expressed in terms of what they aim for in their subjects. *What I actually do* was expected to be stated by the students in terms of the number of subjects to which it applies, too. It is expected that this would be influenced by the students' personal beliefs, needs and cognitions, and by the influence of the time available for academic work in competition with other aspects like having fun, listening to music, going out and so on, all now expressed as to what they actually do in their subjects.

The model of the questionnaire is structured in such a way that it can measure motivation of students who are highly motivated in one, or a few subjects, as well as for students who are motivated in some, or many subjects. For example, the model can measure the motivation of a student who spends a lot of time on one subject that he or she likes and not much on other subjects. This is because the response categories were ordered into a format that provided an ordered measurement structure; in none or only

one of my subjects, in some of my subjects, in most of my subjects, and in all my subjects.

In the aspect, *striving for excellence*, under *standards*, it is expected that most students will find it 'easy' to say that they aim to study hard as much they can (item 1) in all their subjects. It is expected that most students will find it 'harder' to say that they aim to Evaluate their performance against the academic standards they set themselves (item 2) in all their subjects and that there may be some variation around this. This is because item 2 involves 'a little bit more effort' conceptually than item 1. That is, to evaluate one's performance involves providing time to reflect on one's behaviour and action towards studies and requires more effort than to aim to study hard. It was expected that most students would find it 'harder still' to say that they set for themselves the highest academic standards which they believe they can achieve (item 3) and that there would be some variation around this. This is because item 3 involves 'a little bit more effort' conceptually than item 2. So it was expected that these three items (1 to 3) will form an ordered pattern of responses by 'difficulty', on average, from 'easy' to 'hard', when students report What they aim for. This is the vertical ordering of stem-items by 'difficulty' in the questionnaire set out in table 3.1.

Correspondingly, similar to the explanation above, it was expected that this vertically ordered pattern of 'difficulties' for the students' self-views of *What they aim for*, in relation to the three items for Standards, would be repeated for their self-views of their behaviour (What they actually do) (Items 1, 2, 3). That is, for the *What I actually do* self-view, the items would be ordered in 'difficulty' from 1 ('easiest') through 2 to 3 ('hardest'), as they are expected for the perspective *what I aim for*.

This vertically ordered pattern of item difficulties is similar for the items in each of the other sub-groups. The explanations for the vertical ordering is not repeated here to avoid repetition, but a reader can easily understand the conceptual ordering by looking at Table 3.1 and the aspects of motivation.

There is also a horizontal ordering of items-by-perspective for each item. That is, for example, I study hard as much as I can (item 1) is expected to be easier in the *what I aim for* perspective than in the *what I actually do* perspective. This is because it requires more effort and will power to actually study hard than to aim to study hard.

This reasoning applies to each of the items in Table 3.1 and is not repeated here. This model of motivation can be tested by measuring the difficulties of the items of the questionnaire, using a Rasch measurement model.

The Questionnaire

The questionnaire initially contained 50 motivational items with a heading 'Motivation to Achieve'. These were taken from the Motivation to Achieve Questionnaire developed by Waugh (2002). They were adapted and simplified to suit high school students in Malaysia.

The 50 items are set up under twelve second-order aspects:

Striving for excellence

(1) Three items measuring standards
(2) Five items measuring goals
(3) Six items measuring tasks
(4) Five items measuring effort
(5) Two items measuring values
(6) Four items measuring ability

Desire to Learn

(7) Three items measuring interest
(8) Six items measuring learning from others
(9) Two items measuring responsibility for learning

Personal incentives

(10) Three items measuring extrinsic rewards
(11) Four items measuring intrinsic rewards
(12) Four items measuring social rewards

All these items were answered in two perspectives (*what I aim for* and *what I actually do*) in relation to motivation to achieve academically, so that the same single trait was influencing all the items, and both perspectives, theoretically.

Table 3.1 QUESTIONNAIRE: MOTIVATION TO ACHIEVE ACADEMICALLY

This questionnaire is anonymous. Please do not write your name, or any other comments that will make you identifiable on it. By completing this questionnaire you are consenting to take part in this research. As such, you should first read the enclosed disclosure statement carefully as it explains the intention of this project.

Please rate the 50 items according to the following response format and place a number (1 - 4) corresponding to ***What I aim for*** and ***What I actually do*** on the appropriate line opposite each statement:

In all of my subjects	put 4
In most of my subjects	put 3
In some (few) of my subjects	put 2
In none or only one of my subjects	put 1

Item no.	Item wording	*What I aim for*	*What I actually Do*
Aspect: Striving for Excellence			
Standards			
1.	I study hard as much as I can.	----------	----------
2.	I think about what I want to attain in my studies.	----------	----------
3.	I set for myself high scores which I believe I can achieve.	----------	----------
Goals			
4.	I try different ways to solve academic (study) problems.	----------	----------
5.	I set realistic and challenging academic (study) goals.	----------	----------
6.	I set highest academic goals which I can achieve.	----------	----------
7.	When I don't get what I expect in my studies, I work hard so that I may achieve my goals.	----------	----------
8.	If I don't attain my goals, I try again and again.	----------	----------
Tasks			
9.	I do study outside (beyond) class homework.	----------	----------
10.	I just aim to complete homework.	----------	----------
11.	I try to do all studies which I think I might succeed.	----------	----------
12.	I try to do most studies which I think I might succeed.	----------	----------
13.	I attempt only the average of my studies which I might succeed.	----------	----------
14.	I only choose the easy study work which I think I will succeed	----------	----------
Effort			
15.	I make strong demand on myself to pass in my studies.	----------	----------
16.	I struggle hard to get correct answers in homework given.	----------	----------
17.	I check my work carefully so that I can get good marks.	----------	----------

18. I prepare myself to get high marks in my studies. ---------- ----------
19. I make strong effort to achieve as high marks as I can. ---------- ----------

Values

20. When I have not enough time for studies, I think about the importance of education. ---------- ----------
21. I value achievement (passing) in studies. ---------- ----------

Ability

22. I have confidence that I can pass in my studies. ---------- ----------
23. I receive encouragement on my studies from my teachers. ---------- ----------
24. I receive encouragement from at least one friend on my ability in my studies. ---------- ----------
25. I receive encourage from at least one of my parents on my ability in studies. --------- ----------

Aspect: Desire to Learn

Interest

26. I show genuine interest in learning. ---------- ----------
27. I show interest in the subjects I take. ---------- ----------
28. I read and research widely on different topics. ---------- ----------
29. I get interested in solving problems that others have as well in a topic. ---------- ----------
30. I show interest about topics being taught. ---------- ----------
31. I concentrate in my academic work. ---------- ----------

Learning from others

32. I participate in classroom discussions. ---------- ----------
33. I participate in small group work/discussions. ---------- ----------
34. I ask questions on topics I do not understand from others. ---------- ----------
35. I try to learn from others who are better in studies than me. ---------- ----------
36. I seek help from experts (e.g., teachers) in my studies. ---------- ----------
37. I pay attention to my teachers to understand what is being taught. -------- ----------

Responsibility for Learning

38. I take my studies as a personal responsibility. ---------- ----------
39. I struggle to gather information on topics so that I can master them. --------- ---------

Aspect: Personal Incentives

Extrinsic Rewards

40. I like the rewards that studies bring. --------- ----------
41. I try to work hard because doing well in studies

brings high status. ---------- ----------

42. I like to study in order to be the winner in my class. ---------- ----------

Intrinsic Rewards

43. I like studies because we interact with friends while we study. ---------- ----------

44. I try to work hard in studies because of the challenges it brings. ---------- ----------

45. I like the intellectual challenge brought about by academic work. ---------- ----------

46. I like to solve problems in studies. ---------- ----------

Social Rewards

47. I like the social relationships involved in studies. ---------- ----------

48. I have fun with peers as we study. ---------- ----------

49. I get honour and praise from my family for passing in my studies/exams. ---------- ---------

50. I get honour and praise from teachers for passing in my studies/exams. ---------- ---------

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Interviews

The in-depth qualitative interviews in this study were designed to contribute to our knowledge about the students' motivation to achieve academically. In-depth interviewing is a qualitative technique that can be described as "a conversation with a purpose" (Marshall & Rossman, 1989, p.82). The interviews may vary in the degree of structure and the amount of latitude respondents have in answering questions. In this study, the interviews conducted were less structured, so as to allow for more detailed probing and freer exploration of students' motivation to achieve, than might otherwise be the case.

Semi-structured face-to-face interviews were chosen as the preferred method to validate and triangulate data obtained from the questionnaire, and to add scope and breadth to the study. The interview method has the advantage of obtaining in-depth data

that is not possible with a survey (Gay, 1987; Minichiello, Aroni, Timewell, & Alexander, 1991). The interview format also allows for flexibility and the opportunity to clarify questions and responses with the subjects in order to understand more about a concept than may be possible with a one-off survey (Rosnow & Rosenthal, 1996; Fontana & Frey, 1994). The interviews were used for validating, clarifying, and seeking further information, on issues identified in the questionnaire. Patton (1990) suggested that using a semi-structured approach (referred to by Patton as the interview guide approach) allows important issues or topics to be outlined in advance. The process also allows for addressing gaps identified in earlier data collection and following a semi-structured interview format means that data collection is "somewhat systematic for each interviewee (Patton, 1990, p.288).

The qualitative methodology in this study can make three broad contributions to the overall understanding of motivation to achieve academically. First, the interviews help us understand the complexity of students' understanding of motivation and variations in aspects that they consider to motivate them to achieve academically. Second, these contextualised examples suggest hypotheses to test using the larger-scale quantitative data which were analysed with a Rasch computer programme. Third, these data enrich the overall understanding of motivation for high school students, allowing us to tell a more comprehensive story of how students motivate themselves, or are motivated, to achieve academically, and why some students are motivated to achieve while others are not.

Interview Guidelines

The key interview questions that were addressed included the following:

1. How do students perceive and gauge their own motivation to achieve?
2. What motivates students to achieve academically?
3. Why are some students motivated to achieve academically in certain subjects while others in the same learning environment are not?
4. Are there people (e.g., teachers/parents etc) who motivate students? If so, who are they and how do they motivate students to achieve academically?

5. What makes students strive for excellence and desire to learn?
6. What makes it difficult for students to achieve academically?
7. What kinds of things do teachers do to motivate students to achieve academically?
7. What kinds of rewards help students to strive to achieve academically?
10. Apart from the three aspects of motivation identified in literature review (Striving for excellence, desire to learn and incentives), do student identify any other aspect or sub-aspect that is part of, or linked to their motivation to achieve academically?

The interview questions were based on an informal discussion on students' motivation that was conducted prior to the main interview. The discussion explored students' opinions, experiences, and perceptions of motivation to achieve. The discussion helped the researcher to formulate the above broad and open-ended questions. The researcher who was the interviewer asked the students the open-ended questions and then used followed up with probes to elicit more information on item being discussed. This format allowed the students to describe their experiences in a more narrative manner, without the limitations of structured questions with only yes/no or multiple choice answers.

Although qualitative interview data are not statistically representative of the general population being studied, they can generate common themes, as well as in-depth data on specific subgroups. Quantitative Rasch analysis was used to determine whether, or how, these themes apply to the sample as a whole.

The in-depth interview used in this study allowed the researcher to probe the motivational items and their connections to academic behaviour. The qualitative data collected through in-depth interviews

provided powerful illustrations of how academic motivation plays out in the lives of students.

Measurement

Problems with measures based on True Score Theory

Most researchers studying motivation have analysed their data using True Score Theory. True Score Theory cannot, however, produce anything better that a ranking of measures. It undoubtedly cannot create a linear measure (see Wright, 1999).

A characteristic measure of motivation (or other educational psychology variable for which data are analysed with True Score Theory) consists of a set of items worded in a simple manner without any conceptual order by difficulty and answered in four or five Likert response categories. For example, I try different ways to solve academic problems (item 3) (strongly agree, agree, neutral, disagree or strongly disagree), and I set realistic and challenging academic goals (item 4) (strongly agree, agree, neutral, disagree, strongly disagree). These response categories are not conceptually ordered from low to high. They have a discontinuity in the middle and, typically, in the data analysis, no check is made that the answers of the respondents to the Likert categories are consistent with the Likert category answers of the other items. In True Score Theory, the items are not designed to be ordered from easy to hard, as is required in the construction of a proper scale of items in Rasch measurement. The total score is used as the measure of motivation and this is clearly not part of a linear scale, just a ranking. A uni-dimensional trait is inferred if the factor analysis of data from all the items shows a high inter-item correlation supporting the inference of a dominant unifying factor. This often leaves items that contribute to 'noise' or error in the measurement of motivation.

Wright (1999) points out the problems with accepting True Score Theory to produce measures of educational psychology variables, like motivation. He produces evidence to show that counting events does not produce equal units of measurement (Wright, 1999, pp. 69), that raw, summed scores are not measures and shouldn't be interpreted as such (pp. 70 – 71), and argued that Rasch measurement models are the

current only known mathematical models that can be used to create proper linear scales of variables in educational psychology (pp. 77-80).

In True Score Theory, perfect and zero scores are modelled to be exact. They have no error variance. Consequently, including extreme scores lowers the average score error and inflates the reliability. In Rasch theory, the extreme score is recognised as containing little information about the person's location on the infinite latent trait. Any arbitrary 'measure' set to correspond to such a score has an infinitely large standard error. Thus, including persons with extreme scores increases the average measurement error and lowers Rasch Person Separation Reliability (Linacre, 1996).

Rasch Measurement

The original Rasch model developed by Danish mathematician Georg Rasch in the 1950's, was the Simple Logistic Model (Rasch 1980/1960) which was used to analyse dichotomous responses. Subsequent work has extended Rasch models to incorporate polychotomous responses where three or more response categories are used to compare measures (Anderson, 1995; Andrich, 1988a, 1988b). Central to the notion of objective measurement in Rasch models, also termed specific objectivity or sample free measures (Andrich, 1988b; Douglas, 1982; Wright & Masters, 1982) is that both items and people can be calibrated on the same scale. That is, the differences between pairs of item difficulties are expected to be sample independent, which is a requirement of the measurement.

The Rasch Measurement Model (Rasch, 1960/1980) specifies the probability of agreement with an item which is sample independent and empirically testable. It produces scale-free measures and sample-free item 'difficulties' (Andrich, 1988b; Wright & Masters, 1982). Mathematically, this means that the differences between pairs of measures and pairs of item 'difficulties' are anticipated to be relatively sample independent in Rasch measurement. This differs from the True Score Test Theory, where the sums of scores on the items and the item 'difficulties' are not calibrated on the same scale, and hence the totals are strictly sample dependent. True Score Test Theory cannot produce anything better than a ranking scale that will vary from sample

to sample. The goal of constructing a proper measurement scale for motivation (a scale akin to a ruler) cannot be accomplished through True Score Measurement (Waugh, 2002).

The most striking properties of the Rasch model compared to True Score Theory pertain to the powerful possibilities of testing the fit of the model, that is, whether measurement is actually accomplished. A fit analysis may be carried out on three levels. First, on the item level, the suitability of an item as an indicator may be examined by comparing the expected probability of agreement with an item and the observed proportion for any person location level (Rost & Davier, 1994). Second, on the person level, the likelihood of the empirical response pattern given the person location may be determined (Reise, 1990). Third, model features, as the sample independence, may be used to test the model. The Rasch model may be generalised to polytomous items with ordered categories without any additional theoretical input. The formulation of an extended Rasch model (e.g. the rating scale model, Andrich 1978a, 1978b; the partial credit model, Masters, 1982; Andrich, 1988b) follows directly from the application of the dichotomous model to any pair of adjacent categories within an item. A threshold parameter shows where two adjacent categories are equally likely.

Unlike the graded response model (Samejima, 1969), the Rasch approach models the thresholds for each item independently. Consequently, the ordinal scale properties represent a testable hypothesis (Andrich, 1995a; 1995b). Whenever thresholds are reversed, i.e. not appropriately ordered, the scale does not work as anticipated.

The dichotomous Rasch measurement model (Rasch, 1960/1980) provides a probabilistic formulation of a deterministic Guttman model. The Rasch method provides us with the mathematics and way to create linear measures of variables. There are five main requirements for linear measures in educational psychology (Wright, 1999, p.100): (1) Measures must be linear, in the sense that equal differences between the numbers on the scale must equal the same amount of what is being measured, so that adding, subtracting, dividing, and multiplying can be done with them; (2) item difficulties must be calibrated sample-free; (3) person measures must be calibrated test-free; (4) persons must be able to be measured on parts of the scale targeted at their

abilities so that other parts of the scale do not affect their measure; and (5) the method should be easy to apply.

The Simple Logistic Model of Rasch (Rasch 1980/1960) is used to create measures when item responses are dichotomous, as in yes or no, right or wrong, never or sometimes. The Extended Logistic Model of Rasch is used when the response categories are three or more (see Andrich, 1988a), as in none, sometimes, often or nearly always, which is applicable to this study. Currently (probably), the best computer program to use in creating a linear scale is Rasch Unidimensional Measurement Models (RUMM) (Andrich, Sheridan, Lyne & Luo, 2000). The computer program makes six tests of the data to fit the measurement model so that a linear scale can be created (see Waugh, 2003). Before these are explained, one must first understand that the Rasch Model requires that data fit the measurement model and not the other way round (see Andrich, 1989). The measurement requires that item difficulties be ordered from easy to hard. It requires that persons with high measures most probably answer the hard, medium and easy items positively, that persons with medium measures most probably answer the medium difficulty and easy items positively (but not the hard items), and that persons with low measures most probably answer the easy items positively (but not the medium difficulty and the hard items). Mathematically, the Rasch Method produces scale-free person measures and sample-free item difficulties (Andrich, 1988b; Wright & Masters, 1982, 1981). This means that differences between pairs of person measures and the corresponding pairs of items difficulties are sample independent, a requirement of a linear measure.

The six tests of data to fit a linear scale with the RUMM computer program (Andrich, Sheridan, Lyne & Luo, 2000) are now given (see also Waugh, 2003). One, item thresholds are calculated in relation to the category responses. At a threshold, persons have odds of 1:1 of answering adjacent categories. Three response categories means that there are two thresholds, four response categories means that there are three thresholds, and so on. If the category responses are answered consistently by persons, in line with their person measures and the item difficulty, then the thresholds for that item are ordered in correspondence with the ordering of the response categories. Otherwise the item is deleted.

Two, an item-trait test-of-fit (a chi-square) is calculated with corresponding probability of fit (see Andrich & Van Schoubroeck, 1989, p. 479 – 480 for the equations). If the observed and the expected values are not significantly different, then there is no significant interaction between the responses to the items and the person measures along the trait, according to the measurement model. The test shows the collective agreement for all items across students of different measures along the scale and indicates whether a uni-dimensional trait (inferred by a single score for each person) can be used to describe each person's item response.

Three, an item-person interaction and a person-item interaction are calculated. The item-person test-of-fit examines the response patterns for items across persons and the person-item test-of-fit examines the response patterns for persons across items (see Styles & Andrich, 1993, p. 914 for equations). The fit statistics approximate a distribution with a mean near zero and a standard deviation near one, when the data fit the measurement model. Negative fit statistics indicate a response pattern that fits the model too closely (probably because response dependencies are present, see Andrich, 1995) and positive fit statistics indicate that the other measures are present as 'noise'.

Four, a Person Separation Index is 'constructed as the ratio of estimated true variance among persons and estimated observed variance among persons, using the estimates of their locations (measures) and the standard errors of these locations (measures)' (Andrich & Van Schoubroeck, 1989, p.483). For good Rasch measures, this index would always be expected to be greater than 0.90 and is interpreted in the same way as a Cronbach Alpha. Standard errors of measurement for the measures and the item difficulties are calculated (see Wright & Masters, 1982, for the equations).

Five, residuals are calculated for item and for persons. Residuals are differences between the expected values predicted from the model and the observed values. For good measurement, residuals should be minimised, but this depends on collecting good data and on the persons answering the questionnaire properly and consistently in line with the truth.

The sixth test concerns construct validity of the data (note: in modern measures the data are valid and reliable, not the questionnaire). The questionnaire measuring motivation has items designed to be ordered from easy to hard in each sub-group. Each

item will be answered from two perspectives, which themselves are ordered from easy to hard. So the questionnaire has different items ordered vertically from easy to hard, with each item perspective ordered horizontally from easy to hard. This structure of conceptual item difficulties can be tested by examining the actual item difficulties, and so the construct validity of the data supporting the model behind the questionnaire can be tested.

Samples

Students (questionnaire)

In this study, data were collected from a convenience sample of 522 high school students in Kota Kinabalu, Sabah state in Malaysia. The sample consisted of senior high school students (Years 12 and 13) aged between 16 to 18 years. There were 294 girls (56%) and 228 boys (44%). The schools have both boys and girls studying in the same environment. Students participated on an anonymous and voluntary basis.

They were selected from three private schools in Malaysia. One of the schools, "Oakwood High School" (this is a pseudonym for confidentiality purpose) is a Chinese managed private school which is part of the national system of education in Malaysia. The second school "Ryan Senior School" (this is also a pseudonym for the purpose of confidentiality) is a famed semi-government high school which is part of the national system of education in Malaysia. The third school, "Brookwood High School" (this is also a pseudonym for the purpose of confidentiality) is a Christian high school run on a non-profit basis, and is part of the national education system.

From a socio-economic point of view, the majority of the participants in this study belong to the upper and middle class society. They come from families that have opted to educate their children in private schools, which charge slightly higher fees for tuition, and other fees compared to the government schools. In turn, the parents of these students expect a better education for their children. It is thus clear that only students who can afford to pay higher fees than the ones charged in government schools can join these schools. Only a few students join these schools from the poor section of the society. These are the ones who have been offered scholarships. Such scholarships are competitive and are offered on a merit basis.

Student (Interviews)

A fixed sample for the interviews in phase two of this study was not determined at the outset. Informed by Strauss and Corbin (1990), the sampling decision evolved as the research progressed. Bearing in mind that there is little or no benefit in continuing the process of interviewing individuals once saturation of data or concepts is achieved (Strauss & Corbin, 1990), the end number of subjects for phase two of the study was 45 students. Sampling for the interviews was also 'purposive' to some extent, using the 'snowball technique' (Bouma, 2000; Oppenheim, 1992). This involved approaching those students known to the researcher, or those who had volunteered first, and asking them to nominate others they know and so on. It was anticipated that most students who had volunteered to be interviewed would tend to be relatively confident. So in an endeavour to achieve some balance, four students who were known to lack some confidence were approached. The four students indicated they would be willing to participate in an interview. It was interesting to note that only one student who was approached said, in effect, that she was not sure that she would be of much 'help' to the research.

The sample selected for the interviews were students who had participated in answering the questionnaire. Participation in the interviews was on voluntary basis, and this was conducted in their schools. Twenty-five of the student participants were boys and the other twenty were girls.

The sample was helpful in finding out why they answered the motivation items in the questionnaire the way that they did and also to find out if there were issues that were not handled in the questionnaire, yet needed attention with regard to their motivation to achieve academically. This was to delve deeper into the motivation thinking of some of the students.

Ethics Approvals

Approvals from Edith Cowan University

To get approval to conduct research involving human subjects from Edith Cowan University, one has to demonstrate that ethical considerations have been considered. This researcher demonstrated this aspect and was granted approval to

conduct the research using a sample of high school students. As required by the Ethics Committee of ECU, a letter was attached to the questionnaire outlining the purpose of the research and the rights of the participants (see appendix A). In this latter, it was indicated that participation in the study was voluntary and students could pull out at any time without prejudice. It also indicated that students' participation had nothing to do with any formal, or informal assessment, in their school subjects.

The letter attached to the questionnaire indicated that no names were required on the questionnaire and individuals were to remain anonymous. The research results would be published without names of students, and participants were informed that if they wanted, they could obtain a copy of the results or ask any questions about the study by contacting the researcher or their school's principal. The contact address of the researcher was included in the letter to participants.

Before granting Ethics approval, the committee asked this researcher not to question the integrity of the students when validating their responses through interviews after the administration of the questionnaire. The Ethics Committee required that verbal and written responses be dealt with in such a way that students do not feel their honesty is being questioned. After giving a response to this concern, the researcher was granted approval to conduct research involving human subjects by Edith Cowan University.

Approvals from Malaysia

Before administering the questionnaire to students in Malaysia, approval was sought from the administrators of the schools that participated in the study. A letter addressed to the Principals was written to seek permission to conduct the research. The letter (see appendix A) gave the details of the study, and requested that the researcher be allowed to conduct research by involving senior students of he school on voluntary and anonymous basis. The school administrators were happy to grant approval to use their students in their school. School Principals requested to see the research questionnaire before it was administered and this was provided to them. After going through the questionnaire, and ascertaining that all ethical and moral issues had been considered, approval was granted.

Consent to participate was also sought from the students. Before asking the students to fill in the questionnaire, a letter addressed to them at the front part of the questionnaire was discussed. The letter (see appendix B) gave the details of the study, and requested them to participate on voluntary and anonymous basis. Only those who accepted to participate were given the questionnaire. Most students were very willing and accepted to participate in this study.

Pilot testing

Questionnaire

Before the main data collection, a formal pilot test of the questionnaire was trialled using a sample of 30 students. Students were selected from the three schools that were participating in the study. Students selected to participate in this study were all able to read and understand the English language.

During the pilot testing of the questionnaire, each participant was asked to answer the questions on the motivation questionnaire. After completing the questionnaire, each participant was asked to provide either verbal, or written feedback, on several aspects. The aspects are adapted from Bell (1987, p. 65). They are:

1. How long did the questionnaire take to complete?
2. Were the instructions clear? Should any instructions be changed?
3. Did you understand all the questions? Do you think there is any question that needs to be altered to make the meaning clearer?
4. Were the response categories workable and understandable?
5. Did you object to answering any questions?
6. Was there any major aspect of motivation that you think was left out?
7. Is there anything that needs to be improved in the questionnaire?
8. Do you have any other comments about the questionnaire?

The pilot questionnaire took 20 to 30 minutes to complete. Students were allowed enough time to complete the questionnaire. Students reported that the

instructions on how to rate the 50 items according to the given response format (*What I aim for* and *What I actually do)* by placing a number (1 - 4) on the appropriate line opposite each statement were clear. An explanation of how to complete the questionnaire was given using an example, before they filled in the questionnaire. Students, thus, did not feel the need for instructions in the questionnaire to be changed.

In the pilot testing of the questionnaire, students reported that the response categories were workable and understandable. Some students, however, reported that they could not understand some of the questions. The researcher discussed the questions that were not clear with the students.

In making their recommendations, students said that some items would be easily understood if the wording was tuned in line with common regional use of English language. They asked that some item wording of a few questions be improved in the questionnaire. For example, students said that instead of using the term 'academic tasks', this could be changed to 'studies' and/or 'homework'. Even though the terms are not exactly synonymous, a consideration of this was made. After this cordial discussion, it was decided that the wording be altered to make their meaning clearer.

Following this discussion, the questionnaire was revised. The response categories remained the same, but the item wording of some questions was changed with simpler words. Words that are not easily understood by students such as: evaluation, conscientiously, intellectual, and academic tasks, were replaced in the wording of the questionnaire. Some other questions were rephrased. The item wordings that were altered were for questions 2, 15, 18, 19, 20, 23, 24, 25, 31 and 36.

No student objected to answering any questions. All were willing to participate and considered themselves privileged to take part in initial pilot testing of the questionnaire on motivation. Students said they could not think of any aspect of motivation that had been left out. They however commented that some students seem to have no motivation to achieve at all. Explaining their points, students said some students did not take their studies seriously and did not portray a keen interest to achieve academically. Such students believed that they have all they need in terms of friends and money for their own enjoyment. Participants, however, agreed that many students valued education and had high expectation to achieve academically. From this

discussion in the pilot study, it was decided that a more detailed oral discussion with students be organised. This would form a qualitative analysis of students' motivation in this study and led to the interview questions.

Data Collection

Administration of main questionnaire

From the responses gathered during the pilot testing of the questionnaire, changes were made and a final questionnaire was prepared. The final questionnaire was then administered to 522 students of Years 12 and 13 in three schools. One teacher accompanied this researcher during data collection and was helpful in distributing the questionnaire. Before students begun to respond to the questions, they were asked to give true and accurate answers. Enough time was given to the students to answer the questionnaire. This helped in obtaining good and valid data. The research questionnaire took 20 to 35 minutes to complete. Students filled in the questionnaire in their schools.

Administration of the Interviews

After the informal discussion on students' motivation, the main interview was organised. The discussion explored students' opinions, experiences, and perceptions of motivation to achieve academically. An atmosphere that was conducive was chosen for the interviews and students were asked to be as free and open as they can during the discussion. All students responded willingly. They were willing to discuss all questions and enough time was allocated for the interviews. The interviews generally took 35 to 55 minutes. The interview data were accurately recorded, and numbered by student, paragraph and line.

Data Analysis

Responses of the questionnaire were entered into an excel file in terms of the response category codes (1, 2, 3, and 4). The data were then analysed using the Rasch Unidimensional Measurement Models (RUMM 2010) program (Andrich, Sheridan, Lyne & Luo, 2000). At the outset, the program discarded two students due to corrupted data, thus leaving the data of 522 of the 524 students for subsequent analysis. A number of steps were taken in order to create a proper scale of motivation to achieve academically for high school students. To begin with, the item thresholds were checked so that only those items with ordered thresholds (indicating that the response categories for the item were answered consistently and logically) were included in the final analysis. Next, the residuals were examined, the residuals being the difference between the expected item 'difficulty' calculated according to the model and the actual 'difficulty' as agreed on by teachers. The item-trait chi-square of items were then checked to identify items that fitted the model. This chi-square examines the consistency of the item parameters across the student motivation measures for each item. Next, the person-item test-of-fit was investigated. The non-fitting items (30 out of the original 50, determined through the steps above) were discarded from the scale, and a proper linear scale with only 20 items that fitted the Rasch model was created. Finally, the person measures (student motivation scores) and item 'difficulties' were calibrated on the same scale by the RUMM 2010 computer program, thus providing the final analysis of the model of student motivation to achieve academically.

The interview data were analysed qualitatively and manually. Interview data were analysed from transcripts. Statistical comparisons between the students were made using non-parametric statistics. Responses were entered on data recording sheets. Data from the 45 data sheets of each student interviewed were analysed. This involved coding students' responses according to emerging pattern. The results of the analysis of the interview data are set out in chapter V. The coded responses formed the subtopics for Chapter V.

Summary

This study used a questionnaire to collect data on motivation using items that form a multi-aspect model and which are influenced by the same single trait, motivation to achieve academically. This model was based on Striving for Excellence (Standards, Goals, Tasks, Effort, Values and Ability), Desire to Learn (Interest, Learning from Others and Responsibility for Learning), and Personal Incentives (Extrinsic, Intrinsic and Social). The sample was 522 students in high school (A-level) in Malaysia. A model of motivation was created where items were ordered from 'easy' to 'hard' and the measures of motivation are ordered from low to high. The data were analysed with the computer program Rasch Unidimensional Measurement Model (RUMM-2010) (Andrich, Lyne, Sheridan & Luo, 2000) to create a linear scale. The results of the analysis of the questionnaire data are set out in the next chapter. This includes the results of the Rasch analysis, motivation measures, item difficulties and the psychometric characteristics of the scale.

The pilot test of the questionnaire and the discussions with some students, led the researcher to devise some interview questions. The reasons for interviewing a sample of the 522 students was to find out why they had answered the motivation items the way they did and to delve deeper into the motivation thinking of some of the students. A sample of 45 students was interviewed. The results of the analysis of the interview data are set out in Chapter V.

CHAPTER IV

RESULTS
(PART A - MEASUREMENT)

This chapter begins with the results of the analysis of the data using the computer program Rasch Unidimensional Measurement Model (RUMM-2010) (Andrich, Lyne, Sheridan & Luo, 2000). In this section, the Rasch data reliabilities and the fit statistics to the model for the 20 stem-items (effectively 40 items) motivation scale (N=522) are presented. Then, a scale of Motivation to Achieve Academically in Malaysia is presented and discussed. This is followed by an explanation of the psychometric characteristics of the scale–data followed by a discussion on item fit to the measurement model. Next, the non-fitting items are discussed followed by the meaning of the motivation scale. This is followed by an explanation of the content valid, but non-fitting items. The category curves are then presented and discussed. The chapter then concludes with a summary.

Analysis of the data

Rasch Data

The results are set out in four Tables and six Figures. Table 4.1 gives the global fit statistics for motivation from the Rasch analysis, the Index of Student Separation (proportion of observed variance considered true), and the item trait statistic for the 20 stem-item scale. Table 4.2 shows the Item difficulties (locations), Standard Error (SE), residuals and fit to the measurement model. Table 4.3 shows the motivation items and their difficulties. Table 4.4 shows the difficulty of the aspects of Motivation

Figure 4.1 shows the person measures versus the item thresholds for all the items that fit the measurement model. Figure 4.2 shows the person measures of motivation versus the item thresholds for the aspect Striving for Excellence, while figure 4.3 shows the person measures of motivation versus the item thresholds for the aspect Desire to Learn, and Figure 4.4 shows the person measures of motivation versus

the item thresholds for the aspect Incentives. Figure 4.5 shows the category curve of a good fitting item, while figure 4.6 shows the category curve for a not-so-good fitting item.

Psychometric characteristics of the motivation scale data

Twenty items relating to motivation and twenty corresponding items relating to self-reported behaviour were shown to have a good fit to the measurement model. The item-student tests-of-fit (see Table 4.1) indicate that there is acceptable consistency of student and item response patterns. That is, there is acceptable agreement amongst the students to the item 'difficulties' along the scale. When the items fit the measurement model, the fit residuals have a mean near zero and a standard deviation near one. The fit residuals for the items are good, but the fit residuals for the persons are only just acceptable.

Thresholds are the estimated boundaries between adjacent response categories for each item where the odds are 1:1 of answering in none, some, most or all the subjects, students need correspondingly higher motivation score in order to provide a positive response. The results show that the item threshold values are ordered from low to high. This means that the students have answered the questions consistently and logically with the ordered response format used. 30 of the original 50 stem-items were discarded (see Appendix A), because they had reversed thresholds indicating inconsistent category responses, or the students could not agree on the 'difficulty' of the item on the scale (according to the fit statistics). That is, these 30 items did not satisfy all of the criteria for measurement, but the twenty remaining stem-items did.

The Index of Student Separability (akin to traditional reliability) for the 40 item scale is 0.92. This means that the proportion of observed variance considered true is 92% and is very high.

The global item-trait interaction probability is 0.43 (df=280) (table 4.1) and this indicates that there is no significant interaction between student responses to the items and the location values of the students along the motivation scale. That is, it is a unidimensional measure of motivation, and there is a strong agreement between all 522 students to the different difficulties of the items on the scale.

The items are appropriately targeted against the motivation measures. That is, the range of item thresholds matches the range of motivation measures on the same scale (see Figure 4.1). The measures range from -1.8 to +2.4 logits and the thresholds from -2.4 to +2.2 logits.

Table 4.1: Global fit statistics for motivation from the Rasch analysis (n= 522, I = 40)

ITEM-PERSON INTERACTION					
	ITEMS			PERSONS	
	Location	Fit Residual		Location	Fit Residual
Mean	0.000	0.50		0.44	-0.43
SD	0.633	1.08		0.72	2.25
Skewness		0.34			-0.16
Kurtosis		-0.85			0.11
Correlation		-0.05			0.11
Complete data DF =		0.97	Complete data DF =		0880.000

ITEM-TRAIT INTERACTION		RELIABILITY INDICES	
Total Item Chi Square	283.33	Separation Index	0.92
Total Deg of Freedom	280.00		
Total Chi Square Probability	0.43		

POWER OF TEST-OF-FIT = Power is EXCELLENT

[Based on Separation Index of 0.92]

Notes on Table 4.1

1. The Index of Student Separation is the proportion of observed variance that is considered true (92%) and is high.
2. The item and student fit statistics have an expectation of a mean near zero and a standard deviation near one, when the data fit the model. (In this case, the fit statistics are not perfect, but are acceptable).
3. The item-trait interaction test is a chi-square. The results indicate that there is good collective agreement between students of differing motivation for all item difficulties. This means that a unidimensional trait has been measured.
4. All numbers are given to 2 decimal places because the errors are to two decimal places (about 0.06, see Table 4.2)

The RUMM 2010 program rates the overall power of tests-of-fit in the categories of too low, low, reasonable, good, and excellent, based on the separation index and, in this case, the power of the tests-of-fit was rated as 'excellent'. All these tests indicate that the psychometric characteristics of the data forming the scale are very good.

Fit to the Model

In determining the fit of the items to the model, the RUMM 2010 program estimates two statistics. One is the item-trait test-of-fit (chi-square) which examines the consistency of the item parameters over the range of students' motivation scores and an overall test-of-fit. Results indicate that there is general agreement on the location of the item 'difficulties' by students with motivation scores located along the same scale (see table 4.1). In other words, there is agreement for the location or 'difficulties' of all items across students with different motivation scores. The other statistic provided by the RUMM 2010 program is the item-student interaction test-of-fit which examines the consistency of response patterns for students across all items and for items across all teachers. The item-student test-of-fit indicates that there is good consistency of student and item response patterns (see table 4.1). The mean item fit residual is 0.50 and its SD is 1.08, which is close to the ideal of zero and one. The mean student fit residual is -0.43 and its SD is 2.25 which is acceptable. The locations ('difficulties') of the items are reasonably well targeted against the students comprising a range of items from 'easy' to 'hard' which almost cover the range of students motivation scores from 'low' to high' (see figure 4.1).

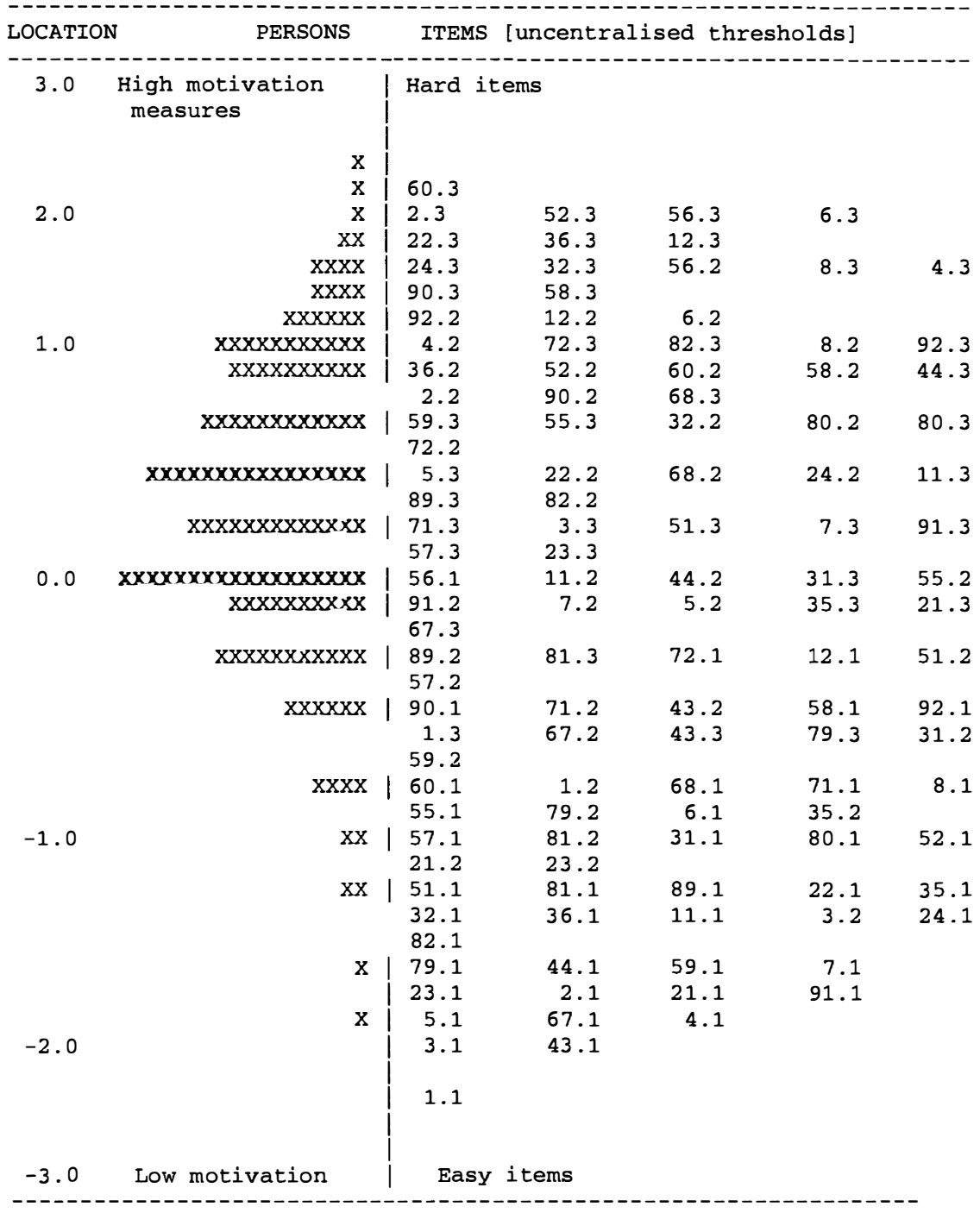

Figure 4.1 Person measures of motivation V item thresholds (N=522, I=40, T=120)

Notes on Figure 4.1

1. The scale is in logits, the log odds of answering positively.
2. Measures of motivation are calibrated on the same scale as the item difficulties.
3. The items are appropriately targeted, as the item thresholds cover the range of student measures of motivation.
4. Items at the easy end of the scale are answered positively by most students. As the items become 'harder', students need a higher motivation to answer the items positively.
5. Each X represents 4 students.
6. The 'difficulties' are the thresholds. For example 60.3 ('hardest' threshold) is a point between the 3rd & 4th responses, where the odds are 1:1 of answering response categories 3 or 4, for item 60.
7. The zero point on the motivation scale does not represent zero motivation. It is an artificial point representing the mean of the item difficulties, calibrated to be zero, in Rasch measurement. It is possible to calibrate a true zero point, if it can be shown that an item represents zero motivation. In the present study, there is no true zero point.
8. Taken together, these results indicate that a good linear scale of motivation has been created, that the data are reliable and consistent, that the errors are small in relation to the separation of measures along the scale, and that the power of the tests-of-fit are excellent. An implication is that valid and reliable inferences can be made from the motivation scale data composed of the 20 items.

Table 4.2 Item difficulties (locations), Standard Error (SE), residuals and fit to the measurement model

Item	difficulty	SE	Residual	DegFree	DataPts	Chi Sq.	Probability
1	-1.20	0.07	-0.86	505.98	522	6.39	0.48
2	0.49	0.06	-0.16	505.98	522	1.54	0.98
3	-0.93	0.06	1.04	505.98	522	4.10	0.76
4	0.38	0.06	-0.30	505.98	522	8.47	0.27
5	-0.45	0.06	1.23	505.98	522	5.66	0.57
6	0.93	0.06	-0.76	505.98	522	6.33	0.49
7	-0.34	0.05	2.37	505.98	522	16.10	0.00
8	0.73	0.06	-0.57	505.98	522	11.99	0.07
11	-0.17	0.05	0.01	505.98	522	7.79	0.33
12	0.98	0.06	-0.79	505.98	522	8.74	0.25
21	-0.79	0.06	1.11	505.98	522	7.51	0.36
22	0.39	0.06	0.27	505.98	522	8.90	0.24
23	-0.67	0.06	1.03	505.98	522	4.56	0.71
24	0.37	0.06	0.50	505.98	522	2.01	0.96
31	-0.37	0.05	3.03	505.98	522	10.76	0.12
32	0.40	0.06	1.23	505.98	522	6.94	0.42
35	-0.61	0.06	-1.42	505.98	522	15.89	0.00
36	0.55	0.06	-0.89	505.98	522	6.40	0.48
43	-1.00	0.06	0.48	505.98	522	7.91	0.32
44	-0.09	0.05	1.03	505.98	522	10.70	0.13
51	-0.40	0.05	1.67	505.98	522	2.59	0.91
52	0.68	0.06	0.11	505.98	522	2.37	0.94
55	0.05	0.05	1.97	505.98	522	5.87	0.54
56	1.26	0.06	0.17	505.98	522	5.51	0.56
57	-0.26	0.05	-0.57	505.98	522	4.92	0.66
58	0.67	0.05	-0.75	505.98	522	9.99	0.16
59	-0.37	0.06	0.04	505.98	522	6.48	0.47
60	0.78	0.06	-0.27	505.98	522	6.63	0.45
67	-0.72	0.06	1.19	505.98	522	4.77	0.68
68	0.25	0.05	2.28	505.98	522	8.97	0.23
71	-0.35	0.05	1.74	505.98	522	5.02	0.65
72	0.53	0.05	1.65	505.98	522	14.17	0.02
79	-0.82	0.06	1.01	505.98	522	12.06	0.07
80	0.16	0.05	1.20	505.98	522	4.94	0.66
81	-0.78	0.06	2.04	505.98	522	8.15	0.30
82	0.23	0.05	-0.06	505.98	522	4.59	0.70
89	-0.33	0.05	-0.18	505.98	522	5.44	0.60
90	0.63	0.05	0.01	505.98	522	1.93	0.97
91	-0.43	0.05	-0.91	505.98	522	7.80	0.33
92	0.61	0.05	-0.01	505.98	522	2.42	0.93

Notes on Table 4.2

1. Location is the item 'difficulty' in logits (the log odds of answering the response categories positively).
2. SE is the standard error in logits.
3. Residual is the difference between the observed and expected responses.
4. Probability is the chi-square fit to the measurement model. Chi-square is sensitive to sample size and is not to be taken too strictly for large samples, like this study.

Table 4.2 shows that the residuals are acceptable. Residuals are the differences between the actual response and the response estimated from the Rasch measurement parameters. In other words, a residual is the difference between the observed and expected responses. Residuals are supposed to be within the range $-2<x<+2$. From the table 4.2, only four items are outside this range. The rest of the items (36 out of 40) have acceptable residuals.

The table shows that the items have a good fit to the measurement model with only three items having a chi square probability $p<0.05$. Thus, 37 out of the 40 items fit the measurement model within acceptable limits.

Note. It may seem to a reader that one should delete those four items with poor residuals, and the three items with low probability of fit to the measurement, and re-analyse the data. This was done, but then other item data do not fit the measurement model and reliability was reduced. This means that Rasch analysis determines what set of item data best produce a linear, unidimensional scale through their inter-relationships.

Non-fitting items

Thirty of the original fifty stem-items, that were proposed as content valid, did not fit the strict requirements of the Rasch measurement model and were discarded. However, the Rasch model does not tell the researcher how to revise an item to make it fit, if it doesn't fit. All it tells the researcher is whether the particular wording used for the item produces data that can be explained by a single predominant trait.

The non-fitting items may be a result of reversed thresholds, in which students may not have answered the response categories consistently and logically. Items that fit the model have ordered thresholds that correspond to the ordered response categories. Another reason for the non-fit of some of the items was the lack of consensus among the students on the location of the items on the scale. In this case, the students cannot agree on the item difficulties. For example, some students with high motivation may

find an item 'easy' while others with a similar motivation level may find the same item 'difficult'. Any disagreement about the item difficulty shows up as an inconsistent response pattern.

The way forward in the future is to reword the non-fitting items so that they fit the ordered-by-difficulty patterns in the model of motivation conceptually, and are consistent with the 20 stem-items already found to fit the model, and then re-test the model with another data set.

Table 4.3 Motivation items and their difficulties

QUESTIONNAIRE: MOTIVATION TO ACHIEVE ACADEMICALLY

This questionnaire is anonymous. Please do not write your name, or any other comments that will make you identifiable on it. By completing this questionnaire you are consenting to take part in this research. As such, you should first read the enclosed disclosure statement carefully as it explains the intention of this project.

Please rate the 50 items according to the following response format and place a number (1 - 4) corresponding to ***What I aim for*** and ***What I actually do*** on the appropriate line opposite each statement:

In all of my subjects	put 4
In most of my subjects	put 3
In some (few) of my subjects	put 2
In none or only one of my subjects	put 1

Item	Item wording	What I aim for	What I actually do
Aspect: Striving for Excellence			
Standards			
1/2	I study hard as much as I can.	-1.20	0.49
3/4.	I think about what I want to attain in my studies.	-0.93	0.38
5/6	I set for myself high scores which I believe I can achieve.	-0.45	0.93
Goals			
7/8	I try different ways to solve academic (study) problems.	-0.34	0.73
9/10	I set realistic and challenging academic (study) goals.	Did not fit	
11/12	I set highest academic goals which I can achieve.	-0.17	0.98
13/14.	When don't get what I expect in my studies, I work hard to so that I may achieve my goals.	Did not fit	
15/16	If I don't attain my goals, I try again and again.	Did not fit	

		What I aim for	What I actually do
Tasks			
17/18	I do study outside (beyond) class homework.	Did not fit	
19/20	I just aim to complete homework.	Did not fit	
21/22	I try to do all studies which I think I might succeed.	-0.79	0.39
23/24	I try to do most studies which I think I might succeed.	-0.37	0.40
25/26	I attempt only the average of my studies which I might succeed.	Did not fit	
27/28	I only choose the easy study work which I think I will succeed	Did not fit	
Effort			
29/30	I make strong demand on myself to pass in my studies.	Did not fit	
31/32	I struggle hard to get correct answers in homework given.	Did not fit	
33/34	I check my work carefully so that I can get good marks.	Did not fit	
35/36	I prepare myself to get high marks in my studies.	-0.61	0.55
37/38	I make strong effort to achieve as high marks as I can.	Did not fit	
Values			
39/40	When I have no enough time for studies, I think about the importance of education.	Did not fit	
41/42	I value achievement (passing) in studies.	Did not fit	
Ability			
43/44	I have confidence that I can pass in my studies.	-1.00	-0.09
45/46	I receive encouragement on my studies from my teachers.	Did not fit	
47/48	I receive encouragement from at least one friend on my ability in my studies.	Did not fit	
49/50	I receive encourage from at least one of my parents on my ability in studies.	Did not fit	
Aspect: Desire to Learn			
Interest			
51/52	I show genuine interest in learning.	-0.40	0.68
53/54	I show interest in the subjects I take.	Did not fit	
55/56	I read and research widely on different topics.	0.05	1.26
57/58	I get interested in solving problems that others have as well in a topic.	-0.26	0.67
59/60	I show interest about topics being taught.	-0.37	0.78
61/62	I concentrate in my academic work.	Did not fit	

		What I aim for	What I actually do
Learning from others			
63/64	I participate in classroom discussions.	Did not fit	
65/66	I participate in small group work/discussions.	Did not fit	
67/68	I ask questions on topics I do not understand from others.	-0.72	0.25
69/70	I try to learn from others who are better in studies than me.	Did not fit	
71/72	I seek help from experts (e.g., teachers) in my studies.	-0.35	0.53
73/74	I pay attention to my teachers to understand what is being taught.	Did not fit	
Responsibility for Learning			
75/76	I take my studies as a personal responsibility.	Did not fit	
77/78	I struggle to gather information on topics so that I can master them.	Did not fit	
Aspect: Personal Incentives			
Extrinsic Rewards			
79/80	I like the rewards that studies bring.	-0.82	0.16
81/82	I try to work hard because doing well in studies brings high status.	-0.78	0.23
83/84	I like to study in order to be the winner in my class.	Did not fit	
Intrinsic Rewards			
85/86	I like studies because we interact with friends while we study.	Did not fit	
87/88	I try to work hard in studies because of the challenges it brings.	Did not fit	
89/90	I like the intellectual challenge brought about by academic work.	-0.33	0.63
91/92	I like to solve problems in studies.	-0.43	0.61
Social Rewards			
94/93	I like the social relationships involved in studies.	Did not fit	
95/96	I have fun with peers as we study.	Did not fit	
97/98	I get honour and praise from my family for passing in my studies/exams.	Did not fit	
99/100	I get honour and praise from teachers for passing in my studies/exams.	Did not fit	

Meaning of the motivation scale

The results of the Rasch analysis show that twenty motivation items fitted the measurement model. The motivation perspective on the items (what I aim for) were 'easier' than their corresponding behaviour perspectives (what I actually do), as conceptualised. At least one item from all aspects of motivation named in the original structure fitted the measurement model (see table 4.4), except for values, responsibility for learning and social rewards.

The 20 stem-items that make up the variable motivation are conceptualised from three first order orientations, operationally defined by a number of 2nd order orientations. The three 1st order orientations, striving for excellence, desire to learn and personal incentives are supported as contributing to the variable, motivation to achieve academically. The 2nd order orientations that involve standards, ability, goals, tasks, effort (but not values) are supported as contributing to striving for excellence. The 2nd order orientations that involve interest, and learning from others (but not responsibility for learning) are supported as contributing to desire to learn. The 2nd order orientations that involve intrinsic rewards, extrinsic rewards (but not social rewards) are supported as contributing to personal incentives.

The 20 stem-items that fitted the measurement model define the variable motivation. Each motivation item is linked to a corresponding behaviour item, such that it is 'easier' than the behaviour item on the scale. The items have good content validity and they are derived from a conceptual framework based on previous research. This, together with the data relating to reliability and fit to the measurement model (psychometric characteristics), is strong evidence for the construct validity of the data. This can be held to mean that the students' responses to the 20 stem-items are related sufficiently well to represent the variable, motivation.

The items of the scale are ordered from 'easy' to 'hard' (see Figure 4.1). Nearly all the students answered the 'easy' items (1, 3, 43, 79, 81, 21) positively. As the items become progressively 'harder' on the scale, the students need a higher motivation measure to answer them positively for all subjects (items 56, 12, 6, 60, 58). Students

with low measures of motivation cannot answer the 'difficult' items positively for all subjects. The item 'difficulties', and the student measures are calibrated on the same interval level scale. Equal differences on the scale between measures of motivation represent equal differences in item 'difficulty'. However, there is no true zero point of item 'difficulty' or motivation.

Table 4.4 Difficulty of the aspects of Motivation

Aspect	Mean *Attitude difficulty*	Mean *Behaviour difficulty*
Striving for excellence		
Standards	-0.86	0.75
Goals	-0.51	0.86
Tasks	-0.58	0.40
Effort	-0.61	0.55
Values	No fit	No fit
Ability	-1.0	-0.09
Mean	-0.71	0.49
Desire to learn		
Interest	-0.27	0.85
Learning from others	-0.54	0.39
Responsibility for learning	No Fit	No fit
Mean	-0.41	0.62
Personal incentives		
Extrinsic rewards	-0.80	0.20
Intrinsic rewards	-0.38	0.62
Social rewards	No fit	No fit
Mean	-0.89	0.41

For the aspect striving for excellence, the easiest mean attitude item is ability, and the hardest is goals. For the behaviour perspective, the easiest mean is ability and the hardest is tasks. For the aspect Desire to learn, the easiest mean attitude item is

learning from others, and the hardest is interest. For the behaviour perspective, the easiest mean is learning from others and the hardest is interest. For the aspect Personal incentives, the easiest mean attitude item is extrinsic rewards, and the hardest is intrinsic rewards. For the behaviour perspective, the easiest mean is extrinsic rewards and the hardest is intrinsic rewards (see Table 4.4).

Thresholds (Striving for Excellence)

LOCATIONS	PERSONS	ITEMS (Uncentralised thresholds)						
3.0	High motivation measures	Hard Items						
	X							
	X							
2.0	X	2.3	6.3					
	XX	22.3	36.3	12.3				
	XXXX	24.3	32.3	8.3	4.3			
	XXXX							
	XXXXXX	12.2	6.2					
1.0	XXXXXXXXXXX	4.2	8.2					
	XXXXXXXXXX	36.2	44.3	2.2				
	XXXXXXXXXXXX	32.2						
	XXXXXXXXXXXXXXX	5.3	22.2	24.2	11.3			
	XXXXXXXXXXXXX	3.3	7.3	23.3				
0.0	XXXXXXXXXXXXXXXXX	11.2	44.2	31.3				
	XXXXXXXXX	7.2	5.2	35.3	2.3			
	XXXXXXXXXX	12.1						
	XXXXXX	43.2	1.3	43.3	31.2			
	X XXX	1.2	8.1	6.1	35.2			
-1.0	XX	31.1	21.2	23.2				
	XX	22.1	35.1	32.1	36.1	11.1	3.2	24.1
	X	44.1	7.1					
		23.1	2.1	21.1				
	X	5.1	4.1					
-2.0		3.1	43.1					
		1.1						
-3.0	Low motivation	Easy items						

X = 4 Students

FIGURE 4.2: Person Measures of Motivation V Item Thresholds (Striving for Excellence) (N=522 I=18 T=54)

In the figure 4.2, the motivation measures are ordered vertically on the left-hand-side from low (bottom) to high (top), on the same scale as the item difficulties for striving for excellence (on the right-hand-side) from easy (bottom) to hard (top).An examination of the person measures of motivation versus item thresholds for the aspect, striving for excellence (Figure 4.2) illustrates that the thresholds are ordered and that, as expected, increasingly higher measures of student motivation are required in order to respond to the harder items in the higher categories.

The thresholds are boundaries located between the response categories and are related to the change in probability of responses occurring in the two categories separated by the threshold. When the thresholds are ordered in line with the ordered response categories, the data fit the Rasch measurement model better. Under the aspect Striving for excellence, item 2 (I think about what I want to attain in my studies), item 6 (I set for myself high scores which I believe I can achieve) and item 36 (I prepare myself in order to get high marks in my studies) have the highest difficulty when answered in the higher response categories. Item 1 (I study hard as much as I can) and item 43 (I have confidence that I can pass in my studies) are the easiest when answered in the lower response categories.

Thresholds (Desire to Learn)

LOCATION	PERSON	ITEMS (Uncentralised thresholds)			
3.0	High motivation measures	Hard items			
	X				
	X	60.3			
2.0	X	52.3	56.3		
	XX				
	XXXX	56.2			
	XXXX	58.3			
	XXXXXX				
1.0	XXXXXXXXXXX	72.3			
	XXXXXXXXXX	52.2	60.2	58.2	68.3
	XXXXXXXXXXX	59.3	55.3	72.2	
	XXXXXXXXXXXX	68.2			
	XXXXXXXXXXX	71.3	51.3	57.3	
0.O	XXXXXXXXXXXXXXXXXX	56.1	55.2		
	XXXXXXXXXX	67.3			
	X XXXXXXXXX	72.1	51.2	57.2	
	XXXXXX	71.2	58.1	67.2	59.2
	XXXX	60.1	68.1	71.1	55.1
-1.0	XX	57.1	52.1		
	XX	51.1			
	X	59.1			
-2.1	X	67.1			
-3.0					
	Low motivation	Easy items			

X = 4 students

FIGURE 4.3: Person Measures of Motivation V Item Thresholds (Desire to learn) (N=522, I=12, T=36)

In the figure 4.3, the motivation measures are ordered vertically on the left-hand-side from low (bottom) to high (top), on the same scale as the item difficulties for desire to learn (on the right-hand-side) from easy (bottom) to hard (top). Figure 4.3 above shows that the thresholds are ordered and that, as expected, increasingly higher measures of student motivation are required in order to respond to items in the higher categories.

Under the aspect Desire to learn, item 60 (I show interest in subjects being taught), item 52 (I show genuine interest in learning) and item 56 (I read and research widely on different topics) have the highest difficulty when answered on the higher categories. Item 67 (I ask questions on topics I do not understand from others) and item 59 (I show interest in topics being taught) are the easiest when answered in the lower categories.

Thresholds (Personal Incentives)

LOCATION	PERSON	ITEMS (Uncentralised thresholds)		
3.0	High motivation measures	Hard items		
	X			
	X			
2.0	X			
	XX			
	XXXX			
	XXXX	90.3		
	XXXXXX			
1.0	XXXXXXXXXXX	92.2		
	XXXXXXXXXX	82.3	92.3	
	XXXXXXXXXXX	90.2		
	X XXXXXXXXXXXXX	80.2	80.3	
	XXXXXXXXXXXX	89.3	80.2	
0.0	XXXXXXXXXXXXXXXXXX			
	XXXXXXXXXX	91.2		
	X XXXXXXXXXX	89.2	81.3	
	XXXXXX	90.1	92.1	79.3
	XXXX	71.1	79.2	
-1.0	XX	81.2	80.1	
	XX	81.1	89.1	82.1
	X	79.1		
		91.1		
-2.1	X			
-3.0				
	Low motivation	Easy items		

X = 4 Students

FIGURE 4.4: Person Measures of Motivation V Item Thresholds (Personal Incentives) (N=522, I=8, T=24)

In the figure 4.4, the motivation measures are ordered vertically on the left-hand-side from low (bottom) to high (top), on the same scale as the item difficulties for personal incentives (on the right-hand-side) from easy (bottom) to hard (top). Figure 4.4 which shows the person measures of motivation versus item thresholds for the aspect, personal incentives, illustrates that the thresholds are ordered and that, as expected, increasingly higher measures of student motivation are required in order to respond to the personal incentive items in the higher categories.

Under the aspect Personal incentives, item, and item 91 (I like to solve problems in studies) has the lowest difficulty when answered in the lower response categories. Item 90 (I like the intellectual challenge brought about by academic work) has the highest difficulty when answered in the high response categories.

Good fitting items

For an item to fit the Rasch model, the thresholds need to be ordered in line with the response categories. This means that students with low motivation would most likely be able to respond positively to a low category, but students would need progressively higher motivation in order to respond positively to the higher categories. If the progression of students motivation from 'low' to 'high' corresponds to the item categories from low to high, then the item thresholds will be in an ordered sequence. The RUMM 2010 program provides a Category Probability Curve for each item which makes it possible to view the extent to which the ordered thresholds are distributed logically, in line with the response categories.

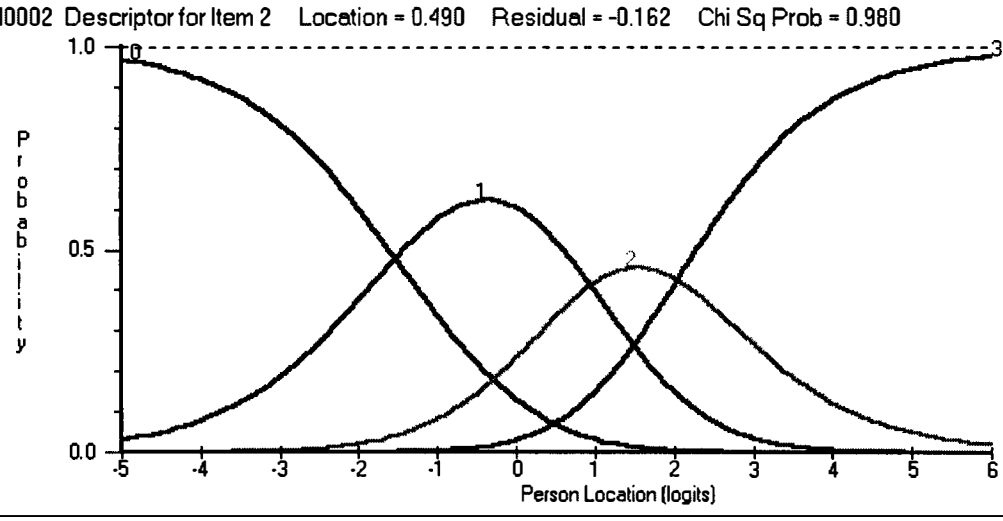

Figure 4.5: Item category curve for motivation item number 2 (good fitting item)
Note. The Rasch program converts the response categories 1, 2, 3, 4 to 0, 1, 2, 3.

Figure 4.5 above, shows the category curve for the good fitting item 2, *I think about what I want to attain in my studies.* Item 2 has a chi square probability of 0.98 which indicates an excellent fit to the measurement model. Its 'difficulty' is 0.49 which indicates that students found it relatively hard *to study as much as they can.* Figure 4.5 shows that the category 0 curve indicates that a student with motivation score of -5.0 logits (Person Location) has around 0.97 probability of answering this category (In none or only one of my subjects). However if the student motivation score was +2.0 logits, the probability of answering in this category reduces to near zero. Looking at the category 1 curve, a student with a motivation score of -5.0 has a probability of about 0.04 of answering in this category (in some (few) of my subjects), while a student with a motivation score of around -0.5 has a probability of around near 0.6 of answering in this category. In the category 2 curve, a student with a motivation score of -0.25 has a probability near zero of answering in the category (in most my subjects), while a student with a motivation score of +1.5 has a probability around 0.4 of answering in this category. In the category 3 curve, a student with a motivation score of -0.05 has a probability near zero of answering in the category (in all my subjects), while a student with a motivation score of +6 has a probability around 0.98 of answering in this category.

An examination of the category curve for item two above illustrates that thresholds are ordered and that, as expected, increasingly higher measures of student motivation are required in order to respond to this item in the higher response categories. That is, in order to respond positively to the item *I study hard as much as I can,* in the category (in all my subjects), students need to have a higher motivation score than to respond positively in the categories, *in most of my subjects, in some of my subjects, and in none or one of my subjects, respectively.* This means, too, that the students discriminated between the four response categories logically and well.

Not-so-good fitting item

An example of a not-so-good fitting item is item 7, *I try different ways to solve academic (study) problems.* The category probability curve for this item is shown on Figure 4.6. The item is an example of an 'easy' item, (difficulty -0.34) with a chi square probability of 0.00, which indicates a poor fit to the measurement model.

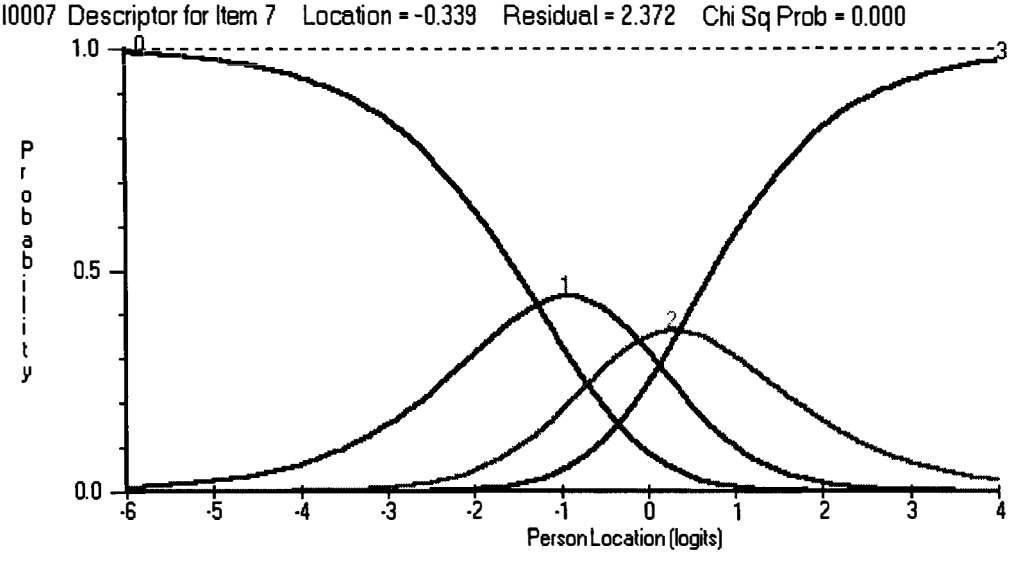

Figure 4.6: Item category curve for motivation item number 7 (not-so-good fitting item).

Note. The Rasch program converts the response categories 1, 2, 3, 4 to 0, 1, 2, 3.

From the curve, it is evident that some students did not respond as expected. With a student motivation score of around zero there is about the same probability of answering in categories 1, 2 and 3. The problem seems to be that students did not discriminate very well between categories 2 (in most of my subjects) and 3 (in all my subjects). However, they were able to discriminate well between the categories 0 (in none or only one of my subjects), 1 (in some of my subjects) and 3 (in all of my subjects).

Summary of results

The motivation scale created in this study supports the view that nine out of 12 aspects form the structure of motivation for years 12 and 13 students in Malaysia. This structure is based on striving for excellence (standards, goals, tasks, effort, and ability) (but not values), desire to learn (interest and learning from others) (but not responsibility for learning), and personal incentives (extrinsic, intrinsic) (but not social rewards).

The measurement of motivation is designed to include students who are highly motivated in one, two, three or more subjects. It places all nine aspects on an interval level scale in which the student measures of motivation and the item 'difficulties' are calibrated on the same scale. The items on the scale are ordered from 'easy' to 'hard' and the measures of motivation are ordered from low to high. Individual motivation items are shown to be related to corresponding self-reported behaviour items, and that the attitude perspective is easier than behaviour perspective. The computer program RUMM 2010 (Andrich, Lyne, Sheridan & Luo, 2000) was very useful in creating and analysing the scale. From the results presented, it is concluded that the data gathered were valid and reliable, and that they form a good unidimensional scale from which valid and reliable inferences can be made.

The findings could be summarised as follows:

1. 20 stem-items fitted the Rasch model well and define the variable motivation. Each motivation item is linked to a corresponding behaviour item such that it is 'easier' than the behaviour item on the scale.
2. A good scale of academic motivation to achieve for high school students has been created, and the data were valid and reliable. There is strong agreement amongst the students to the item 'difficulties' along the scale.
3. The reliability is high (0.92), the errors are small in relation to the measures, and the tests-of-fit are excellent, for the 20 stem–items that fitted the measurement model.
4. Thirty stem-items, originally considered to be content valid, did not fit the strict requirements of the Rasch measurement, and were deleted from the model.
5. The new structure of motivation for high school students in Malaysia is supported by 20 stem-items that fitted the measurement model. This can be held to mean that the students' responses to the 20 stem-items are related sufficiently well to represent the variable, motivation. The structure of motivation is based on three 1st order orientations, striving for excellence, desire to learn and personal incentives and nine 2nd order orientations. These are standards, ability, goals, tasks, effort as part of striving for excellence; interest, and learning from others as part of desire to learn and intrinsic rewards, extrinsic rewards as part of personal incentives.

CHAPTER V

RESULTS (PART B): DATA ANALYSIS FOR INTERVIEWS

Forty-five students were interviewed about their academic motivation and, in particular, about their reasons for striving to achieve, their sources of motivation, and their incentives. This chapter reports the students' understanding of motivation through their stated reasons for striving to achieve academically and their perception of their sources of academic motivation. It then presents the responses of students about their desire to learn. In this section, the views of high school students on what makes them desire to learn, what made it difficult for them to learn, and what they think they could do to improve their desire to learn, are reported. It relates these reported views to some established psychological views on motivation.

Next, the value of incentives as expressed by students and the role of teachers in students' academic motivation is presented. This is followed by their perception of the role of testing and examinations in students' motivation. Following this, the chapter then examines the lack of motivation by some students. In this section, students' attributions of success and failure are presented and analysed. The chapter ends with a summary.

Students' Motivators

Striving to achieve academically

All 45 students interviewed in this study expressed a desire to succeed in their academic performance. They would like to dominate their peers and they desire to achieve academically, especially in continuous assessment tests, and in main examinations. Their daily studies and careful planning of their academic work for most students, is a tenacious struggle to refine their achievement techniques, improve their strategies towards achieving, and strive for the summit, at least as presented in the interviews. One student clearly put it during the interview when asked how he would

describe his effort to achieve (The numbers and letters after the questionnaire refer to the student number, the question, and the paragraph of the transcript of the interview).

> I will struggle to achieve and attain the best scores, no matter what it takes (1:a.2).

It was noticed that some students are motivated to succeed for success itself, while others strive to achieve because they fear failure. For many students, their desire to achieve leads to higher levels of academic motivation. This study found that twenty-nine of the forty-five students highly motivated, eager, driven, determined, confident, single-minded, and obsessed. When one student was asked to talk about what his goals and abilities are, he responded as follows.

> I believe I can get straight A's in academic and non-academic tasks in this school, if I work hard towards it. I have the power and capacity to reach this target, if I utilize my abilities to the fullest. I have enough resources, dedicated teachers, valuable books, and I have internet facilities available for my utilisation, both at home and at school (5:a.2).

The above student, by saying this, shows that he has set a high standard at which he is aiming. He desires to achieve academically, and he believes that he can attain his target. He continued in the same vein, when asked how he thinks he could achieve his academic goals.

> I study hard. (Yes) I do. I spend a lot of time with my books. I read more than what is taught in the class. I have a personal library and the internet is always my essential tool for reference. I sacrifice many things, especially football, which I love so much, as well as watching television, so that I may pass my STPM examination (*STPM is the standardised national examination in Malaysia which is taken prior to entry into university*) (5:a.3).

Another student said the following when asked to talk about his academic beliefs, his goals and ability.

> I aim higher than I believe I can achieve. In other words, for me, the sky is the limit. I know I can break academic records that have been set in this school, and not only in this school, but in the entire State of Sabah (6:a.4).

Noticeably, when the students' 'tendency to achieve' surpasses the 'tendency to avoid failure,' greater motivation may occur. Students such as the ones quoted above, and many others, work hard to achieve academically and derive greater satisfaction from pursuing success without worrying about the possibility of failure. They are success oriented! It is possible that such students may display boredom against weaker opponents, or display a decline in motivation, if they think that there is little chance of achieving.

The study also encountered students who are motivated to study because of the 'fear of failure'. These students derive great motivation to pursue success because of worrying about the possibility of failure. The do not want to fail, and so they study hard.

When one student was asked to talk about what motivates him to work hard, he said the following.

> I desire to achieve what my parents want. I do not want to fail, because that would be a great disappointment to them. They (*parents*) believe I can succeed in the national examinations. They have high expectation on me and they have said to me many times that I can attain very high scores. It'd be a great shame on me, if I disappointed them. I believe in them (10:a.4).

Another student responded to the same question as follows.

> My parents have taken great effort to send me to this school. We pay a lot of money to earn good education. Failing would be a disappointment to me and to my parents. I study very hard because I

would be traumatised if I failed, while all my friends achieved high scores in the exams (11:a.5).

Motivation is one of the major factors in addressing students' willingness to carry out academic tasks, which consequently leads them to achieve, or not to achieve, academically. To many students, motivation increases when they realize that a gap exists between their current level of knowledge and the level which they desire. To self motivated students, learning is fun when they try to close the gap in order to achieve the desired level of knowledge. When asked her purpose of striving to achieve in academic tasks, one student responded as follows.

> The more I study and research on a few class tasks, the more I realise that there is a lot more on the particular topic that I do not know. I find pleasure in personal study, in order to learn more, not only for examination purposes, but also for my own personal satisfaction (17:b.3).

To students, such as the one quoted above, their motivation to achieve academically is the satisfaction they get and 'a job well done' attitude. This could be viewed as the intrinsic desire for academic success and competence.

Students' desire to learn is motivational when it helps them meet their needs and interests. The desire to achieve is aimed at students' zone of proximal development, where they can handle the learning task with some support, so that they see growth which is reinforcing. As students become more competent and achieve academically, they feel a greater sense of mastery, thus increasing their sense of self-efficacy. This contributes to motivation.

When one student was asked to talk about how he feels (or would feel) on achieving high grades on academic tasks, he said the following.

> It is great to stand up in the midst of a problem and say... I can solve the problem...because I learnt it. It is my wish to learn and

> achieve high in my studies, so that I can be that one person (35:c.5).

Notably, some students are likely to start with, persist at, and master tasks, at which they think they are good. One student demonstrated this when asked why he strives to achieve in a certain subjects.

> To me, studying mathematics is very important. It is not like studying history, moral education or geography. We need mathematics everywhere; in business, in the farms, everywhere... even in the kitchen where the *Ama* (house help) has to know how much salt to put into the food, without spoiling the meal. I need mathematics in my life, and I know that I can get all formulas in my head. So, to me, if I have a problem to solve, I will not stop until I get the correct answer (18: c. 6)

A student such as the one quoted above is a task-oriented student. He focuses on developing academic competence, at least in particular subjects of his interest. From the above student, it could also be noted that a student is likely going to strive to excel, if he or she recognizes the importance of a particular subject. Thus, students need to know why each subject is important to them and how it is applicable in their daily lives.

To a few students (4 out of 45), the goal for striving to achieve academically is to show off their ability and outperform their fellow classmates. One student said the following when asked why he strives to achieve.

> I would like to shine among all the students. Isn't it great to be named by the principal or the form teacher as the top scorer in the class? Sometimes we compare our grades after the examinations. I am striving to excel so that when the results are out...it'll be the time to show my friends that I am an outstanding student (23:d.7)

Desire to learn

To understand what makes students desire to learn, what made it difficult for them to learn, and what they think they could do to improve their desire to learn, some general questions were asked. These were followed by a further probe which was initiated in order to understand and clarify what the students' responses were. These questions were as follows.

What makes you desire to learn?

What, in the world around you, makes it difficult for you to learn?

What, within yourself, makes it difficult for you to desire to learn?

What kinds of things do teachers do that help you to desire to learn?

What kinds of activities help you to enjoy learning and why?

The questions were thought likely to encourage consideration of factors internal to the student, and external factors of context and culture both within the school, and more broadly. In the responses to these questions, there was substantial agreement with most of the students. The general thrust of students' comments is recorded below.

Many students (30 out of 45) spoke of motivation being high when teachers 'make the lesson fun', and are themselves (teachers) enthusiastic about teaching and learning. One student responded as follows when asked what makes her desire to learn.

> I desire to learn if the teacher makes the class interesting and with a variety of classroom tasks. Teachers who are lively, who show great interest and enthusiasm in what they are teaching keep me interested in learning throughout the lesson. When that lacks in the teacher, I slowly begin to snooze (11:e.8).

However, a few students (3 out of 45) warned against unremitting, over the top, enthusiasm which, although it could be recognized as real, was nonetheless, tiring! In

general, students wanted variety within lessons and in academic tasks. Students said (43 of 45) that they did not enjoying copying materials from test books. They desired that teachers should see them as individuals and to know where they had got to in their learning. The students saw this as the foundation for creating a good relationship with the teacher, and this 'good relationship' was seen as essential for their desire to learn. Stressing this point, one student said the following.

> It is extremely boring to copy notes in class for more than twenty minutes, or simply listening to a teacher speak to us for a full lesson (12:e.9)

Many students (40 out of 45) said that their interest in academic tasks was maintained when there was a match between the tasks and their own abilities as well as what they consider important. They desire to learn at their own pace, and to have some say about what and how they learnt. They wanted to be involved in lessons in a manner that makes them feel that they are coming out with important ideas and not simply getting ideas from the teacher or the text books. One student said the following when asked to talk about what would help him be more interested in learning.

> I like my teacher to give us tasks that challenge us to think more than what is in the books. That way, the teacher can appreciate that we are contributing some new ideas in a particular topic. Group work is also helpful in our desire to learn because, when we discuss issues with our peers, we clarify each others points as well as put our ideas in some new and interesting way (16:e.10).

Only two students saw a sense of 'teacher being a friend or at least being friendly' as an important basis for students to desire to learn in a subject. All students (45 out of 45) agreed that it was important that teachers had content mastery their teaching subject.

When asked how she would like to be encouraged to learn one student said the following.

> In any classroom task, or in an assessment test, I would like my teachers to rate my work in relation to my previous efforts. That way, I can accept their compliments and praise, but also accept constructive criticism. I will then know how to improve in my studies (2:f.12).

Most of the students (38 out of 45) said that they value learning from their fellow students. They said that ideas and expressions of their own life experiences are found to be much more meaningful when they come from their own peers in the same grade. They said that teachers should allow some time in every lesson for group and pair discussion. Students said that when they sit for too long, without being involved by either being asked questions or without any class discussion, they feel bored and sleepy and tired. From this it is clear, at least from students' statements, that teachers should use participatory pedagogies, where the major approach is learning by students through fellow students.

Some references were made to the importance of regular marking of academic tasks. Many student responses indicated that they really valued marking, which includes some teacher's comments on good and bad points in the work that students have done. Although they recognized that teachers were under time pressure, they pointed out some of their teachers achieved this standard of marking. The implication was, 'Why not all?' Views were varied about whether every error (e.g. of spelling) should be corrected in every piece of work. One student commenting on his desire to learn, based on a teachers' continued guidance, said the following.

> After I do a certain task, especially assessment tests and examinations, I like to get not only the marks recorded but also teacher's comments about the good points about my work as well as the weak part. For example in English, when I write and essay, I like to know about what was good in the essay an how I could improve the essay and my general writing skills. That way, I will desire to do more writing in the future (1:g.13).

Most students would like the physical conditions within which they worked to be pleasant and stressed the demotivating effect of 'tatty classrooms'. Some students (18 out of 45) were critical of those of their peers who disrupted lessons. They expected teachers to be strict with any student making nasty, mocking, cutting down comments in the classroom.

When asked to talk about their own responsibilities for creating the conditions that would improve motivation, some students (28 out of 45) accepted that they should take a positive attitude, listen to what the teacher says and to try to learn. One student responded as follows when asked how he would enhance his own desire to learn.

> I have to work on it (*desire to learn*). This is not an easy task because we have so many other interesting things to do. It is some kind of self-discipline and to achieve a personal desire to learn in order to achieve academically needs great commitment and effort. I get the desire to learn when I think more about my goals, especially what I want to be in the future (14:f.15).

All students (45 out of 45) agreed that they would like their teachers to be approachable so that they felt able to ask questions and make mistakes without fear of the consequences. They would like teachers to ask more questions to students but also be able to accept students' responses even if they did not make sense.

The findings confirm that students have well-formulated opinions about their desire to learn, and about the things which teachers need to do to help them learn. Since the very open questions that were used to structure the interviews did nothing to prompt responses about particular aspects of motivation, it is interesting that the responses could be understood in terms of detailed elements of motivational model proposed in this study.

Incentives

Many students interviewed (28 out of 45) stated that they appreciate the incentives they receive and that incentives do motivate them to achieve academically. Some students are motivated by verbal rewards like praise, while others desire tangible rewards. Many references were made to the importance of praise and encouragement, students stressing that these enhanced their self confidence. Formal systems of praise such as commendations were not cited with particular enthusiasm, and unfair distribution of praise was seen as having a very negative influence motivation. Many students (28 out of 45) were clear that praise should be special and should help them to understand what was good about their work (so that the good things could be repeated) and where improvements might be made (so that they could continue to progress).

When asked to explain if teacher or parents make him enjoy academic tasks and persist in them, one student said the following.

> I feel good to read the comments that my English teacher writes after reading my essays. He praises my efforts, and he gives me ideas on ways to improve my work. I like that and it makes me feel like I can do better next time. That way, I have enjoyed perfecting my writing skills. I would not like to let him down (18:h.3).

Another student said the following on the same question as above.

> My parents recognize my effort in trying to achieve in my studies and they congratulate me when I do very well. They hug and praise me when I do well. These are a great source of encouragement for me and I try to work hard so that I can receive the praises (19:h.4).

To a few students (five out of forty-five), tangible rewards like money and gifts, or taking them for holidays, do motivate them to achieve academically. This could be defined as the extrinsic motivation of an outside stimulus. Probing on the question of external rewards further, some students stated that their desire to learn is diminished,

once they achieved their academic target that was set by their parents. One student said the following when asked if she studies in order to receive prizes and rewards.

> I remember working very hard because my parents had promised me that, if I could attain at least three A's in the end of year examinations in form five (year 12), they would take me to China for holidays. I longed to travel to this country so I worked very hard in my studies. I managed to get the target grade, and had a great time in China. Later, when I came back, I didn't work as hard as before (21:h.4).

Teachers as Motivators

Students recognize the importance of teachers, as people who can inspire them to work hard. Some students believe that their motivation to achieve depends solely on the teacher. If a teacher provides choice, optimum challenge, and positive feedback, students are motivated to achieve. If the teacher is enthusiastic, adds humour, and has good verbal expression, students' motivation improves.

When asked to say if he thinks teachers have a role to play in students' academic motivation, one student responded as follows.

> I always want to attend Puan Melanie's classes (*this name is a pseudonym for the purpose of anonymity*) because the teacher makes the lessons very interesting and funny. When she teaches, she makes the class exciting and she simplifies the topics that she teaches so as to make it easy for us to understand (23:i.2).

Another student said the following when asked to talk about the role of teachers on his academic motivation.

> Some teachers in our school have the oratory skills and are very interesting while teaching. They speak with power and authority on

> the subjects they teach. That motivates me. I have very high motivation for some subjects such as English literature; I am provoked in my thought pattern to see literature ideas, in a new way for myself. The teacher does not 'spoon feed' us. He challenges us to creatively come up with new ideas on certain issues that are being discussed. My teacher is a great source of my motivation to achieve in this subject (25:c.4).

Role of testing and examinations in students' motivation

Continuous testing, in the form of assessments and examinations, is a motivator to many students. Some students (7 out of 45) stated that they enjoyed competing with their peers in academic tasks. They value classroom tasks and like to take assessments as a way to gauge their understanding and those of their friends at the same year level.

When asked to comment on his perception of academic tests and examinations, one student said the following.

> I enjoy doing examinations because, when I pass, I am able to gauge my abilities against those of my friends. Tests and examinations are important to me. They help me to know what level I am with regard to what the teachers have taught. If my friends defeat me, I try to work harder, but most of the time, I win" (30:j.5).

Another student gave the following in response to the same question as that above.

> I get motivation to study when I know that there is an exam coming soon. I do a count-down of the dates left before the exam. That way, I study hard so that I study with focus, and so that I am not caught up unprepared (41:j.6).

It is important that tests and examinations be ongoing, and related to continuous progress, if they are to be a motivator of students to achieve academically, according to the interviews. Testing and examinations inform teaching and, when students are tested on what is taught and practised in the class, there is a steady building of competence through mastery, which is related to academic achievement. Students naturally seek to understand why they achieve, or fail to achieve, academically. Only when learners attribute their success, in their tests and examinations, to effort are they likely to exert genuine effort aimed at achieving academically. Thus, how a student thinks about, or interprets success or failure, in tests and examinations, determines his or her motivation.

Students who lack motivation

Some students lack motivation to achieve academically. They portray little desire to learn, and little willingness, or energy, to take action towards achieving in their academic tasks. When students lack motivation to achieve academically, they do not complete tasks, such as schoolwork or homework or projects. They develop an apathetic, *"I don't care"* attitude, with little desire to change. They appear bored, tired, and may sleep excessively, even in class during lessons, and they perform poorly in their tests and examinations.

Students who lack motivation are at risk of not fully developing their rich academic talents. This problem is especially evident with some students of high academic ability. Many students are highly talented, but a lack of motivation, undermines the full academic achievement.

This study encountered students who gave different reasons as to why they lack the motivation to achieve academically. Some students (6 out of 45) seem to have a programmatic mismatch between their motivational needs and educational opportunities. It was found that some students are less motivated to achieve academically, because they often make faulty attributions. Some attribute their lack of motivation to achieve to personal factors and/or environmental factors.

Asked how he would rate his ability to achieve and what his desired academic results are, one student responded as follows.

> I'm not the clever type. I can do just a little and I am satisfied with that. If I can manage to get a score which is considered as 'pass', then I have no worries. I will be comfortable to get a certificate at the end of my high school. I know that my certificate won't be a very good certificate, because I am a below average student (37:k.1).

Another student said the following when asked how she rates her motivation to achieve in her studies.

> I know clearly that I cannot succeed in my studies with the kind of scores that I would desire to get. Almost all of our teachers are boring and sometimes it is too hot in the classroom. How can we study in such an environment and do well? It just feels sleepy being in the class. Sometimes I don't have enough time to study (39:k.2).

These attributions are faulty, and dangerous, because they impede more effective study approaches, as well as lowering the motivation to achieve. For example, students who believe that they lack ability are likely to get discouraged from developing effective learning goals. Mastery of content requires that motivation to achieve academically is not derived from faulty attribution.

It was noted that some students (4 out of 45) believe that they can take control of their motivation to achieve academically, even if they have adopted every excuse for their lack of motivation. These students recognize that the excuses they make are decisions for which they have to take full responsibility. When one student was asked if he thought he utilised all his academic ability towards achievement, he made the following comment.

> I think I am not using all my abilities and effort to get better outcomes in my studies. I believe that I can do better but, honestly speaking, I am quite happy with my 'pass' results (40:k.1).

If these students are to realize the academic achievements of which they are capable, they probably require academic motivation to achieve. Students, with the help

of teachers need to optimize their motivation to achieve academically. For them to do this students, as well as educators, need to recognise the three major aspects of motivation to achieve (Striving for Excellence, Desire to Learn and Personal Incentives). The more often that students are optimally motivated to use their academic ability, the more committed they are likely to become towards academic achievement.

Data from the interviews in relation to the three aspects of motivation (Striving for Excellence, Desire to Learn and Personal Incentives), suggest that they contributed to motivation to achieve academically. Students may need to develop positive attributions, based on striving to achieve, a genuine desire to learn, and the provision of rewards, as part of their own reinforcement. Implementation of these aspects will likely increase academic motivation to achieve. Although false attributions (excuses) commonly block effective motivation to achieve, it is possible and necessary to control them. Doing so may increase students' motivation to achieve academically.

Students seem to need to develop and nurture motivation to achieve, to have a positive focus, to be achievement-oriented, and to reduce anxiety. This supports the motivation model, conceptually developed in this study. The model focuses on three aspects. One is striving for excellence in which goals, effort and ability provide an excellent way for continual improvement. Attaining these goals provides a rewarding sense of satisfaction, regardless of competitive outcomes and makes students confident to "go for it" during assessments. Two is an inner desire to learn, in which, students are interested, excited and enjoy learning. They make an effort to learn from others, and to seek help, both from their teachers and peers, in the event that they do not understand classroom tasks. These students also take a personal responsibility for learning and achieving. Three relates to rewards that achievement brings, including intrinsic, extrinsic and social rewards. Many students are motivated as they expect some reward, as appreciation of their efforts.

Summary

Forty-five students were interviewed about their motivation to achieve academically. In particular, they were asked about their reasons for striving to achieve, their sources of motivation, and their incentives. The interviews were intended to provide an understanding of motivation and various perspectives related to it. Overall, the students' responses as depicted in this chapter strongly suggest that students have different perceptions of academic motivation and have different levels of motivation, and are motivated to achieve academically for various reasons. The perspectives of students' motivation are similar to the ones formulated in the questionnaire in this study, and they fall under three main aspects of motivation (Striving for excellence, desire to learn and incentives). Some students strive to achieve academically because they fear failure while many other students lack motivation to study because they make faulty attributions and do not recognise the importance of the aspects of their own motivation to achieve academically. Fear of failure is a way for students to protect their self-esteem and is also common among students. These kind of students may strive in their academic tasks because they fear to fail, but if they do not achieve their targets in their academic tasks they always have an excuse at the ready.

CHAPTER VI

SUMMARY, RESEARCH QUESTIONS AND DISCUSSSION, AND IMPLICATIONS

This chapter begins with a summary of the study, drawing together the major findings, from both the results of the Rasch measurements and the interview data. The findings are drawn together in the framework of addressing the research questions proposed at the beginning of the study. Next, implications are outlined for administrators, high schools teacher educators, and for further research.

Summary

This study was conducted in two phases. The first phase involved completing a questionnaire on motivation to achieve academically. In this phase, a person convenience sample of 522 high school students of senior (A-level) classes (Years 12 and 13) was used. The sample was taken from three high schools in Kota Kinabalu, Sabah state in Malaysia. The sample consisted of 294 girls (56%) and 228 boys (44%). The stem-item sample was initially 50, reduced to 20 that fitted the measurement model to form a unidimensional scale from which valid and reliable inferences could be made. In the first phase of the study, students completed self-report questionnaires in their schools on a voluntary and anonymous basis. A scale was created in which the Motivation measures were calibrated on the same scale as the item 'difficulties'. The findings from phase one informed the direction for phase two of the study.

In the second phase of the study, semi-structured face-to-face interviews were conducted, using a sample of 45 students, to gain further data to enhance the data obtained from the questionnaire, and to add scope and breadth to the study. The interviews explored students' opinions, experiences, and perceptions of motivation to achieve academically. The interviews were based on validating, clarifying, and seeking further information, on issues identified in the questionnaire.

The sample selected for the interviews were students who had participated in answering the questionnaire. Participation in the interviews was on voluntary basis, and this was conducted in their schools. Twenty-five of the student participants were boys and the other twenty were girls.

A model of academic motivation was formulated from 12 aspects, and attitudes and behaviours. This structure is based on striving for excellence (standards, goals, tasks, effort, values and ability), desire to learn (interest, learning from others and responsibility for Learning), and personal incentives (extrinsic, intrinsic and social rewards). Each of the 50 items was answered in two perspectives, a self-reported attitude (*what I aim for*) and a behaviour (*what I actually do*).

A Rasch measurement model was used to create a scale of academic motivation, using the Extended Logistic Model of Rasch (Andrich, 1988a, 1988b; Rasch, 1980/1960) with the computer Program Rasch Unidimensional Measurement Models (RUMM - 2010) (Andrich, Sheridan, Lyne & Luo, 2000). Data from only 20 of the 50 items fitted the measurement model. These data supported a structure of motivation involving nine of the twelve aspects originally proposed. Values (under striving for excellence), responsibility for learning (under desire to learn) and social rewards (under personal incentives) did not fit the measurement model and were discarded.

In the course of conducting the research through phase one and two, the five aims of the research were met. That is, (1) a conceptual model of academic motivation involving attitudes and behaviours in relation to three main aspects was constructed. The three aspects are: (a) Striving for excellence (standards, goals, tasks, effort, Ability and resources) (values did not fit the model); (b) Desire to learn (interest, learning from others) (responsibility for Learning did not fit the model); and (c) Personal incentives (extrinsic, intrinsic) (social rewards did not fit the model). Two (2), a questionnaire based on the conceptual model of academic motivation was created and data from three high schools in Malaysia were collected using the questionnaire. The questionnaire in the study was based on the conceptual model stated above, where the items in their second-order aspects are organised according to their 'difficulty', in Guttman-like patterns, or ordered-by-difficulty patterns. Each item was answered in two perspectives, *what I aim* for and what *I actually do*. Three (3), a unidimensional, linear scale of

academic motivation using the Extended Logistic Model of Rasch (Andrich, 1988a) with the computer Program Rasch Unidimensional Measurement Models (RUMM) (Andrich, Sheridan, Lyne & Luo, 2000) was created and the conceptual model of motivation was tested. Four (4), the psychometric properties of the scale were analysed to interpret the meaning of the scale of academic motivation. Five (5), the qualitative data from 45 interviews with students in high schools in Malaysia were analysed to gain further insights into students' opinions, experiences, and how they conceptualise their own academic motivation to achieve academically.

Answering the research questions

The major findings of the study are summarised within the framework of the research questions outlined in chapter one.

Research Question 1: How might a model of academic motivation be operationally defined to include attitudes and behaviour and based on three main aspects: (a) Striving for excellence (standards, goals, tasks, effort, values, ability and resources; (b) Desire to learn (interest, learning from others, and responsibility for learning); and (c) Personal Incentives (extrinsic, intrinsic and social rewards)?

This research question has been addressed specifically in chapter four of this study. A conceptual model of academic motivation was constructed. Striving for excellence was originally defined in terms of six second-order aspects: standards, goals, tasks, efforts, values and ability. Desire to learn was originally defined in terms of three second-order aspects: interest, learning from others, and responsibility for learning. Personal incentives were originally defined in terms three second-order aspects: extrinsic, intrinsic and social rewards. The items designed to measure these aspects were conceptually ordered from easy to hard.

Nine of the originally proposed aspects fitted the model. Only three aspects did not fit the model. They are values, responsibility for learning and social rewards. The model of academic motivation shows that students form an attitude towards each of the

nine second second-order aspects for each of their academic subjects and that this attitude influences their behaviour towards each of the twelve aspects. This model accounts for the variety of attitudes (and behaviours) towards the nine aspects in relation to the variety of the academic subjects studied. The model that was constructed accounts for students who are highly motivated in only one subject, as well as those motivated to achieve in many, and it does this by allowing for variation in motivation against all nine aspects.

Research Question 2: To what extent does the measure of academic motivation represent a linear scale?

Research question two has been addressed specifically in chapter 4 of the study. A multi-aspect model of academic motivation was devised and tested, based on three aspects of academic motivation - striving for excellence, desire to learn and personal incentives. Striving for excellence was defined in terms of six second-order aspects: standards, goals, tasks, efforts, values and ability. Desire to learn was defined in terms of three second-order aspects: interest, learning from others, and responsibility for learning. Personal incentives were defined in terms three second-order aspects: extrinsic, intrinsic and social rewards. It was expected that students would form two perspectives of each aspect - an attitude (this is *what I aim for*) and this would influence their behaviour (this is what I actually do). From the twelve second-order aspects, items were devised and conceptually ordered by expected 'difficulty'. It was also expected that students would vary in their attitudes (and behaviour) for these twelve aspects for different academic subjects. The model allowed for this variation by using responses relating to a number of subjects studied. The Rasch measurement computer program calibrated the motivation measures and the 50 item difficulties on the same linear scale, and this enables the motivation model to be tested.

Twenty (20) stem-items fitted the Rasch measurement model well. Their attitudes were 'easier' than their corresponding behaviour for each of 20 items on the scale. They formed an interval-level scale in which the proportion of observed variance considered true was 0.92. The response categories were answered logically and

consistently. So the data for the 20 stem-items are highly reliable, and they support the revised structure of motivation behind the questionnaire.

There was no significant interaction between student responses to the items and the location values of the motivation measures along the scale. This means that there is good agreement about the difficulties of the items along the scale and that a uni-dimensional trait of motivation has been measured. The errors are small in relation to the measures, and the tests-of-fit are excellent, for the 20 stem–items that fitted the measurement model.

Thirty (30) stem-items were originally considered to be content valid did not fit the strict requirements of the Rasch measurement. A way forward would be to reword the non-fitting items in a different ordered-by-difficulty pattern, collect more data, and re-analyse with the Rasch computer program.

Research Question 3: What is the relationship between attitudes and behaviour in academic motivation?

Research Question three (3) was specifically addressed in chapter four. The study shows that in academic motivation, attitudes are linked to behaviour. Attitude was measured in terms of *What I aim for* while behaviour was measured in terms of *What I actually do.* Attitude (*What I aim for)* reflected the students' needs, expectations, cognitions and desires, all internally and covertly contained within the students' minds, but now generally expressed in terms of what they aim for in their subjects. Behaviour (*What I actually do*) is what students actually do towards achieving academically and was expected to be stated by the students in terms of the number of subjects to which it applies. An interesting feature of the relationship between attitudes and behaviours of students in academic motivation is that when all the items that do not fit the model are deleted, attitudes are easier than their corresponding behaviours.

Research Question 4: What is the relationship between the three aspects of academic motivation - striving for excellence, desire to learn and personal incentives?

Research question four was specifically addressed in Chapter 4. From the Rasch analysis, it can be seen that at least one item from all the three aspects of motivation (striving for excellence, desire to learn and personal incentives) named in the original structure fitted the measurement model. The only aspects that did not fit the structure of motivation were values, responsibility for learning and social rewards. Twenty stem-items from the three aspects of motivation make up the variable motivation to achieve academically. The 2nd order orientations that involve standards, ability, goals, tasks, effort (but not values) are supported as contributing to striving for excellence. The 2nd order orientations that involve interest, and learning from others (but not responsibility for learning) are supported as contributing to desire to learn. The 2nd order orientations that involve intrinsic rewards, extrinsic rewards (but not social rewards) are supported as contributing to personal incentives.

Research Question 5: What are Malaysian high school students' conceptions of academic motivation in terms of attitudes and behaviour, striving for excellence, desire to learn and personal incentives?

This research question has been dealt with in chapter 4 and 5. From the Rasch analysis of 20 stem-items that fitted the Rasch model, it can be seen that student's motivation to achieve academically is linked to behaviour. Students find attitude items (what I aim for) easier than behaviour items (What I actually do). There is strong agreement amongst the students to the item 'difficulties' along the scale.

From the qualitative analysis of the data from 45 students who were interviewed about their motivation to achieve academically, the following conclusions are made in the study.

Students have different perceptions of academic motivation and have different levels of motivation. Student's motivation to achieve academically varies from highly motivated, average motivation, low motivation to very low motivation. In addition,

student's motivation levels could be increased, if the aspects of motivation reported in this study such as the use of interactive class methodologies, allowing students to learn from peers through pair work and group discussions, teacher's content mastery and regular feedback from teachers are given attention. Even though all students desire to achieve academically, not all strive to excel towards achieving their academic goals which they set. There are some students who are self motivated while others derive their motivation to achieve academically from incentives. Students have different levels of motivation for different subjects. There are some students who are highly motivated in one, two, three or more subjects.

Students derive their motivation to achieve academically from various sources. One major source of student motivation to achieve academically is when the content matter is delivered by the teacher using an exciting methodology. Another major source of student motivation to achieve academically is when students are involved in learning and are given the chance to contribute their own ideas about the subject matter. Teachers who are able to create an interactive environment in the classroom are a great source of motivation to achieve for many students.

The findings also indicate that when the students' 'tendency to achieve' surpasses the 'tendency to avoid failure', greater motivation may occur. Student who are highly motivated to achieve academically derive greater satisfaction from pursuing success without worrying about the possibility of failure. However 'fear of failure' can be a source of motivation for students. There are students who derive great motivation to pursue success because of worrying about the possibility of failure. The do not want to fail, and so they strive to achieve academically.

Students who are motivated to achieve academically experience strong academic success, significant value for learning, and gratifying pleasure in achieving academically. Intrinsic and extrinsic rewards are valuable means of motivating students to achieve academically.

Many students lack motivation to study because they make faulty attributions and if they do not recognise the importance of the aspects of their own motivation to achieve academically.

A better understanding of motivation to achieve academically and its components (*striving for excellence, desire to learn and personal incentives)* has important implications for maximizing academic motivation to achieve, and these are now explained.

Implications of the Study

Implications for administrators

The findings from this study indicated that motivation of students to achieve academically vary from highly motivated, average motivation, low motivation to very low motivation. In addition, students reported that their levels of motivation could be increased, if the aspects of motivation reported in this study such as the use interactive class methodologies, allowing students to learn from peers through pair work and group discussions, teacher's content mastery and regular feedback from teachers were given attention. Given that school administrators (principals) can exert influence over the school culture, and in order for students to be highly motivated to achieve academically, school administrators (principals) need to be well placed to show support and understanding of the aspects of motivation to achieve academically. This can be achieved, in part, through seeking motivation researchers and practitioners' input in school decision making, ensuring resources are used towards giving students some form of incentives are used as part of motivating and encouraging teachers in their effort to motivated student who cannot self-motivate.

School administrators could acquire knowledge of appropriate motivation programs for students. This is possible if the administrators will commit themselves towards empowering teachers to get the skills necessary in understanding how motivation for high school students works. However, principals may require support from the education system in order to acquire knowledge and understanding of academic motivation. There is also a strong implication for principals to find innovative and creative ways in consultation with teaching staff on how to provide opportunities for student to self-motivate.

This study found that some students have low motivation to achieve academically. Such students could not be able to answer hard items in the higher categories. For example, students with low motivation were not able to answer item 60 (I show interest in the topics being taught). Students who lack interest in the content matter of a topic in the classroom are not likely going to achieve academically. Administrators and policy makers need to prepare learning materials in such a way that the material is interesting to students. Further, they need to encourage and train teachers to use teaching methods that present learning materials in some interesting way. When the content matter is interesting, then the students would be able to show interest in the topics being taught. This way, students will be motivated to achieve academically.

Implications for teachers

Teachers were mentioned in this study by the students as important sources of motivation. From this perspective, the implication is clear. High school teachers need to adopt and develop the skills necessary that will motivate students to achieve academically. They need to devise ways of making their lessons more interesting and relevant by using appropriate and effective pedagogical techniques.

There are some hard items which students were not able to answer positively, both for motivation and behaviour. Such items include item 60 (I show interest in the topics being taught), item 2 (I study hard as much as I can), item 52 (I show genuine interest in learning), item 56 (I read and research widely on various topics), and item 6 (I set for myself high scores which I believe I can achieve). Students with high motivation can answer all the items, but students with low motivation will answer only the easy items but not the hard items such as the ones mentioned above. The hard items which students with low motivation could not answer are indicators of the areas that students need help from teachers and other educational stakeholders. Teachers need to help students with these areas so that students could be more motivated to achieve academically. For example for item 60, teachers need to formulate a teaching methodology that employs an interesting approach to the content matter being taught. This way, students' interest in the topic being taught will be stimulated and enhanced.

For item 2, teachers need to use various teaching methods to encourage students to study hard. Some teachers, for example, take some time to show students the importance of studies. If they take such an approach, teachers need to know how to show to the students, the importance of studying hard, both for the benefit of the students and the society at large. When students study hard, they are more likely going to achieve academically.

The need for persistence is emphasised as a major element, especially when dealing with students who have a mind-set that some subjects, or lessons, or tasks are always boring. To change this attitude would take time, and teachers have to be patient with such students. It is essential that high school teachers and practitioners do not abandon their efforts through frustration, but rather, persevere in motivating students in their classes. It is suggested that, as the need arises, it is reasonable that high school teachers allocate a portion out of class hours, to talk to, or do some activities with, or for students, that may act as a way to initiate communication which may act a bridging stone towards getting them to be academically motivated.

As part of being pro-motivators, high school teachers could adopt a more internal locus of control, and reflect continually on their role as motivators, and the context within which they communicate their teaching, inspiration and motivation and their philosophy with students. Engaging in a critically reflective process could provide them with more understanding of themselves and their students, and provide direction for their teaching and motivating roles. Further, high school teachers need to be prepared and ready to support their beliefs and appropriate methodologies in motivating students with knowledge and research.

Implications from the Rasch Measurement

The implications for researchers in this study is that there should be more educational studies in which linear measures are made of important variables and analysed using the Rasch measurement model. Wright (1999) claims that one cannot produce linear measures in education and educational psychology and make proper inferences (1) by just using raw scores totalled from a number of items, (2) by allowing

guessing parameters in the measurement model, (3) by allowing item discriminations in the measurement model to vary, (4) by not minimizing residuals, (5) by not creating measures that can be added and subtracted (see also Wright, 1985), and (6) by destroying construct validity. Wright (1999) argues that the Rasch measurement model (as used in the current study to produce a linear scale) is producing a 'revolution' in educational measurement and its use can lead to the creation of 'stable and reproducible laws like we have in physics' (p.101). A further implication is that the measure of motivation created in the present study might be useful, along with other linear measures, in producing a 'law' in education. This would be an exciting development.

It is further proposed that researchers need to continue to explore the Rasch measures in motivation as well as qualitative measures that include observational study and directed interviews with students on how motivation to achieve academically can be utilized in order to attain highest academic outcomes.

Finally, future research in motivation needs to investigate ways to develop an appropriate theoretical model of students' motivation. Researchers need to continue to search for the most appropriate, and long lasting model of student's motivation to achieve academically through the 'lenses' of research and use the most modern measurement tools available such as the Rasch measurement model.

Implications for further research

The findings of the present study have contributed to knowledge of students' motivation to achieve academically and provided further possibilities for the direction of future research in the field. The new model of students' motivation to achieve academically developed in the present study has enabled attitude and behaviour items to be linked together to form a motivation scale from which valid and reliable inferences can be made.

The model can only be regarded as the beginning in this area and hence needs further testing and refinement. Subsequent versions of the scale of motivation to achieve academically for high school students would be improved with testing in other

countries and with inclusion of further 'harder' items to better target students with high academic motivation to achieve.

Thirty (30) motivational stem-items, that were originally considered to be content valid, did not fit the strict requirements of the Rasch measurement. A way forward would be to reword the non-fitting items so that they fit the ordered-by-difficulty patterns in the model of motivation, collect more data, and re-analyse the data with a Rasch computer program. It is also proposed that a future study attempt to extend the model beyond the sub-aspects of main aspects of motivation developed in this research, namely, striving for excellence, desire to learn and personal incentives. Such sub-aspects could include role-models and school assessments and classroom environment.

The results support the model of attitude/behaviour developed by Fishbein and Ajzen (1975), and Ajzen (1989), where intentions (attitudes) influence behaviour. In the present study, attitudes were found to be easier than behaviours and to influence behaviours. Fishbein and Ajzen's model can be extended and tested. The extensions could involve extra variables such as capability and ideals.

This study collected data from only one state in Malaysia, namely Sabah, and with only 522 students from Years 12 and 13 (A-Levels). It is proposed that the model of motivation need to be tested in other parts of Malaysia and in other Asians countries. It is also proposed that the model be tested with male and female students to check if there are any gender implications that could be drawn. Further, the model requires testing with other grades (Years 1 to 11).

A recent issue of the Journal of Applied Measurement (November, 4(4) 2003) has two papers related to the measurement of motivation and future research on motivation. Michell (2003) suggests that researchers will not discover any laws of variables (like motivation) in educational psychology, unless there is a theory of item construction linked to the cognitive process in motivation formation and application. The present study has tried to link item location with student cognitive approaches but, clearly, more detailed item theory needs to be done. This might mean, for example, that students could be interviewed to try to determine how they link motivation items by difficulty and cognitive functions.

The second paper tests a number of hierarchical, multi-dimensional models of motivation using confirmatory factor analysis. The models presented by McInerney, Marsh, and Yeung (2003), contained mastery (effort, task, purpose), performance (praise, competition, power, token), and social (concern, dependence and affiliation) as second order aspects, linked to general and global first order motivation. Most of the second order aspects are similar to the ones used in the present study. The two main differences are that they found: (1) a multi-dimensional structure of motivation for nine second order aspects (rather than unidimensional), and (2) a global structure of motivation (using ordered scales and factor analysis), rather than a unidimensional and interval-level scale. Rasch analysis can test for a multi-dimensional model, as has been done for self-concept (see Waugh, 2003a), and this procedure could now be done to test for the proposed hierarchical, multi-dimensional model of motivation.

A Closing Thought

In our present times, we are faced with an urgent need to develop an appropriate theoretical model of motivation to achieve academically for high school students. Educators need to understand how motivation to achieve academically works and how to motivate their students. Sharing their interest in, and passion for, the subject that has become their life's work is just a part of the struggle to get the students to achieve the best.

Well-motivated students are engaged with the material, are enthusiastic, and eager to achieve academically. This is an ideal situation that educators and researchers want to foster. Yet, motivating students can be a difficult task, particularly given the diversity of goals, interests and experiences they bring with them. Students have many levels of motivation, both intrinsic and extrinsic, that can underpin a student's decision to strive for excellence, and desire to learn in a particular subject/course. Educators and researchers need to be aware of all these complexities in students' motivation to achieve academically.

One major tool that educators can use to initiate motivation in the subjects that they teach is to share their love and fascination for their discipline with their students.

They need to take every opportunity to be enthusiastic. Educators may find it valuable also to make their classes a "safe" place for students to discuss problems and ask questions. Encourage them to ask "stupid" questions - use techniques like anonymous questions on slips of paper to build trust and rapport. Teachers could use students' mistakes (and their own) as learning opportunities.

As this research has shown, students' motivation to achieve academically varies from highly motivated, average motivation, low motivation to very low motivation. While some students are highly motivated to achieve academically, educators will also encounter some low motivated students who simply aren't interested in a particular subject at all. Other students seem incapable of engaging with a subject despite their sincere efforts to do so and your best efforts to make the material interesting and relevant. It may be that their lack of motivation goes deeper than their struggles with a particular subject. This is part of the complexities of motivation that was earlier mentioned. It may be important to find out if a lack of motivation for such students can be traced to disillusionment with a certain year level (grade), difficulties in adjusting to life away from home (for boarding schools), or a recent traumatic loss. These students, much more so than others, find it difficult to force themselves to learn material that is (to them) uninteresting or irrelevant. Educators need to know how to identify students' problems and seek ways to help them or recommend services such as counselling that may be appropriate in such circumstances.

As researchers and educators, let us all journey together in finding the best model that will maintain a stable learning environment, which keeps students motivated to achieve academically with a view to establishing holistic, creative and self-motivated learners.

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Appendix A: **INFORMATION STATEMENT AND REQUEST FOR CONSENT TO CONDUCT INTERVIEW**

To the Principal,

Research Area: Motivation to Achieve Academically:

I am conducting research into motivation of high school students to achieve academically. I kindly request you to allow your students in your school, in the senior school (Year 12 and 13) to participate in this study.

The purpose of this research is to create a measuring instrument for academic motivation that can be used by others and to investigate students' motivation to achieve in your school with a view to helping teachers and students learn better.

It is expected that this research will benefit the school, teachers and students and the researcher studying students' motivation to achieve academically.

Participation will be voluntary and students can pull out at any time without prejudice. No names will be required on the questionnaire and individuals will remain anonymous. The research results will be published without names of students, as these are not recorded on the questionnaire.

The school may get a copy of the results or ask any questions about the study by contacting Mr. Joseph Njiru at the address below. If you have any concerns about the project, or would like to talk to an independent person, you may contact my supervisor, Dr. Russell Waugh, Edith Cowan University, at the following email address: r.waugh@ecu.edu.au

Thank you for your cooperation. It is appreciated and it helps us to improve our understanding of the learning processes of students.

Joseph Njeru Njiru

Appendix B: **A letter to Students**

Dear Student,

RE: MOTIVATION TO ACHIEVE ACADEMICALLY:

You are asked to complete the attached questionnaire on academic Motivation to achieve in relation to a research project that I am conducting.

The purpose of this research is to create a measuring instrument for academic motivation that can be used by others and to investigate students' motivation to achieve in your school with a view to helping teachers and students learn better.

It is expected that this research will benefit the school, teachers and students and the researcher studying students motivation to achieve academically.

Participation is voluntary and you can pull out at any time without prejudice. Your participation has nothing to do with any formal or informal assessment in your school subjects.

No names are required on the questionnaire and individuals remain anonymous. The research results will be published without names of students, as these are not recorded on the questionnaire.

You can obtain a copy of the results or ask any questions about the study by contacting Mr. Njiru at the address below. If you have any concerns about the project, or would like to talk to an independent person, you may contact the head teacher (Principal) in your school.

Thank you for your cooperation. It is appreciated and it helps us to improve our understanding of the learning processes of students. Your Consent to complete the questionnaire is given on the conditions mentioned above.

Joseph Njeru Njiru

APPENDIX C: QUESTIONNAIRE: MOTIVATION TO ACHIEVE ACADEMICALLY

This questionnaire is anonymous. Please do not write your name, or any other comments that will make you identifiable on it. By completing this questionnaire you are consenting to take part in this research. As such, you should first read the enclosed disclosure statement carefully as it explains the intention of this project.

Please rate the 50 items according to the following response format and place a number (1 - 4) corresponding to ***What I aim for*** and ***What I actually do*** on the appropriate line opposite each statement:

In all of my subjects	put 4
In most of my subjects	put 3
In some (few) of my subjects	put 2
In none or only one of my subjects	put 1

Item no.	Item wording	*What I aim for*	*What I actually Do*
Aspect:	**Striving for Excellence**		
Standards			
1.	I study hard as much as I can.	----------	----------
2.	I think about what I want to attain in my studies.	----------	----------
3.	I set for myself high scores which I believe I can achieve.	----------	----------
Goals			
4.	I try different ways to solve academic (study) problems.	----------	----------
5.	I set realistic and challenging academic (study) goals.	----------	----------
6.	I set highest academic goals which I can achieve.	----------	----------
7.	When I don't get what I expect in my studies, I work hard to so that I may achieve my goals.	----------	----------
8.	If I don't attain my goals, I try again and again.	----------	----------
Tasks			
9.	I do study outside (beyond) class homework.	----------	----------
10.	I just aim to complete homework.	----------	----------
11.	I try to do all studies which I think I might succeed.	----------	----------
12.	I try to do most studies which I think I might succeed.	----------	----------
13.	I attempt only the average of my studies which I might succeed.	----------	----------
14.	I only choose the easy study work which I think I will succeed	----------	----------
Effort			
15.	I make strong demand on myself to pass in my studies.	----------	----------
16.	I struggle hard to get correct answers in homework given.	----------	----------
17.	I check my work carefully so that I can get good marks.	----------	----------
18.	I prepare myself to get high marks in my studies.	----------	----------
19.	I make strong effort to achieve as high marks as I can.	----------	----------

In all of my subjects	put 4
In most of my subjects	put 3
In some (few) of my subjects	put 2
In none or only one of my subjects	put 1

Item no.	Item wording	*What I aim for*	*What I actually Do*
	Values		
20.	When I have no enough time for studies, I think about the importance of education.	----------	----------
21.	I value achievement (passing) in studies.	----------	----------
	Ability		
22.	I have confidence that I can pass in my studies.	----------	----------
23.	I receive encouragement on my studies from my teachers.	----------	----------
24.	I receive encouragement from at least one friend on my ability in my studies.	----------	----------
25.	I receive encourage from at least one of my parents on my ability in studies.	---------	----------
	Aspect: Desire to Learn		
	Interest		
26.	I show genuine interest in learning.	----------	----------
27.	I show interest in the subjects I take.	----------	----------
28.	I read and research widely on different topics.	----------	----------
29.	I get interested in solving problems that others have as well in a topic.	----------	----------
30.	I show interest about topics being taught.	----------	----------
31.	I concentrate in my academic work.	----------	----------
	Learning from others		
32.	I participate in classroom discussions.	----------	----------
33.	I participate in small group work/discussions.	----------	----------
34.	I ask questions on topics I do not understand from others.	----------	----------
35.	I try to learn from others who are better in studies than me.	----------	----------
36.	I seek help from experts (e.g., teachers) in my studies.	----------	----------
37.	I pay attention to my teachers to understand what is being taught.	--------	----------
	Responsibility for Learning		
38.	I take my studies as a personal responsibility.	----------	----------
39.	I struggle to gather information on topics so that I can master them.	---------	---------

In all of my subjects	put 4
In most of my subjects	put 3
In some (few) of my subjects	put 2
In none or only one of my subjects	put 1

Item no.	Item wording	*What I aim for*	*What I actually Do*
	Aspect: Personal Incentives		
	Extrinsic Rewards		
40.	I like the rewards that studies bring.	---------	----------
41.	I try to work hard because doing well in studies brings high status.	----------	----------
42.	I like to study in order to be the winner in my class.	----------	----------
	Intrinsic Rewards		
43.	I like studies because we interact with friends while we study.	----------	----------
44.	I try to work hard in studies because of the challenges it brings.	----------	----------
45.	I like the intellectual challenge brought about by academic work.	----------	----------
46.	I like to solve problems in studies.	----------	----------
	Social Rewards		
47.	I like the social relationships involved in studies.	----------	----------
48.	I have fun with peers as we study.	----------	----------
49.	I get honour and praise from my family for passing in my studies/exams.	----------	---------
50.	I get honour and praise from teachers for passing in my studies/exams.	----------	---------