

**STUDENTS' METACOGNITION AS A MEDIATOR
BETWEEN INSTRUCTION AND STUDENT
COGNITION**

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NG PENG LAN

**Thesis Submitted to the Faculty of Education, University of Malaya
In Fulfilment of the Requirement for the Degree of
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Synopsis

This qualitative case study complemented by quantitative data analysis examined pre-university Sociology students' metacognitive processes and how their strategies change based on achievement and metacognition levels. The Planned Action Interview (PAI) on 53 students' metacognitive processes found three phases: Metacognitive Knowledge (MK), Metamotivators (MM), and Metacognitive Regulation (MR) and three dimensions of learning: metacognitive, cognitive, and behavioral. First, at the metacognitive dimension, MM mediates between MK and MR. Second, at the cognitive dimension, student metacognition mediates between instruction and learning. Student metacognition improves through reflecting, monitoring, controlling, and motivating strategies. The metacognitive profile of eight high achievers consisted of an evaluative reflectivist, high self-knowledge, self-motivated, high self-control, and self-constructivist. This profile provided guidelines to facilitate use of metacognitive skills. Characteristics of effective meta-tasks found were reflectivist, self-constructivists, engaging, evaluative, and optimally challenging tasks. The Planned Action Scale (PAS) consisting of 85 items was administered to 115 pre-university students. Both the PAI and PAS were adapted from the Motivated Strategies for Learning Questionnaire (MSLQ: Pintrich et.al 1991) and the Metacognitive Awareness Inventory (MAI: Schraw & Dennison, 1994). A one-way ANOVA compared the mean achievement scores of 115 students that were grouped as low, medium, and high metacognition. A significant difference was found, $F(2, 112) = 8.50, p = 0.001$. Further analysis using a hierarchical regression technique showed that instructional task and student metacognition have a significant standardized effect, $F(2, 112) = 18.52, p < .001$ on student achievement scores. The qualitative and quantitative findings support the mediating role of metacognition in The Theory of Metacognitive Action Learning Strategies (MALS) for effective learning outcomes and future instructional designs.

Sinopsis

Tujuan kajian kes kualitatif, dilengkapi dengan analisis data kuantitatif, adalah untuk meneliti proses-proses metakognitif pelajar-pelajar sosiologi pra-university dan bagaimana strategi mereka berubah berdasarkan tahap pencapaian dan metakognisi. Dapatan dari Temubual Tindakan Dirancang (TTD) ke atas proses-proses metakognitive 53 orang pelajar mendedahkan tiga fasa: Pengetahuan Metakognitif (PM), Meta-Pemotivasi (MP), dan Regulasi Metakognitif (RM) bersama-sama dengan tiga dimensi pembelajaran: metakognitif, kognitif, dan kelakuan. Pertama, untuk dimensi metakognitif, MP menjadi pengantara PM dan RM. Kedua, untuk dimensi kognitif, metakognisi pelajar menjadi pengantara pengajaran dan pembelajaran. Tahap metakognisi pelajar meningkat melalui strategi-strategi refleksi, pemantauan, pengawalan, dan motivasi. Profil metakognitif lapan pelajar berpencapaian tinggi termasuk ciri-ciri penilai reflektivis, pengetahuan sendiri, motivasi sendiri, pengawalan sendiri, dan konstruktivis sendiri. Profil ini memberi garis panduan untuk penggunaan kemahiran-kemahiran metakognitif. Tugas-tugas meta mengandungi ciri-ciri reflektivis, konstruktivis sendiri, menarik perhatian, penilaian, dan mencabar. Skala Tindakan Dirancang (STD) berbilangan 83 item juga dilengkapi oleh 115 pelajar. TTD dan STD diadaptasikan daripada *Motivated Strategies for Learning Questionnaire* (Pintrich et al., 1991) dan *Metacognitive Awareness Inventory* (Schraw & Dennison, 1994). Analisis ANOVA keatas skor pencapaian 115 pelajar bermetakognisi rendah, sederhana, dan tinggi mendapati perbezaan signifikan, $F(2, 112)=8.50, p < .01$. Analisis regresi hierarki mendapati tugas pengajaran dan metakognisi pelajar ada kesan standardized yang signifikan, $F(2, 112)=18.52, p < .001$ terhadap skor pencapaian pelajar. Peranan metakognisi sebagai pengantara dirangkumi dalam *The Theory of Metacognitive Action Learning Strategies* (MALS) untuk panduan rekabentuk pengajaran pada masa akan datang untuk menghasilkan pembelajaran berkesan di kalangan pelajar-pelajar.

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University of Malaya

CHAPTER 1

BACKGROUND TO THE STUDY

1.1 Introduction

In any teaching and learning context, many factors influence the learning processes and thereby the learning outcomes. Recent research conducted in developed industrial countries has shown that one of the factors that influence student cognition is their metacognition. However, few studies on the role of metacognition on student cognition of learning have been conducted in the Malaysian context.

Flavell (1976) defined metacognition as ‘thinking about thinking’. He considered metacognition as cognition that reflects on, monitors, or regulates cognition. Metacognition has been defined as the activity of monitoring and controlling one’s cognition (Young & Fry, 2008), and as the executive functions that control actions or the ability to recognize and evaluate thinking patterns (Weinert, 1987). Metacognition involves knowing about thinking and knowing about how to employ executive function processes to regulate thinking (Corno, 2001; McCombs, 2001). Metacognition is also about flexible knowledge of thinking strategies. It involves executive function processes of applying and selecting strategies to assist in thinking (Paris, Brynes, & Paris, 2001). Meltzer (2004) considered metacognition as involving core executive function processes that affect academic performances. The core executive processes consist of planning, organizing, prioritizing, memorizing, shifting flexibilities and checking.

It is useful to consider metacognition as the adjective used to describe the awareness of thinking and reflection as the verb of the process of thinking about thinking (Daniels, 2002). Pintrich defined metacognitive knowledge as knowledge about cognition in general as well as awareness of and knowledge about one’s own cognition (cited in Krathwohl, 2002).

Schraw and Dennison (2002) stated that metacognition refers to the ability to reflect upon, understand, and control one’s learning. They found two main components

in metacognition: knowledge about cognition and regulation of cognition. They conducted two experiments using exploratory factor analysis and the results supported the two-factor model, with internal consistency of .90 measured by the Cronbach alpha. The two factors were significantly correlated, $r=.54$.

1.2 Statement of Problem

Recent research has indicated that students who are aware of their metacognition achieved more successful learning. This research related to metacognition has proven its importance in the area of students' learning gains. Many pre-university students struggle with the transition from secondary school to pre-university especially in subjects like Sociology that deals with abstract concepts and terminologies. The statistics on cumulative world grades from the International 'A' Level Board showed that candidate grades for June 2011 in humanities subject like Sociology has one of the highest percentage of ungraded candidates (24.5%) who scored lower than E grade and only 10.1 % scoring A or A*. Sociology deals with ill-structured authentic real life problems and requires higher order thinking skills. Pre-university Sociology student frequently faced difficulties in learning the abstract theories and concepts in Sociology and one of the possible solutions to help student learn Sociology is to incorporate metacognitive learning strategies into instructional tasks. However, the lacked of an in-depth knowledge and understanding of how metacognition can assist in student cognition of learning in Sociology has prompted me to examine this problem. There is a gap in the literature on the detailed processes of how students think about thinking. Kuhn (2000) suggested the need to know more about how metacognition develops and how it comes to regulate cognition successfully. She stressed the need to know how metacognitive development can be facilitated. Zeidner, Boekaerts, and Pintrich (2000) stated that literature showed the unclear distinction between self-regulation and metacognition. They suggested that researchers need to conduct process-oriented studies to determine how students think and the type of learning strategies they learn to

apply in one context to another. There is a lack of knowledge on how student know what they know and what they do not know, and how they regulate their learning. There is a need for research into metacognitive learning strategies that can be incorporated into instructional tasks to make learning meaningful, effective, and efficient for the students.

A deeper understanding of the metacognitive processes of student learning to identify the different metacognitive characteristics of high, average, and low achievers is therefore needed. Young and Fry (2008) stated that many teachers are faced with students with various degrees of metacognitive skills. In addition, past research has acknowledged the positive effect of metacognition on student cognition of learning but there are students of different degrees of metacognition. A comparison of these three groups will identify the metacognitive knowledge and skills that high achievers have that average or low achievers lacked. However, few studies especially in the Malaysian cultural context have provided details of the types of metacognitive strategies that are successfully used by students.

Past classical theories and research in sociology have elaborated on how individuals learn to conform to the social expectations, norms, and values in society through observation, imitation, role play and playing games. This research profiled the metacognitive strategies used by high achievers to learn how they learn and to model their strategies for weak students. There is lack of empirical data and knowledge on how high achievers make use of their metacognition to assist in the learning process. Boekaerts (1996) stated that there is still a lack of research that describe the process through which self-regulated learning develops and lack of knowledge as to why some students become motivated to self-regulate their own learning and others do not. This study aims to provide empirical data for instructors on what and how to train metacognitive knowledge and skills on learning.

Another problem lies in how to motivate student to use their metacognition to regulate cognition of learning. Past research has shown that those students with higher metacognition have more control and monitoring of their cognition of learning. Pintrich (2000) stated that there is little research on “metamotivation” that composed of student awareness of and attempts to control motivation. A deeper understanding of how certain students are able to successfully motivate their regulation of cognition and thereby improved their knowledge of cognition will be significant to an understanding of the process of learning. Many studies stated the need for motivation before learning can take place. But at which point of the learning process does motivation drive action to learn? Abraham Maslow (cited in Goble, 1970) discussed the need for the B-needs (Being Needs) as a higher level need of individuals. Maslow coined the word, ‘meta-motivators’ as the driving force to act to achieve a desirable goal. But how do meta-motivators and metacognition fit into the instructional and learning model? This study explored how meta-motivators fit into the metacognitive processes of student cognition of learning. Teachers teach well and students still cannot learn as they are not equipped with metacognitive knowledge and regulation. Kuhn (2000) stated that this could be due to a failure to transfer knowledge. This failure to apply what they learn in schools to real life problems could be due to lack of procedural knowledge which is a sub-component of metacognition. Metacognition and meta-motivators could be the essential missing link between teaching and learning process.

Next, the problem lies in how to design the types of instructional tasks that can scaffold, support, and motivate the use of metacognition to improve student achievement in the subject. There is a lack of knowledge and understanding of the role of how student metacognition interacts with instructional tasks to contribute positively to student achievement in Sociology. This research will provide an in-depth description of the dynamics of student metacognitive processes and how they interact with instructional tasks to bring about positive learning outcomes.

There is a gap in understanding the different dimensions of the learning process i.e. from the meta-level to cognitive-object level and finally to the observable evidential behavioral level. There have been numerous theories propounded on motivation but few provided a holistic and practical model of learning that integrates instructional task, student motivation, meta-motivators, student cognition of learning, metacognition on student achievement with empirical evidence especially in the Malaysian context. There is a need to learn how to assess student metacognition and then how to access it so that it can be developed further to assist in learning in any instructional model. Students need to learn two levels of knowledge: knowledge of content and knowledge of how to learn. If students know the procedural knowledge, a key metacognitive regulatory component, of how to acquire content knowledge necessary to solve a problem, they will be able to apply it in day to day problems, adult problems or even problems at work. Metacognition has a strong influence on student achievement. There is a need to understand and learn how to facilitate students' regulation of their metacognition. Therefore, students can be trained to enhance their metacognition to take control or ownership of their own learning to become independent learners.

1.3 Rationale of Study

The central focus in this study is the concept of metacognition on learning. This study on metacognition was selected to provide a deeper knowledge and understanding of how and why certain Sociology students learn more effectively than others. Since the 1980s, I have had the opportunity to teach large number of pre-universities Sociology students in major colleges in Malaysia. During my years of teaching experience in Sociology, I have observed that majority of Sociology students faced difficulties in learning the subject and achieving competence in the subject. Many students failed to monitor and control their learning as they cannot catch up with the large amount of reading materials of abstract theories and concepts in the subject and had difficulties understanding the content knowledge due to many variables such as lack of language

proficiency, thinking skills, metacognitive knowledge, motivation, and so forth. Since implementing more use of metacognitive tools and strategies in the classroom and portfolio assessment, the students have reported more positive learning outcomes as well as improvement in students' examination scores and the passing rate in their final examination in the last six years. The main rationale of this study is to increase the awareness of the importance and use of metacognition as a mediator between instruction and learning to assist students in coping better in Sociology in a Malaysian context. Many past studies have shown that high metacognitive awareness among students contributes positively to learning achievements but there is a lack of how to increase students' metacognitive awareness and also how to motivate students to engage their metacognition in the learning process (cited in Bond, 2006). The development of a metacognitive profile of high achievers in Sociology was undertaken to provide guidelines on how these students use their metacognition strategically, creatively, and critically for modeling for medium to low achievers in the course. This study contributes to metacognitive knowledge of learning how to learn effectively.

Secondly, this study focuses on student motivation as a key concept in student cognition of learning as there is no conscious or planned action to learn without motivation. This study intended to discover why some students are motivated and some students are unmotivated to regulate their cognition. A detailed knowledge and understanding of the factors that motivate students' regulation of cognition intrinsically and extrinsically can help future learners to understand themselves better and to assist teachers or trainers to facilitate learning by catering to individual differences, creating a positive class climate, and perhaps even provide effective behavioral alteration techniques.

The third key concept in this study brings attention to the importance and usefulness of evidential instructional tasks especially portfolio assessment as one form of authentic formative assessment of what students learn. This study planned to discover

the type of instructional tasks that teachers can implement in the classroom that will engage and enhance student metacognition to improve student cognition of learning. Past studies have also shown that even a marginal increase in students' metacognition can have a positive effect on learning outcomes (Coutinho and Neumann, 2006). The rationale of this study is also to develop procedural knowledge in the design of instructions that are embedded with meta-tasks. This will contribute ideas to effective curriculum planning and design of instructional tasks.

This study is to extend the knowledge and understanding of how student metacognition interacts with their motivation to engage in cognitive and behavioral actions that complete instructional tasks to achieve learning gains. The findings of this study will help to develop a metacognitive theory or approach in relation to student motivation and instructional tasks to facilitate learning more effectively.

1.4 Purpose of the Study

This study focused on three main concepts of student learning. They are student metacognition, student motivation, and instructional tasks. Firstly, it studied the metacognitive processes of student learning and examined how knowledge of cognition and regulation of cognition influence student metacognition. It described and explained the processes that link knowledge of cognition and regulation of cognition as components of student metacognition. It helped us to understand how student account, construct, and give meaning to learning and instruction. In addition, this study explored the metacognitive characteristics of high, average, and low achievers. Next, it also examined whether there is a significant difference in the scores of student achievement among high, medium and low metacognitive students. It is useful for the instructor to know the degree of student metacognitive awareness and the different types of metacognitive strategies used by students of various academic abilities and whether their metacognition affect their level of academic achievements. Furthermore, this study helped instructors to access and assess the extent of student metacognitive

awareness. In addition, it described and explored the dynamics of student metacognitive strategies and how it changed as the degree of student metacognitive awareness changes over time.

Secondly, it explored when students became aware of thinking about thinking and what factors brought about initial student metacognition. Factors such as students' goal achievement orientation, self-efficacy beliefs, control of learning beliefs, tasks value and test anxiety in motivating students to regulate their metacognition were examined. The relationship between student motivation and their metacognition and how the relationship between these two concepts influences their knowledge and regulation of cognition were explored. Since motivation is the driving force behind any planned behavioral action, it adds to knowledge that any regulation of behavior probably begins in cognition and regulation of cognition.

Thirdly, it described the characteristics of instructional tasks that are embedded with metacognitive strategies that will increase student metacognitive awareness. Knowledge of metacognitive instructional tasks will provide instructors with the tools to provoke student thinking about thinking to help regulate their cognition of learning.

Finally, it analyzed the relative contribution of metacognition, motivation, and instructional task related to student achievement in Sociology. This provided valuable knowledge for instructional design to understand how metacognition, motivation, and instructional task contribute toward student achievement.

1.5 Objectives of the Study

The research objectives of this study are:

1. To gain an in-depth understanding of students' metacognitive processes and how their strategies change based on achievement and metacognition levels.
2. To describe the metacognitive profile of high achievers and the strategies they used, and to transfer this knowledge to teachers and students to inform and transform the way learning is constructed.

3. To understand how and why some students are motivated to regulate their metacognition successfully.
4. To identify characteristics of instructional tasks that can raise student metacognition and bring about significant changes in learning outcomes.
5. To assess the effect of metacognition, motivation and instructional tasks on student achievement in Sociology.

1.6 Research Questions

The research questions for this study are:

1. What are the pre-university Sociology students' metacognitive processes and their changes in strategies as their metacognitive awareness increase?
 - a. What are the metacognitive characteristics of high, average and low achieving Sociology students?
 - b. Is there a significant difference in the achievement scores among Sociology students with high, medium, and low metacognition?
2. What is the metacognitive profile of high achieving Sociology students?
3. What are the factors that motivate Sociology students' use of their metacognition?
4. What are the characteristics of instructional task in Sociology that can enhance student metacognition?
5. What is the relative contribution of metacognition, motivation, and instructional task toward student achievement in Sociology?

1.7 The Theoretical Framework

The theoretical framework in Figure 1.1 shows the central construct of student metacognition and its relationship in the seamless instruction, learning, and assessment models. The framework shows the importance of knowing what students think-about how instructional tasks help them to think about their cognition of learning, and finally how assessment helps to inform and improve their learning. This study is based on a pragmatic, constructive and interpretive paradigm of uncovering the underlying patterns

of how student metacognition mediates between instruction and learning (Creswell, 2009).

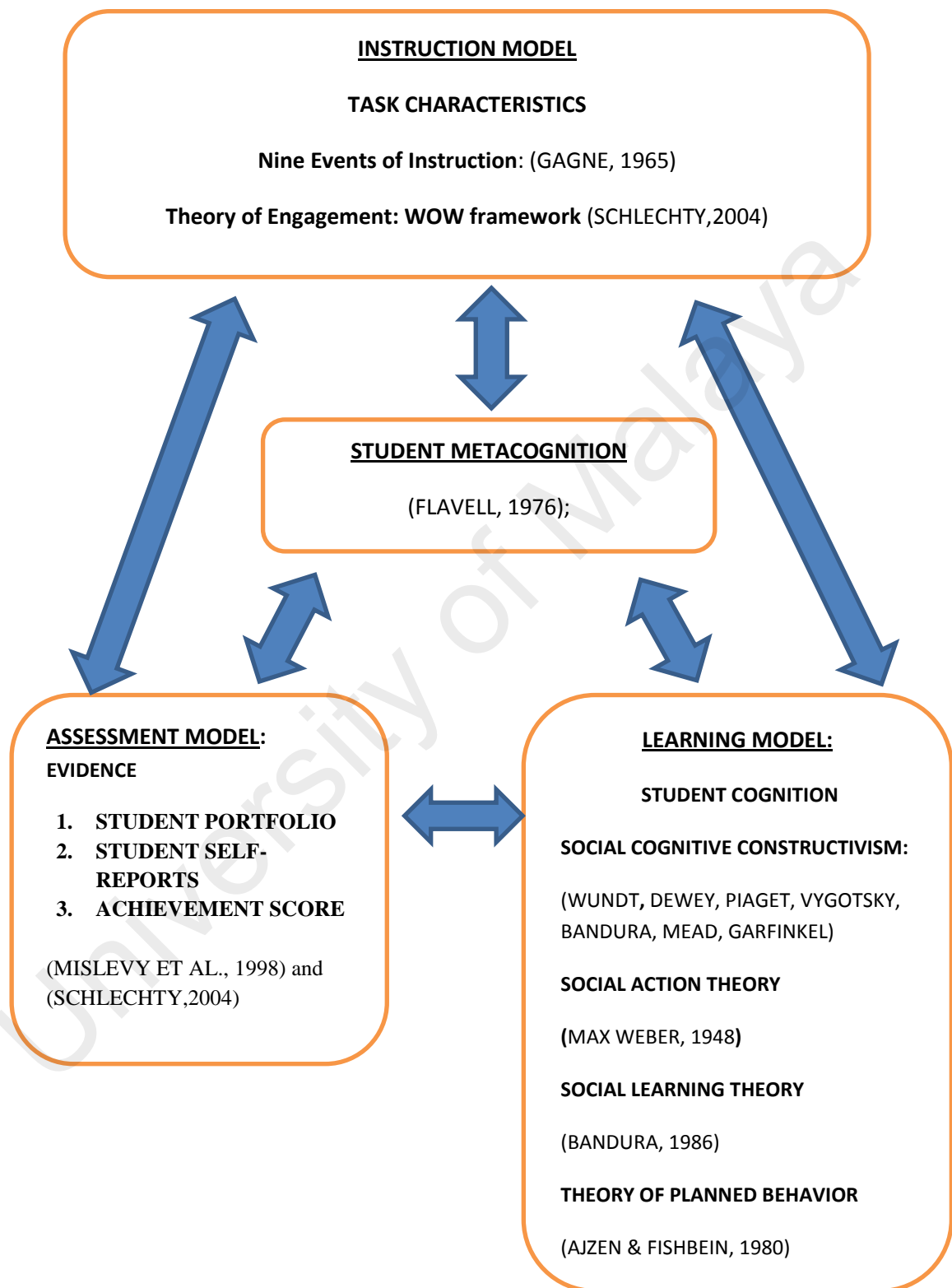


Figure 1.1.A social cognitive constructivist instruction-learning assessment theoretical framework.

1.7.1 Student Metacognition

The central construct in this study investigates the concept of student metacognition (Flavell, 1976, Schraw & Dennison, 1994). Before any learning takes place, there must be awareness of cognition. Metacognition is beyond cognition. Metacognitive awareness is a prerequisite to any learning. The two way directional arrows in Figure 1.1 show the constant interaction and construction of meanings between student metacognition and the three main processes of any learning context.

In Gagne's (1985) nine events of instruction, learning is possible only through gaining awareness, stimulating reflection of prior learning, providing feedback for students to gain awareness of their judgment of learning performance and strategies to enhance retention and transfer of cognition or learning. Many of the nine events or conditions of learning provided by Gagne required some degree of metacognitive processing. A certain level or degree of metacognitive awareness is essential to the process of learning. The framework shows how instruction interacts with student metacognition and learning takes place if the interaction effectively produces a conceptual change in the student cognition. This can only be known if instructors assess the change during and after the process of instruction.

1.7.2 Instructional model

In the traditional instructional model, the focus is on the delivery of curriculum by the instructor. Until today, many educational institutions still have difficulty weaning instructional designs away from teacher-centered to student-centered learning. Fagnant and Crahay (2011) stated that in the past theories of mind and metacognition have mainly been treated as independent variables but recent studies have highlighted the importance of the overlapping areas between theories of mind and metacognition. Thus to understand how the mind reasons or learns new knowledge, there is a need for further empirical studies into how metacognition mediates reasoning or thinking especially in student cognition of learning. Instructional model need to design metacognitive

knowledge, skills, and strategies into the planned curriculum as learning occurs in the mind or cognition of the learner. Pellegrino (2006) argued for a metacognitive approach in instructional design in his paper on ‘Rethinking and Redesigning Curriculum, Instruction, and Assessment: What Contemporary Research and Theory Suggests.’ Thus, the focus on instructional design needs to be directed onto how student learn or how the mind of the individual perceives instruction or delivered curriculum. Figure 1.1 shows a social cognitive constructivist instruction-learning assessment theoretical framework. This theoretical framework is based on the social cognitive constructivist approach by Dewey, Piaget, Vygotsky, Bandura, Mead, and Garfinkel. The instruction-learning assessment triad shows the cyclical process of the learning context. The two-way arrows show the interactive effects that the instructional model has on the learning model and the assessment model, and vice-versa. The feedback into each model shows how student cognition may change as each model interacts with the student cognition and a conceptual cognitive change occurs. However, student learning may not take place effectively without student metacognition as the mediator between instruction and student cognition as shown in Figure 1.1.

Past research by Gagne (1985) and Schlechty (2004) argued that the focus on teaching and learning model should be on designing instructional tasks that can engage the student’s attention and therefore his or her cognition of learning. The two-way arrow between instructional tasks and student learning shows the social-cognitive constructivist approach to learning. Instructors also need to know and understand the extent of student metacognition to be able to plan their lessons. Instructors also need to have knowledge of how students know what they know to be able to construct lessons that are embedded with metacognitive tasks to assist student learning. Instructors need to have knowledge of the subject and knowledge of the learning process to be able to bring about desired learning outcomes. Instructors need to be trained on how to organize, plan, and include metacognitive knowledge and skills into their lesson plan.

There are many levels of instructional knowledge and skills needed: content knowledge of subject, pedagogical content knowledge, philosophy of knowledge, and metacognitive knowledge of the learning process. Therefore, instructors need to know how students learn and also be skilled in procedural knowledge of how student learn.

Any instructional design need to be able to engage the student. Instructional tasks that can engage students can gain their attention. According to Gagne's (1985) nine events of instruction, the first type of instruction must be able to gain the attention of the student by arousing his interest with novelty or surprise. In his fourth edition of *The Conditions of Learning* written in 1965, Gagne incorporated three major components: taxonomy of learning outcomes, conditions of learning, and lastly he provided the nine events of instructions (1985). The three taxonomy of learning are cognitive, psychomotor, and affective domain. Gagne and Driscoll (1988) developed the following conditions of learning: verbal information, intellectual skills, cognitive strategy, motor skill, and attitude. Lastly, Gagne's nine events of instruction are: gaining attention, informing learner of objectives, stimulating recall of prior learning, presenting stimulus material, provide learner guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer (Gagne, 1985). According to Gagne, learning is a step by step process and each step must be accomplished before the next in order for learning to take place.

Schlechy (2004) argued that an engaging teacher may not necessarily improve student learning but an engaged student will improve academic achievements.

Engagement refers to the behavioral intensity, emotional quality, and personal investment in a student's involvement during a learning activity (Connell & Wellborn, 1991; Fredericks, Blumenfeld, & Paris, 2004; Furrer & Skinner, 2003; Welborn (1991) cited in, O'Donnell et al., 2005).

The WOW framework by Schlechy (2004) theorized that when teachers work on the quality of work that they give to their students, the work will engage more

students more of the time. He grouped them into ten categories: Content and Substance, Organisation of Knowledge, Product Focus, Clear and Compelling Product Standards, Safe Environment, Affirmation of Performance, Affiliation, Novelty and Variety, Choice and Authenticity. Students who are engaged are involved in their own learning, showed skills working with others and able to transfer knowledge to solve problems (Schlechty, 2004). Work that was considered un-engaging is repetitive, requires no thought, or forced on them. Engagement is not just keeping busy. Engaged learning is intrinsically motivating. Therefore, instructional tasks need to gain students' attention and engage them in tasks that will motivate them to regulate their cognitive processes, and eventually engage them in evidential tasks to regulate their learning behavior.

1.7.3 Learning Model

The theoretical framework showed the importance of the frequency of interaction between student metacognition and student cognition to help regulate cognition in the learning process. The two-way arrow shows that constant communication occurs between the meta-level and object-cognitive level of an individual's mind. The Nelson and Narens' (1990) model conceptualizes cognitive processes as split into two levels: an object cognitive level and a meta-cognitive level. The information flow is monitored from the object-level to the meta-level while information is controlled from the meta-level to the object-level.

Muis and Franco(2010) research study found that profiling students helped in setting standards for learning. They found that individuals profiled as rational and empirical achieved more learning gains .This might helped in understanding how student learns and creating more learning opportunities for students to increase their epistemological beliefs of how they know what they know.

All learning takes place in the mind i.e. cognition of an individual. Learning is defined as a process of change in behavior or capacity of an individual acquired through experience (Tan, Parsons, Hinson, & Sardo-Brown, 2003). Cognitivists such as Piaget,

Bruner, Vygotsky, Watson and Bandura believe that learning is an internal process. Weber, Blumer, and Mead view meanings as products of social interactions (cited in Cuff, Sharrock, & Francis, 1992). Blumer stated that human beings act toward things on the basis of the meanings which are interpreted from social interactions. Mead, the founder of Symbolic Interactionism, believed that learning is a social experience consisting of a continuous two way process of action and response in the construction of meaning in everyday events such as learning. Mead argued that human beings are able to self-observe and self-indicate to themselves. Human beings are able to have a conversation within itself. The individual's ability to interact within the subjective level and objective level enabled it to develop a self-concept. This self-concept is composed of two components: the subjective 'I' and the objective 'me'. The theoretical framework is underpinned by social constructivist theories that the mind is constructivist and thus there is a need to understand the dynamic interaction between student metacognition and student cognition to be able to understand the complex process of how learning takes place in the mind of an individual.

Researches have shown that given certain instructional tasks, students learn better if they interpret and construct the meaning of concepts, ideas, and theories themselves. A social cognitive constructivist approach to learning will enable the learner to better perceive, understand, and retained the information for a longer term. The instructors or teachers are facilitators of student learning. Students need to be given time on tasks to engage their metacognition and cognition before any behavioral evidence of learning output can be observed. Students learn best when they observe, imitate, and role model experts (Bandura, 1986). Social constructivism emphasizes the importance of learning as an active, constructive process of social interaction by students. They are constantly negotiating the meaning of things in a cultural context. Social constructivists believe that reality, knowledge, and learning are social and culturally constructed.

The self-regulated learning model by Zimmerman (1990), Theory of Planned Behavior (Ajzen & Fishbein, 1980) and the Social Action Theory by Max Weber (cited in Gerth & Mills, 1948) described how students interpret and construct meaning to their actions before they can be motivated to regulate their metacognition to bring about self-regulated learning cognition and behavior or a planned action of learning to achieve learning gains.

The learning processes from metacognition to cognition and finally behavioral action to learn is complex and requires some form of transformation from one dimension of knowledge to another. Max Weber, the founder of Social Action Theory argued that all social actions have meaning and each act requires a subjective motive before any conscious action takes place (Gerth & Mills, 1948). This was the beginning of investigation into subjective motive of action such as what, how, when and why an individual learns. Learning ranges from the highly conscious planned action to the weakly conscious unplanned action. The stronger the degree of metacognitive awareness, the more conscious a learner is of his cognition of knowledge. Learning may occur in formal or informal or even virtual spaces in the twenty first century. If learning becomes a more consciously planned action, then the learner might be able to monitor and control how he learns and benefits from it. Understanding the metacognitive, cognitive, and behavioral action of the learning process of an individual will help instructors to plan effective lessons and learners to better understanding how they learn themselves.

In addition, the self-regulated learning model by Zimmerman (1990) provides an understanding to this process. He stated that self-regulated learning is a cyclical process involving forethought, performance and reflection. Forethought is composed of task analysis and self-motivational beliefs provide the necessary conditions for learning such as goal setting and planning. He explained that the performance phase involves self-control and self-observation processes that occur during learning efforts and which

guide and regulate the learning process. He described the last phase, self-reflection as involving processes which occur after the learning experience and which influence reactions to that experience.

Furthermore, the Theory of Planned Behavior by Ajzen and Fishbein (1980) also provided an in-depth understanding of how planned learning behavior occurs. He stresses on the importance of beliefs in influencing the intentions to act. The motivation to act or intention to engage in any behavior is affected by the individual's attitude, subjective norms, and the perceived behavioral control (Ajzen & Fishbein, 1980). All three components are measured by the individual's beliefs system of his personal, social, and perceived behavioral control respectively. An individual's beliefs system depends on the levels of metacognition and motivation that he engages to bring about the act of planned learning behavior. The learning process of a conscious, thinking individual is a complex change and regulation in metacognition, cognition, and behavior.

1.7.4 Assessment model

Any learning process without some form of assessment is incomplete. In the theoretical framework in Figure 1.1., the two-way arrow between assessment model and student cognition model shows the need for feedback from assessment of student evidential work products to help student regulate their cognition of learning. In fact, the triad between student metacognition, student cognition model, and assessment model itself showed that the feedback of assessment flowed back to student metacognition to help regulate student cognition of learning. Then in turn student cognition can be observed and measured in behavioral evidence in student evidential work products in the assessment model. Metacognitive knowledge was categorized as one of the main dimensions of knowledge in the revised Bloom's Taxonomy. The problem lies in how to assess the many dimensions of knowledge in the learning processes. During the 1990's, Lorin Anderson, a former student of Bloom's and a group of cognitive

psychologist developed a revised Bloom's taxonomy that was more practical and based on action oriented learning. The revised Bloom's taxonomy of Anderson and Krathwohl (2001) consisted of the knowledge of dimension and the cognitive process dimension. The four dimensions of knowledge are factual, conceptual, procedural, and metacognitive. The six cognitive process dimensions are: remembering, understanding, applying, analyzing, evaluating, and creating. The cognitive process dimension contains a verb which refers to the intended cognitive process. The revised version of the Bloom's taxonomy makes it easier to assess students learning outcomes. This leads us to the behavioral outcome of student work products needed as evidence of cognitive processing of learning taking place in the learner. Student work products in their portfolio, student self-reports, and their achievement grades are useful assessment tools of student learning outcomes. The evidence-centered learning approach can be found from students' creation of work products for instructional tasks that are set in accordance to curriculum and instructional objectives.

The evidence model by Mislevy et al. (1998) and Schlechty (2004) helped explain this assessment process. Mislevy et al. (1998) believed that evidence-based task can produce student behavior or performance that should reveal the targeted cognitive constructs. These instructional tasks that are assigned to students help them to regulate their metacognition and knowledge of cognition. In recent research, there is a new focus on learning but it is not on instruction delivery. Schlechty (2004) and Mislevy et al. (1998) have focused on instructional tasks that provide an end product of learning.

In 1956, Benjamin Bloom and a group of educational psychologists developed six classifications of levels of intellectual behavior of learning. Bloom's taxonomy of knowledge consisted of six levels: knowledge, comprehension, application, analysis, synthesis and evaluation. In 2001, Haskell developed two taxonomies of transfer of learning. The first taxonomy consisted of six levels of transfer: nonspecific, application, context, near, far, and creative transfer. The second taxonomy consists of fourteen kinds

of transfer: content, procedural, declarative, strategic, conditional, theoretical, general transfer, literal, vertical, lateral, reverse, proportional, and relational transfer. In summary, Bloom's taxonomy (1956), revised Bloom's taxonomy of educational objectives (2001), and Haskell's (2001) Taxonomies of Transfer of Learning raised the need for an in-depth study of how student successfully apply knowledge or transfer of learning and their use of higher order thinking skills such as analysis, synthesis, and evaluation to improve their grade in the subject.

The conceptual model in Figure 1.2 shows the two levels of cognition: the object level and the meta-level. It illustrates how the two levels interact to bring about the third level: the evidenced level of learning which is objectified in terms of student action or behavior, e.g., students' self-report, student work products in their portfolio, and their achievement scores. Instructional tasks that promote motivation to regulate cognition also need to be embedded with meta-tasks to scaffold motivation to regulate metacognition that composes of knowledge of cognition and regulation of cognition. Students with higher level of knowledge of cognition will be able to adapt effective learning strategies to regulate their cognition. Meta-tasks that enhance knowledge of cognition and regulation of cognition will help to increase metacognitive awareness of student learning. An increased student metacognitive awareness will mediate between instructional tasks and student self-regulating learning behavior, e.g., assimilation, accommodation, and equilibration of student cognition of learning. Instructional tasks that promote regulation of student cognition and scaffolds regulation of student metacognition can complement each other to achieve positive student learning outcomes.

1.8 The Conceptual Model

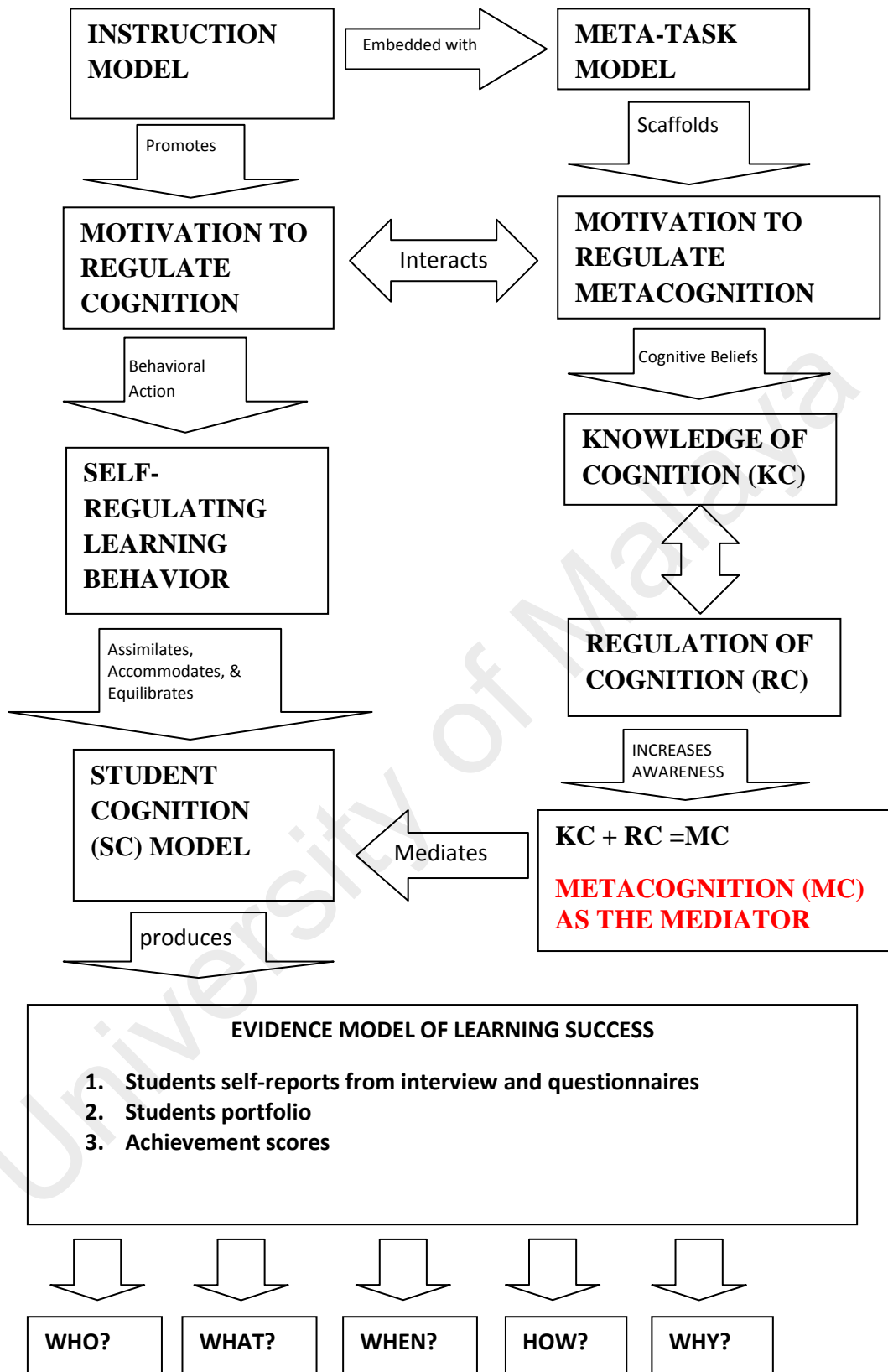


Figure 1.2. A conceptual model of student metacognition as a mediator between instruction and student cognition.

1.8.1 Metacognition

The conceptual model illustrated in Figure 1.2 shows the process of metacognition as the mediator between instruction and learning. Researchers have conceptualized metacognition into two subcomponents: metacognitive knowledge and metacognitive regulation (Flavell, 1987; Schraw & Dennison, 1994). Metacognitive knowledge consists of what we know about our cognitive processes. It consists of declarative, procedural and conditional knowledge (Schraw & Moshman, 1995). Declarative knowledge involves what we know about what we learn. Procedural knowledge is our knowledge about different learning procedures and strategies that works best for us. Conditional knowledge is the knowledge we have about the conditions under which we can implement various cognitive strategies effectively (Schraw & Moshman, 1995 cited in Young & Fry, 2008).

Metacognitive regulation can be described as the planning, monitoring, and evaluating activities we engage in order to facilitate learning and memory (Schraw & Moshman, 1995 cited in Young & Fry, 2008). They described planning as selecting appropriate strategies and cognitive resources, and monitoring as the awareness of our progress through a cognitive task and our ability to determine our performance. Finally, they described evaluating as determining if the learning outcome matches our learning goals and if the regulation processes were effective.

The role of student metacognition is important in the teaching and learning process as it consists of planning, monitoring, controlling and evaluating student cognition of learning. It is the metacognitive process of a learner that helps narrow the gap between what is taught and what is learned. Certain tasks characteristics that incorporate time for metacognition will help students regulate their learning by assimilating and accommodating new information into existing schema in their metacognitive knowledge. There is a need for incubation or reflection time for metacognitive processes or regulation to take place. This will allow time for adaptation

of new information into existing knowledge of cognition. Sometimes it is necessary to restructure the existing schema to be able to accommodate the new information. This takes time and mental effort for the student to adjust their cognition. If this is not done, no new learning takes place. This could be the reason that explains why weak students do not achieve significant learning gains even after many lessons.

1.8.2 Motivation

Metacognitive awareness is not enough to improve student learning. There is a need to understand the factors that will motivate students to self-regulate themselves. Motivation and volition are components of conation, a “crescendo of commitment” that runs “from wishing to wanting to intending to acting (Cronbach, 2002). Figure 1.2 shows two levels of motivation. The first level of motivation (wanting) is the will to regulate metacognition and the second level of motivation (intending to act) is the will to regulate cognition of learning. Studies have shown the importance of self-efficacy beliefs (Bandura, 1986; Pajares, 1996) and goal achievement orientation to motivate student self-regulation of learning. The Theory of Planned Behavior (Ajzen & Fishbein, 1980) discusses the importance of beliefs in influencing the intentions to act at the behavioral dimension. Findings from Bandura (1986) and Pajares (1996) revealed that, when belief assessed and criterial task are matched, prediction of performance of a task is enhanced. Moreover, researchers have shown that self-efficacy perceptions are also good predictors of reasonably generalized performances such as obtained grades (Bandura, 1993; Zimmerman, Bandura, & Martinez-Pons, 1992). Therefore, if students can be motivated to regulate their metacognitive knowledge, they can improve their academic achievements.

1.8.3 Instructional Tasks

Price (2005) discussed the interrelations of four key concepts: metacognition, motivation, memory and self-regulation. The conceptual model in Figure 1.2 illustrates the instructional learning model of how metacognition, motivation, and self-regulation

of tasks in student portfolio works together to bring evidence of student learning and memory in terms of student work products and improved performance in academic achievement. There is a need for instructional tasks to be embedded with meta-tasks to help them complete their tasks. Student portfolio is one form of instructional tasks that requires student to practice meta-tasks such as reflective metacognition constantly on what, when, how, and why they need to complete the tasks.

1.9 Significance of Study

A meta-analysis conducted by the Mid-Atlantic Regional Educational laboratory of more than 11,000 statistical findings correlating school factors with achievement found that students' metacognitive processes is the second most important factor on learning after active student participation in the classroom (cited in Bond, 2006). Coutinho and Neumann (2006) stated that many research have shown that metacognition is an important predictor of academic performance and revealed that even a short metacognition training session can improve performance considerably. According to Veenman, Wilhelm and Beishuizen (2003), many past studies have recognized metacognition as a relevant predictor of learning.

There are four key areas of significance of this study. Firstly, the findings increased our understanding on the relationship between metacognition and student cognition to achieve learning gains. This study described and explained the processes that link knowledge of cognition and regulation of cognition as two key components of student metacognition. It uncovered the underlying patterns of student metacognition. In addition, this study explored the role of student metacognition between instruction and student cognition among high, average, and low achievers. Next, it examined if there is a difference in the scores of student achievement among high, medium and low student metacognitive scores. It is useful for instructors to know the degree of student metacognitive awareness and the different types of metacognitive strategies used by students of various academic abilities and whether their metacognition affect their level

of academic achievements. In addition, the profile of high achievers' metacognition in Sociology is useful to inform instructors and for role modeling for new Sociology students. Furthermore, this study provided instructors with metacognitive strategies for accessing and assessing the extent of student metacognitive awareness. In addition, it described and explored the dynamics of student metacognitive strategies and how it changed as the degree of student metacognitive awareness changes over time. It validated the assumption that a change in student metacognition can bring about higher student achievement in the subject. It will motivate instructors and students to find strategies to enhance metacognitive knowledge, experiences, and skills. Sociology students were selected as the subject deals with abstract theories and concepts that require reading, writing, thinking, communication, examination, self-regulating and metacognitive skills. Sociology students need to be able to hold their thoughts for analysis and synthesis. Thus, an understanding of their metacognitive processes and motivation to self-regulate their learning will contribute positively to helping Sociology students cope with an abstract subject that is new to them.

Secondly, this study explored the factors that brought about initial and subsequent student metacognition. Then, it examined factors such as students' goal achievement orientation, self-efficacy beliefs, control of learning beliefs, task value and test anxiety in motivating students to regulate their metacognition. It explored the relationship between student motivation and their metacognition and showed how the relationship between these two concepts influences their knowledge and regulation of cognition. Since motivation is the driving force behind any planned behavioral action, it adds to knowledge that any regulation of behavior probably begins in cognition and regulation of cognition. A deeper understanding of how to motivate regulation of cognition and thereby improved knowledge of cognition is significant to an understanding of the complex process of learning,

Thirdly, the characteristics of instructional tasks embedded with metacognitive strategies that can bring about a change in the learning process in the classroom are described. An understanding of the type of instructional tasks that students feel and think can help them improve their metacognition on the subject will provide instructors with the tools to initiate change in student learning. Instructional tasks that provoke student thinking about thinking can help regulate their cognition.

Finally, it analyzed the relative contribution of metacognition, motivation, and instructional task relate to student achievement in Sociology. This will provide valuable knowledge for instructional design to understand how metacognition, motivation, and instructional task can be planned to contribute positively to student achievement.

In conclusion, the key purpose of this study is to provide knowledge and understanding of the processes of student metacognition; knowledge on how to assess and motivate student metacognition, and to identify and describe the metacognitive strategies used by high achievers to empower teachers and students with metacognitive knowledge and skills to transform the way learning is constructed. In addition, instructional tasks can be designed to raise student metacognition and bring about significant changes in learning outcomes. The findings of this study can be applied in the teaching and learning process to bring about effective and efficient planned action of learning tasks.

Kuhn(2000) proposed that enhancing metacognitive awareness of what one believes and how one knows and meta-strategic control in application of the strategies that process new information is an important developmental and educational goal. She views metacognition as the locus of developmental change. She discussed why efforts to induce change directly at the performance level have only limited success due to failure to transfer to new materials or contexts. She stated that strategy training may sometimes appear successful, but if nothing has been done to influence the meta-level,

the new behavior will quickly disappear once the instructional context is withdrawn and individuals revert back to their initial behavior. She argued that there is a need to know more about how metacognition develops, and how it comes to regulate first-order cognition, or very often, why it fails to do so.

In addition, the research findings will help instructors to understand the types of characteristics in a task that will bring about metacognitive awareness and strategies. The findings can also be used to train student to improve their metacognition and subsequently their cognition of the subject domain. It will provide the missing link that teachers have been looking to solve the gap between the teaching and learning process. Metacognition is an important mediator between the teaching and learning process. Kuhn (2000) emphasized the importance to know how metacognitive development can be facilitated. She quoted the approach by Brown (1997) such as constructive discussion, questioning, querying and criticism as the reflective activities to internalize self-reflective practices among students. She stressed on the importance for people to become aware of and reflective about their own thinking so that they are able to monitor and manage their academic, work and personal life settings better. She proposed that metacognitive development is a construct that will help to achieve these goals. In addition, Paris and Winograd (1990) identified two main benefits of increased metacognitive awareness. Firstly, the responsibility for learning is transferred from teacher to student and develops independent thinking student. Secondly, it helps to promote motivated intentional learners with positive self-perceptions cum affective personalities (cited in Price, 2005).

There are four classifications of students and their metacognition and cognition. Group one consists of students who are aware of what they know only, group two consists of students who are aware of what they know and what they do not know, group three are students who are unaware of what they know, and group four are students who are unaware of what they do know and do not know. The degree of

awareness and unawareness depends on their level of metacognition. If students are aware of what and how much they know or do not know, the accuracy of their judgment of learning will increase. This helps them to change and regulate their learning when required. An increase in students metacognitive awareness of their cognition for all the groups especially group one, three, and four will significantly increase their accuracy of their judgment of learning and subsequently improve their achievement score. If students are much more aware of what they know and do not know can transfer their learning outcomes more effectively and efficiently.

Table 1.1 applied a similar concept of the Johari Window. It is a cognitive psychological tool created by Joseph Luft and Harry Ingham (1955) helps individuals to understand themselves better. However, table 1.1, used to classify the four possible outcomes of student metacognition, illustrates the significance of this study.

Table 1.1

Four Quadrants of Knowledge of Cognition

Metacognition	I Know	I do not know
Cognition		
What I know	Aware (A)	Unaware (C)
What I do not know	Aware (B)	Unaware (D)

Table 1.1 illustrates the four possible outcomes of self-knowledge of cognition. The assumption is that the majority of students are normally aware of what they know as in quadrant A, and a few might be aware of what they do not know as in quadrant B. Many students may be unaware of what they know as in quadrant C and quadrant D due to lack of opportunities to discover what they do know in regular classroom. The four quadrants of knowledge of cognition show the importance of developing student metacognitive awareness to help learners realize their full potential and enjoy learning gains. If students are aware of what and how much they know or do not know as in both

quadrant A and B, this will increase the accuracy of their judgment of learning and helped them to change and regulate their learning when required. Quadrant B shows student knowledge of what they do not know will help them to initiate regulation of learning to improve their learning outcomes. But the 50 per cent of lack of awareness as in quadrants C and D shows the need to improve student metacognition to bring about improved student learning outcomes. If students are much more aware of what they know and do not know, this will bring about a more efficient and effective transfer of learning outcomes. This study describes the types of instructional tasks that will help to improve student awareness of what they do know and what they do not know as in Quadrants C and D. If instructional design can help students to increase their metacognitive knowledge, student can discover their true potential. This study helps to bring a more in-depth understanding of the metacognitive processes of student learning that can be used by instructors and students to bring about positive and successful learning outcomes.

This study describes the types of instructional tasks that will help to improve student awareness of what they do know and what they do not know. If instructional design can help students to increase their metacognitive knowledge, the students can discover their highest possible potential.

Many employers have reported that new graduates are not equipped with certain expected skills and capabilities. In addition, recent studies and meta-analyses have reported a low level of transfer of learning from grades to actual job performance (Ramocki, 2007). Ramocki (2007) reported that studies done by Roth, BeVier, Switzer, and Shipman (1996) showed a very weak correlation between grades and job performance, averaging about .16 one year after graduation since 1961. They also found that the correlation is weakened to .08 six years after graduation. Ramocki argued that correlations between classroom accomplishment and job performance required more attention to the critical components of metacognition and the transfer of knowledge.

This study will describe and explain the role of metacognition that can be generalized to many learning situations.

The significance of this study is to provide more focus and understanding of the metacognitive processes of student learning that can be used by instructors and students to bring about positive and successful learning outcomes. It will empowered learners on how to learn, promote flexible thinking, help students bypass weaknesses, and encourage independent thinking (Meltzer, Pollica, & Barzillai, 2007 cited in Meltzer, 2007).

1.10 Limitations of the study

The findings of this study are limited to pre-university Sociology students within the age group of 18 to 19 years old in a private college where the medium of instruction is English. This age group provided a good source to assess the level of metacognitive awareness of students in Malaysia as they are able to self-report their cognitions more explicitly. They were able to elaborate on their thought processes. They were more mentally mature to provide rich evidence of their metacognitive processes. The findings may not be generalizable to another age group or pure science students. It is representative of a limited age group and class from a social science discipline that deals with ill-structured problems in a Malaysian context.

Secondly, the findings are limited to the middle and higher socio-economic status of the Malaysian population. This sample of students is selected from a student population from middle to upper class background who can afford private education. They have a rich cultural capital of experiences. They do not lack the economic or financial resources to obtain supporting educational resources such as text books, computer tools, and so forth. There were a few students from a lower socio- economic status who were on scholarships from various organizations.

1.11 Operational Definition of Terms

(i) Metacognition

Metacognition refers to the ability to reflect upon, understand, and control one's learning consisting of the metacognitive knowledge and metacognitive regulation components (Schraw and Dennison, 2002).

(ii) Metacognitive Knowledge

Metacognitive Knowledge refers to the declarative knowledge, procedural knowledge, and conditional knowledge of an individual.

(iii) Metacognitive Regulation

Metacognitive Regulation refers to planning, comprehension monitoring, information, management strategies, debugging strategies, and evaluation processes.

(iv) Cognition of Learning

Cognition of Learning refers to thinking that focuses on knowledge to solve a problem to achieve a conceptual change in the mental schema.

(v) Motivation

Motivation is the incentive or desire to achieve an individual's needs and goals (Gaskin, 2005).

(vi) Conation

Conation consists of the motivation and volition components that runs "from wishing to wanting to intending to acting (Cronbach, 2002).

(vii) Meta-motivators

Meta-motivators refers to drives to achieve high being needs of an individual that go beyond the basic needs to achieve self-actualization (Abraham Maslow cited in Goble, 1970).

(viii) Portfolio Assessment

Portfolio assessment refers to one form of authentic formative assessment of what student learns.

(ix) Portfolio

Portfolios are collections of the best pieces of a student work that provide evaluation and assessment of an individual's strengths and weaknesses.

(x) Meta-tasks

Meta-tasks refers to tasks that engages use of students' metacognition to regulate and control students' cognition of learning such as planning, reflecting, organizing, simplifying, summarizing, relating, analyzing, evaluating and synthesizing content knowledge.

University of Malaya

CHAPTER 2

LITERATURE REVIEW

2.1 The Curriculum-Instruction-Assessment Triad

A holistic understanding of the three key aspects of the educational process starts with curriculum, instruction, and assessment. Marsh and Willis (2007) stated that curriculum is a composition of the planned curriculum, the enacted curriculum, and the experienced curriculum. They make two basic assumptions. Firstly is the flexibility for teachers in translating plans into actions produces the most desirable educational experiences, and secondly is the desirability to have such curricular flexibility. What works for one student at a particular time and place may not work for another student. They focused on the need for teachers to deal flexibly with classroom complexities.

Marsh and Willis (2007) loosely defined curriculum as whatever means that are deliberately undertaken to achieve desirable ends such as specific standards. They stated that a holistic view of curriculum and instruction should empowered teachers to be directly involved in flexible curriculum planning that constantly monitor and adjusts ends and means according to the needs of each classroom situation. They believed that it is undesirable to separate curriculum and instruction. The working definition of the term curriculum adopted by Marsh and Willis (2007) is “an interrelated set of plans and experiences that a student undertakes under the guidance of the school.” This definition covers planned and unplanned curriculum, the experiences of students, the importance of both teachers and students in producing the “lived” curriculum, the complexity of social interactions to enrich individual lives to undertake and complete certain tasks and activities in formal education such as a college.

The Corporate Communication Unit of Education Ministry summarized The National Philosophy of Education in Malaysia as a holistic development of the physical, emotional, spiritual, and intellectual aspects of an individual implemented in government and private schools. The national curriculum’s main purpose of education

is to develop the potential of an individual to its fullest. Various formative assessment models such as portfolio assessment, project-based learning and problem-based learning are used to assess students' development. This philosophy provides a good platform for teachers and students to become familiar with pedagogical models, modular standard-based curriculum, and continuous school-based assessment in the teaching and learning process that promotes a holistic learning system. It also provides a platform for learners to be responsible for their own learning through exploration and enables teachers to motivate students to experiment with ideas (as reported in *The Star*, March 21st, 2010). The Corporate Communication Unit of the Malaysian Education Ministry, Putrajaya reported in *The Star*, March 21st, 2010 that although various pedagogical approaches such as Mastery learning, Contextual learning and Constructivism have been introduced to execute the shift from teacher-centered to more learner-centered learning, some students have not been successful in meeting the learning outcomes specified in the curriculum (*The Star*, March 21st, 2010).

According to the New Commission Report by the National Center on Education and the Economy (2006), little 'adaptive expertise' is used to shape the goals of the official curriculum, the instructional processes or the modes of assessment in the United States (Pellegrino, 2006). Curriculum is defined as the knowledge and skills in subject matter areas that are taught and learnt. While instruction refers to the methods of teaching as well as the learning activities used to help students master the content and objectives specified by a curriculum. Lastly, assessment is the means used to measure the outcomes of education and the achievement of students with regards to the important competencies or goals set by the curriculum (Pellegrino, 2006). However, Pellegrino discussed the lack of alignment among curriculum, instruction, and assessment triad. He defined alignment as achieved when the three functions are directed toward the same ends and reinforce each other. Pellegrino stated that an

assessment should measure what students are instructed and what is instructed should parallel the curriculum planned.

Pellegrino summed up the three important principles about how students learn:

1. Students' beliefs and prior knowledge influence learning
2. Strong knowledge and understanding of facts and ideas organized within a conceptual framework that facilitate retrieval and application
3. A metacognitive approach to instruction that helped them control and monitor their progress to achieve their learning goals.

Bond (2006) examined the role of student reflection in a seamless teaching, learning, and assessment process. He stated that reflective assessment grew out of strong theoretical roots from ancient Greek thought, the philosophy of John Dewey, and cognitive constructivist learning theories. He proposed reflective assessment as a formative process through which students can experience assessment as a part of learning, rather than as a separate evaluative process. Bond's view on assessment is similar to Pellegrino. Both agree that assessment is just as important in the cycle of teaching, learning and assessment process and how each stage feed into the next. Understanding and improving student metacognition will help to align the curriculum, instruction and assessment of learning triad.

Social constructivism emphasizes the importance of learning as an active, constructive process of social interaction and constant negotiation in a cultural context. Social constructivists believe that reality, knowledge, and learning are social-culturally constructed. Learning is a process of change in behavior or capacity of an individual acquired through experience (Tan, Parsons, Hinson, & Sardo-Brown, 2003).

Cognitivists such as Piaget, Bruner and Vygotsky believe that learning is an internal process. Vygotsky (1978) also claimed that learning occurs through interaction with

others. The founder of the Social Learning Theory (Bandura, 1977) believed that learning is both an overt behavior and an internal process.

An understanding of how student construct knowledge will help educators to narrow the gap between the curriculum taught and the curriculum learnt. According to Pellegrino, Chudowsky, and Glaser (2001), the challenge is for teachers to know what students know. Although it is impossible to assess student knowledge and educational outcomes with absolute accuracy, an assessment is a tool designed to observe student behavior and produce data that can be used to draw inferences about what student know. Assessment thus provides useful feedback for teachers and students themselves for further action. Mislevy, Steinberg, and Almond (1998) developed a conceptual assessment framework based on an evidential approach to analyze what students know.

How do teachers know what students know? There is a need to use evidencebased learning products to know what student have learned and the metacognitive profile of students to help teachers facilitate their learning. Recent study by Muis and Franco(2010) found that students profiled as both rational and empirical had the highest frequency of metacognitive strategy and also high frequency of regulation of cognition, and attained higher levels of problem-solving achieving compared to students profiled as rational or empirical only. A metacognitive profile of high achieving Sociology students will inform Theory of Instructional to design or model the same meta-tasksand strategies used by them for students who faced difficulties in learning the subject as Pellegrino(2006) stated that application of metacognition successfully in learning is generally context-based. This research focused on student metacognition in producing quality work products as evidence of student learning. Student metacognition is an important mediator between instruction and student learning to improve student achievements in the subject. Fagnant and Crahay (2011) stated that in the past theories of mind and metacognition have been treated separately. They argued that recent studies have also highlighted the importance of the

overlapping areas between theories of mind and metacognition. They suggested the need to study how personal epistemological beliefs influence metacognition through theory of mind. Since all learning starts in the mind it makes sense that to understand how the mind reasons, there is a need for further empirical studies into how metacognition mediates reasoning or thinking to help achieve positive student cognition of learning. Metacognition acts as the bridge that link instruction and the learning processes more effectively.

2.2 Three waves in the History of Theory of Mind

Learning involves the acquisition of knowledge (Mayer, 2002). Willingham (2007) summarized the theory of mind into three waves. In the first wave, philosophers were interested in how the mind acquires knowledge through perception, memory, and experience.

The second wave occurred in the late nineteenth century, when researchers applied the scientific method called positivism to the study of the mind (Willingham, 2007). The two main methods of inquiry were reasoning and observation. Wilhelm Wundt, founder of modern psychology in 1879 championed introspectionism, a method of study in which people tried to follow their own thought processes as they performed some simple task. Introspection was said to require training. The key limitation was that people had to be trained to report what they were thinking. Thus, the trainer played a key role in shaping what people said they experienced. This would create rigidity of the thinking processes.

The third wave, behaviorism, the science of overt behavior became dominant in explaining human behavior from 1910 until 1950s. Behaviorists argued that Wundt's introspectionism had a huge limitation. It did not work as there was the problem of training people to introspect and methodological problem of measuring cognitive processes that you cannot observe. In 1913, John Watson published a paper titled "Psychology as the behaviorist views it.", called for a shift to a complete behaviorist

approach to psychology and that introspection forms no essential part of it. This presented a setback to the development of the cognitive science until after 1950s.

Watson stressed that psychology should be focused only on observable behavior that explain behavior in simplified theories based on the basic building blocks of behavior.

Watson agreed with the great philosopher, Immanuel Kant that the scientific method could not be applied to mental processes. Kant concluded that mental processes took place in time but they do not take up any space and therefore cannot be measured. Watson argued that it was not a science of mental processes but a science of behavior. He proposed that the basic unit of behavior might be conditioned reflex described by Pavlov as classical conditioning. It begins with an unconditioned stimulus which elicits an unconditioned response. However, if you pair the conditioned stimulus (bell) is paired with the unconditioned stimulus (food) enough times, the conditioned stimulus comes to elicit a conditioned response. Whereas, operant conditioning occurs when an individual actively makes a response (operant), and the probability of making that response in the future changes depends on the consequences the individual encounters.

In 1911, Edward Thorndike proposed the law of effect. This law states that if an action is followed by good consequences, you will repeat the action, but if bad consequences follow you are less likely to do it again. Behaviorism dominated American psychology from 1920s to 1960s because it made many good predictions about behavior. But the limitation in Behaviorism is that most experiments were conducted on animals, instead of on complex humans, resulting in a generalization problem. In addition, there was increasing dissatisfaction with the behaviorist position because they failed to account for some important human behaviors such as language (Willingham, 2007).

How can we explain the complicated workings of mental processes by excluding the mind altogether? Although psychology was considered a science by 1913, behaviorism was found lacking and replaced by cognitive psychology (Willingham,

2007). He described two problems of behaviorism, mainly that it could not account for some behavior, and secondly that it is difficult to imagine that it could explain all human behavior. The behaviorist approach focused only on objective and observable reactions from environmental stimuli. Their main contribution is on the importance of the operational definition, a precise definition that specifies exactly how the concept is to be measured. The three waves of theories of the mind were followed by the cognitive approach.

2.3 A Brief History of the Cognitive Approach

Cognition is the mental activity concerning the acquisition, storage, transformation, and use of knowledge. Ashcraft (2006) defined cognition, “as the collection of mental processes and activities used in perceiving, remembering, thinking, and understanding, as well as the art of using those processes.” He defined memory, an important component that made cognition possible, as the “mental processes of acquiring and retaining information for later retrieval and the mental storage system that enables these processes.” Cognition includes a wide range of mental processes which must operate every time we acquire some information, place it in storage, transform that information, and use it. Matlin (2002) stated that the human mind is an impressively sophisticated piece of equipment that is used every minute of the day and yet there is no owner’s manual on how to operate it. William James (1890) used introspection and followed his own mental processes as a way of learning about them. He is known for his work, *Principles of Psychology* which provided detailed descriptions about humans’ everyday experience and emphasizes that the human mind is active and inquiring. James’s most significant contributions to the field of cognitive psychology were his theories on short-term and long-term memory.

The increasing popularity of the cognitive approach can be traced to psychologists’ disenchantment with behaviorism by the late 1960s. Complex human behavior could not be readily explained by using concepts such as stimuli, responses,

and reinforcement. Many mental activities could not be studied because behaviorists limited themselves only to observable responses. Therefore, cognitive psychology began to emerge in the mid-1950s by growth in linguistics, human memory, developmental psychology, and the information-processing approach. The best known example of the information-processing approach is the Atkinson-Shiffrin (1968) model, which proposes three different memory storage systems: sensory memory, short-term (working) memory, and long term memory (cited in Matlin, 2002). Input coming into sensory memory holds for about 0.5 to 1.0 seconds in the visual system, i.e., just long enough for us to select what to attend to and process further. Attention and pattern recognition occur to help identify and select information for further processing (Leahey & Harris, 2001).

The founding father of cognitive development, Piaget (1964) described the formation of cognitive schema of mental representations such as assimilation, accommodation and equilibration of new information. Piaget developed the four stages of Cognitive Development: the sensorimotor stage, the preoperational stage, the concrete operational stage and the formal operational stage.

Meaningful learning occurs when an individual is able to assimilate and accommodate new incoming information into his mental schema. Piaget's concept of equilibration of new information is similar to the concept of metacognition as the mediator between instruction and cognition of learning. He suggested that equilibration consists of auto-regulation as in regulation of cognition, one of the main components of metacognition (Leahey & Harris, 2001).

Kuhn (2000) suggested that metacognition could be the locus of developmental change. She proposed that increasing meta-level awareness and control may be the most important dimension in terms of which the learning process or changes in conceptual learning occurs cognitively. Is it possible that metacognition is the command center of thinking?

However, critics such as Arlin cited in Tan et al. (2003) have argued that Piaget neglected a fifth stage of cognitive development in which individuals are able to reconceptualize existing knowledge and generate unique ways of thinking about the world. Piaget thought that cognitive development reaches the stage of formal operational thinking by the age of about 15. Similar to Piaget's description of how schemas are formed, Garfinkel (1967) described how individuals document events, phenomena or episodes of learning and indexed them in a context based system in his Ethnomethodology theory.

Crossland (2010) pointed out that recent studies showed that it takes 25 years for the major changes in human physical and cognitive development to be completed within a social context, and 30 years for the major changes in emotional development to take place. He argued that even though human brains have similar structures and functions, each human brain is unique because of its own genetic inheritance in terms of cognitive and emotional traits and is further shaped by different learning experiences.

Crossland found that recent understandings gained from neuroscience on brain research have changed the emphasis from teaching to the learning process and provided teachers with a larger range of strategies that can transform the pace and direction of learning. Firstly, his six years research found that the human brain is built to learn and grow throughout its life by developing both its structure and function. Secondly, all learning has a fundamental emotional component. Thirdly, the brain is not a fixed structure and it has an immense capacity to adapt to changes in itself and in its surroundings. Fourthly, he argued for cultural diversities and variations on learning in classrooms and each individual learns at a different pace.

This leads to a social constructivist approach. Blumer (1969) sees meanings as socially constructed from social interactions. Blumer stated that human beings act toward things on the basis of the meanings which are interpreted from social interactions. In addition, Mead (1913) showed how the self is formed through social

interaction. Mead disagreed with Cooley's looking glass self which is formed from the one-way response from others. For Mead, the individuals have choices to accept or reject the labels given by others. He believed that learning is a social experience consisting of a continuous two way process of action and response in the construction of meaning in everyday events such as learning.

Furthermore, Lev Vygotsky (1978) brought in a new emphasis on learning based on a common cultural context that allows sharing of information among students and teachers. There are three major principles underlying Vygotsky's social cognitive development: within social interaction, limited time span and learning as a process (Wink and Putney, 2002). Vygotsky refined Piaget's work on cognitive development. He described the concept of zone of proximal development (ZPD) in learning. ZPD is the difference between an individual's current level of development and his potential level of development. The zone consists of three levels: that a person can do without help, that which a person cannot do even if helped, and that which a person can do with help. He argues that a simple evaluation of a task completed by one person cannot measure his cognitive development. His theory is about the potential of development of an individual rather than a snapshot evaluation of a child (Galant, 1998 cited in Lutz and Huitt, 2004). His view would agree with the need for continuous formative and not just a summative examination of learning where it may be too late to develop cognition. Vygotsky argued that the Piagetian stages may not be accurate as each child learns based on the priorities of importance structured by his sociocultural context (cited in Tan et al., 2003).

Unlike Vygotsky, Bruner (1961) agrees with the Piagetian notion that cognitive development occurs in stages but that it is not limited by the age or stages of development. He believed that a child can be taught any content if the he or she acquires more knowledge and capacity. In addition, he also disagreed with Piaget that all cultures or societies develop through the same stages. Bruner argues that different

societies and cultures have different tools and may not develop in the same way.

However, Brunner agrees with Vygotsky that learning is a socially interactional experience.

How do teachers measure student knowledge? It is not a straightforward task to measure the attributes of mental representations and the internal cognitive processes. These schema and processes cannot be externally observed. We can only infer from student self-reports, behavior, their work products and their achievement scores. The key factors described by Piaget, Vygotsky, Brunner, Mead, Cooley and Garfinkel in understanding cognition of individuals consists of the documentation process of information based on interpretation of meanings derived from social interaction in a social context. Vygotsky (1978) brought in social cultural context and how it influence cognition. However, whether cognitive development occurs in social cultural context or stages, unlimited by age or if there is an optimal zone of development are areas for research.

2.4 Differentiating Cognition and Metacognition

Cognition focuses on knowledge to solve a problem. Metacognition refers to the knowledge of the process to solving a problem (Downing, Kwong, Chan, Lam, & Downing, 2008). Flavell (1976), Schraw and Dennison (1994) Garfinkel (1967), Kolb (1984), and Zimmerman (1990) brought in reflection as important to how student regulate their cognitive processes. Flavell (1979) stated that metacognitive knowledge is not much different from cognitive knowledge. But the two is differentiated in how it is used. Knowledge is considered metacognitive if it is used in a strategic manner to meet an objective of learning.

2.5 The Origins of Metacognitive Approach

Metacognition is defined as an executive learning process of “knowledge and beliefs accumulated through experience and stored in long-term memory” (Flavell, 1976). Metacognition can be defined as thinking about thinking. Figure 2.1 illustrates

the conceptual framework for Flavell's model of metacognition where the activity of each component and its two-way relationship between the components determine a learner's ability to control his cognitive activities.

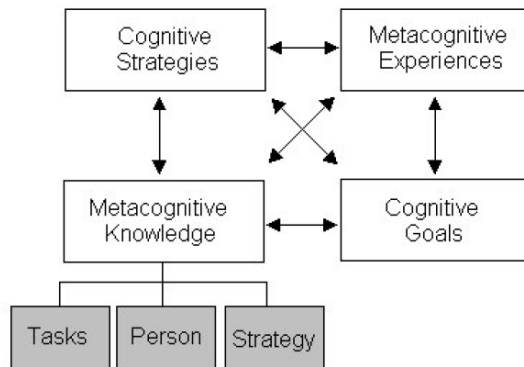


Figure 2.1. Flavell's model of metacognition (adopted from Flavell, 1976).

Flavell's (1979) model involves four major components: cognitive strategies, metacognitive knowledge, metacognitive experiences, and cognitive goals. According to Flavell (1979), metacognitive knowledge consists of knowledge of person variables, tasks variables and strategy variables. The person variable refers to knowledge and beliefs about differences within an individual as well as between individuals. The task variable relates to information about a specific task, its organization, cognitive demands and the selection of solution paths for successful completion of the task. The strategy variable consists of procedural knowledge that increases the chance of achieving the goals of the task. An outcome of conscious activation of metacognitive knowledge leads to metacognitive experience. Flavell (1976) described metacognitive experience such as a feeling of satisfaction as more likely when learners indulge in cognitive tasks that require elaborate and highly conscious reflective thinking. The cognitive goal triggers the use of metacognitive knowledge and lead to new metacognitive experiences.

Livingston (2003) defined metacognitive regulation as consisting of strategies that are sequential processes that one uses to control cognitive activities, and to ensure that cognitive goals have been achieved.

Brown's (1987) model, based on the dual component of metacognition, consists of knowledge of cognition and knowledge of regulation. These two components are closely related but differ in terms of age, task dependence, stability, and fallibility. Nelson and Narens' (1990) model conceptualizes cognitive processes as split into two levels: an object cognitive level and a meta-cognitive level. The information flow is monitored from the object-level to the meta-level while information is controlled from the meta-level to the object-level.

Flavell (1979) defined metacognition as the ability to understand and monitor one's own thoughts. Kuhn (2000) focused on two fundamental questions: Where does metacognition come from and what kinds of it are there? In addition, she examined the relation between metacognition and cognition. She proposed that metacognition develops with age and becomes more explicit, more powerful, and hence more effective as individuals become more aware of their thoughts. Flavell (1999) stated that by age three, children have acquired some awareness of themselves and others and begin to refer to their own knowledge states using verbs such as think and know. By age 4, they develop the false belief understanding that others' behavior guided by beliefs and desires may not be the same as their own and could be incorrect. This is the early development of the awareness of the sources of one's knowledge. Hofer and Pintrich (1997) claimed that these early metacognitive achievements served as the foundations for high-order thinking skills later on.

Meltzer (2004) developed the funnel model of executive functions consisting of planning, organizing, prioritizing, shifting, memorizing and checking. Many of these executive functions are part of metacognitive processes of student learning. Based on the funnel model, the students need to filter through all the information perceived through processes from the planning stage to self-monitoring stage of checking.

Students are said to be metacognitive when they are engaged in thinking about themselves, the nature of learning tasks, and the social contexts (Brown, 1987 cited in

Lin, 2001). Research shows that effective learners are those who are aware of their strengths and limitations and find strategies to overcome their shortcomings (Bransford, Brown and Cocking, 1999, Chapters 3, 4 and 7 cited in Lin, 2001). Students who are engaged in metacognitive activities such as self-assessment, self-explanation, monitoring, or revising enhanced their learning especially among weaker students (White & Frederiksen, 1998 cited in Lin, 2001).

Schraw (2001) described two components of metacognition: knowledge of cognition and regulation of cognition. Knowledge of cognition refers to what individuals know about their own cognition. It includes at least three different kinds of metacognitive awareness: declarative, procedural, and conditional knowledge (Brown, 1987; Jacobs & Paris, 1987; Schraw & Moshman, 1995 cited in Schraw, 2001). Declarative knowledge refers to knowing about things. Procedural knowledge refers to knowing “how” to do things. Conditional knowledge refers to knowing the “why” and “when” aspects of cognition. Regulation of cognition refers to a set of activities that help students control their learning. Three essential skills in regulation include planning, monitoring, and evaluation (Jacobs & Paris, 1987, as cited in Schraw, 2001). Planning involves the selection of appropriate strategies and the allocation of resources that affect performance such as allocating time or attention selectively before beginning a task. Monitoring refers to self-awareness of comprehension and task performance such as periodic self-testing while learning. Evaluating refers to appraising the products and efficiency of one’s learning such as re-evaluating one’s goals and conclusions.

Many researches support the view that metacognitive regulation improves student achievement such as better use of attentional resources, better use of strategies, and a greater awareness of comprehension breakdowns (Brown & Palincsar, 1989; Cross & Paris, 1988 cited in Schraw, 2001). Schraw concluded that the findings of these studies are important as they suggest that even younger students can be taught metacognitive skills. He argued that metacognitive knowledge is multidimensional,

domain-general in nature, and teachable. Recent research in neuroscience according to Crossland (2010), found that teachers need to provide regular opportunities for metacognition and bridging to aid the process of assimilating and accommodation so that the brain can be more effective at remembering and using the important facts, principles, and routines. Another key message he had for teachers was that supporting teaching in the form of metacognition and bridging are crucial at the time of learning spurts in development for producing optimal performance in brain development by encouraging the right connections to be culled and new ones to be grown so that the brain can move to the next level of thinking. For school-aged pupils learning spurts in optimal performance occur at about 4,7,11, and 15 years of age (Fisher, 2008 cited in Crossland, 2010).

2.5.1 Metacognition Defined as Reflections

Flavell (1976), Garfinkel (1967), Kolb (1984), and Zimmerman (1990) brought in reflections as important to how student regulate their cognitive processes. There is a need to understand how student construct knowledge as evidence of their assimilation of knowledge and the different level of knowledge learnt.

Kolb (1984) discussed the experiential learning cycle based on two dimensions: perception and processing continuum. He developed the four learning styles consisting of diverger, assimilator, converger, and accommodator. Within the four learning styles, students display concrete experiential learning, reflective observation learning, abstract conceptualization learning, and active experimental learning. The two learning styles that exhibit use of reflection to think about the learning experience are the assimilator and converger. Kolb's (1984) cyclical model considers that reflective thinking plays an important role in learning for certain individuals.

Garfinkel's (1967) Ethnomethodology theory described how individuals document events, phenomena or episodes of learning and indexed them in a context based system. He described the development of underlying patterns of thoughts through

the following stages: documenting, indexicality, contextualizing, and reflexivity. An in-depth understanding of these four stages helped to analyze how students' conception of new knowledge is documented and indexed to a certain social context. He explained how students are able to make sense of events by reflecting on the earlier documented underlying patterns of such events. These underlying patterns provided guidelines for understanding the social world.

2.5.2 Metacognitive knowledge as One Dimension of Knowledge

Metacognitive knowledge was categorized as one of the main dimensions of knowledge in the revised Bloom's Taxonomy. During the 1990's, Lorin Anderson, a former student of Bloom's and a group of cognitive psychologist developed a revised Bloom's taxonomy that was more practical and based on action oriented learning.

Table 2.1

The Revised Bloom's Taxonomy (Anderson and Krathwohl, 2001)

Cognitive Processes						
The Knowledge Dimensions	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual						
Conceptual						
Procedural						
Metacognitive						

Table 2.1 shows the revised Bloom's taxonomy of Anderson and Krathwohl (2001) that is composed of the knowledge and the cognitive process dimensions. The four dimensions of knowledge are factual, conceptual, procedural, and metacognitive. The six cognitive process dimensions are: remembering, understanding, applying, analyzing, evaluating, and creating. The cognitive processes of learning the four dimensions of knowledge culminate in the final behavioral outcome of creating such as constructing own notes, essays or work products. These are the measurable and observable evidence of the complex cognitive processing of learning.

Mayer (2002) classified three types of learning outcomes: no learning (neither possesses nor encoded nor is able to use relevant knowledge), rote learning (possesses relevant knowledge, encoded/attended to relevant information but has not understood it and therefore cannot use it), and meaningful learning (paying attention to relevant incoming information, mentally organizing it into a coherent representation, and mentally integrating incoming information into existing knowledge. Meaningful learning is consistent with knowledge constructivism in which students actively seeking to make sense of their learning experience so that they not only remember and understand them but can apply them. There is a need to measure cognitive processes for retention and transfer, and the revised Bloom taxonomy is suitable as it includes six cognitive process categories such as remember which measures retention, with the other five (understand, apply, analyze, evaluate, and create) increasingly measure transfer Mayer (2002).

2.5.3 The Role of Metacognition and Sociology

Research question one in this study explored the students' metacognitive processes and how their strategies change based on achievement and metacognition levels. Research question two described the metacognitive profile of high achievers and the strategies they used, and to transfer this knowledge to teachers and students to inform and transform the way learning is constructed since metacognition is useful for learning an abstract subject like Sociology. The characteristics that Conti and Fellenz (1991) assumed for real-life adult learning is similar to the demands of a subject like Sociology that deals with the observables and unobservable aspects of social life. Learning Sociology requires students to apply to real-life situations and is a form of authentic learning experience. The first characteristic identified by Conti and Fellenz (1991) is the need for the learners to recognize problems in the real world rather than have the teacher identified for them. Second, problems have to be defined since it influences how they are solved. Third, sociological or real life problems are ill-

structured. Fourth, such problems are contextualized while school problems are decontextualized. Fifth, relevant information of problems have to be discovered or researched and not given. Sixth, solving real life problems requires a balanced assessment of both sides of the arguments while school problems confirm the facts. Seventh, school based teaching usually gives immediate feedback but there is seldom feedback on real life problems until it may be too late. Eighth, school environment encourage individual solutions to problems but real-life problem solving is usually based on negotiation and group decision processes. Subjects like Sociology deals with real problems in the world and do not have absolute answers. Many of the assumptions of real-life adult learning are similar to the sociological problems dealt in this course. Sociology students need to make use of higher order thinking skills to solve them. Flavell's (1976) model and Brown's (1987) model of metacognition focused on the need to regulate cognition to achieve learning gains.

2.5.4 Levels of Metacognition

According to NCREL, Swartz and Perkins (1989) distinguished five types of thinking and four levels of metacognition. The five types of thinking are: critical, creative, applied, metacognition and learning for understanding and the active use of knowledge. The four levels of increasing metacognitive thought from low level to high level: tacit use, aware use, strategic use and reflective use. Tacit use refers to decision-making without thinking about it, aware use refers to consciously thinking of when he or she is doing it, strategic use refers to organized thinking by way of particular conscious strategies that enhance its efficacy, and reflective use refers to reflective thinking before, after and during the process pondering on how to proceed and how to improve.

Kreber (2004) analyzed two models of reflection: Mezirow's (1990,1991) theory of transformative learning and Zimmerman and Schunk's (1998) theory of self-regulated learning and explored how each can enhance our understanding of educational

development in tertiary settings. She concluded the study with some concrete suggestions for future research and the practice of educational development such as helping practitioners to identify relevant learning goals for themselves through promoting premise reflection on what is meaningful knowledge about teaching. Their second purpose would be to help participants engage in self-regulated learning by recording their experiences in a journal. Thirdly, they wanted to promote process reflection. She concluded that both models of self-regulation and transformative learning can provide clear and useful guidelines for the design of educational development and research.

Grossman (2009) classified four different levels of reflection: Content-Based reflection (Hatcher & Bringle, 1997), Metacognitive Reflection (Bransford, Brown, & Cocking, 2000; Donovan, Bransford, & Pellegrino, 1999); Felton, Gilchrist, & Darby, 2006; May & Etkina, 2002; Zimmerman, 2002); “Self-Authorship” Reflection (Baxter Magolda, 2001; Kegan, 1994); and Transformative (Hatcher, Bringle, & Muthiah, 2004; Kiely, 2005; Mezirow, 1997) or Intensive Reflection (Peltier, Hay, & Drago, 2005).

First level, Content-Based Reflection was defined as “the intentional consideration of an experience in the light of particular learning objectives” by Hatcher and Bringle (1997). Hatcher and Bringle (1997) and others suggested the need for Content-Based Scaffolding such as providing a structure, feedback and opportunity to rewrite to encourage Content-Based Reflections. Without scaffolding, students could not see the difference between evidence and inference. They were able to understand the instruction to describe their experience in sensory terms: see, hear, touch, taste and smell. The students did not naturally cite the empirical evidence that led them to their inferences (Grossman, 2009). With more practice or opportunity to revise or rewrite their assignments, they become more detailed in their perception.

Grossman (2009) suggested three structures to scaffold Content-Based Reflections: personal experience described in sensory details, directly cited definitions

of course concepts, and point-for-point comparisons between experience and the concepts. Many students gave him their conclusions unsupported by empirical evidence that had led them to their inferences. This shows the need to scaffold the learning process before the students reported they could now judge better their observations based on factual or sensory terms.

Barry Zimmerman (2002) defined the second level of reflection: Metacognitive Reflection as the awareness of and knowledge about one's own thinking. Grossman(2009) stated that research have shown that "experts" monitor their own understanding carefully from novices and this was important in experts' ability to adapt their knowledge to such problems. Robert Kegan's research (1994) suggested that the process of asking students to reflect on their thoughts and feelings is more complex than expected. Kegan (1994) described that students are likely to report what they should feel than what they do feel. He proposed that reflective thinking requires a mental ability to stand apart from, or outside of an idea, though, fact, or description to be able to understand what went through one's mind during the process. He also stated the need for mental maturity to have developed a mental place that allows their inner experience to be the object of their observation. Grossman (2009) concluded from Kegan's model that students need a lot of scaffolding to learn how to reflect. Kegan's four-step bridge for metacognition composed of a descriptive model of the mind, applying the model to a case, applying to others and reflecting on one's thoughts and feelings.

For the third level reflection, Kegan (1994) emphasized that to be able to reflect on their inner states of mind, students need to reach a "Self-Authorship" Reflection stage. This requires students to understand the effects different thoughts about perceptions have on emotion and subsequent action. Grossman (2009) stated that the students learned how one's exaggerated thoughts intensify one's feelings of depression and anxiety. The students were able to see how they were responsible for some of their feelings or are able to "self-author" their own feelings. Self-authoring is defined as

reframing one's thinking and developing a new way of making meaning (Marcis Baxter Magolda 1998,2001 as cited in Grossman, 2009).

The last level of reflection known as Transformative or Intensive Reflection involved an even deeper level of reflection. Jack Mezirow (1997) defined Transformative reflection as the, "The process of effecting change in frame of reference... Frames of reference are the structures of assumptions through which we understand our experiences". Mezirow (1991) distinguished between three kinds of reflection: content, process, and premises. He contended that one can reflect on the content or description of a problem, the process or method of the problem-solving, and the premises upon which the problem is based on. On the other hand, Richard Kiely (2005) states, " The ideal end result of transformational learning is that one is empowered by learning to be more socially responsible, self-directed, and less dependent on false assumptions." This is the final outcome that most instructors hope for; that their students can be empowered by their learning. Grossman (2009) observed that his students, when asked to reflect over the whole term work and were graded on how well they gave detailed examples to illustrate their learning, were able to move to a level of reflection above the metacognitive level such as transformative reflection.

Within the four levels of reflection, there are overlapping areas such as content based reflection is already included in metacognitive reflection in the form of metacognitive knowledge. Self-authorship reflection is about creating new ideas or concepts and this is also within the conditional metacognitive knowledge dimension. Lastly, transformative reflection is the mediating part of metacognition to bring about evidential cognitive and behavioral change. Rather than developing stages of reflection, there is a need to develop stages of metacognition.

Grossman (2009) explained how and why it was so difficult for students to do reflections. It also suggested the need for creating structures or scaffolding student learning to encourage students to bridge the gap between instruction and cognition. The

different levels of reflections emphasized the importance of going beyond cognition into metacognition to enable transformative learning to take place successfully.

2.6 The Relationship between Metacognition, Motivation and Metamotivation

Metacognitive awareness is not enough to improve student learning. There is a need to understand the factors that will motivate students to self-regulate themselves. Learning behavior does not occur unless students are engaged in the process itself. There is a need to understand the basic need theory of motivation. What motivate students to regulate their learning and how to maintain a high level of engagement? Research question three focused on discovering the factors that can motivate student regulation of learning behavior through regulation of their cognition.

Motivation is incentive or desire. It is about individual's needs and goals. Volition is the will to consciously act on a choice or desire. Volition is the drive to achieve what one desires. Volition consists of self-regulation and executive control, conscious effort, and self-monitoring that mediate the enactment of goals and intentions (Gaskin, 2005).

Needs of individual could be biological, affective, emotional, cognitive, aesthetic, volitional, behavioral, spiritual or more. There are behavioral, cognitive, attributional, psychoanalytic, humanistic, achievement motivation and expectancy theories of motivation. Motivational researchers such as Keller (1983), Locke (1991), and Ruohotie (1996) have tried to organize and provide a holistic explanation of the various theories of motivation (cited in Kivinen, 2003).

There are many theoretical approaches, e.g., Expectancy-Value, Self-Concept, Self-Determination, Interest, Attribution, Flow and Goals theory that are used to study student motivation (Ecclecs, Wigfield & Schiefele, 1998 cited in Ahmed & Bruinsma, 2006). In Ahmed and Bruinsma's study, they focus on Self-Determination theory and Self-Concept theory as these two theories focus on the central role of the self as antecedent to autonomous motivation (Deci & Ryan, 1985 as cited in Ahmed &

Bruinsma, 2006). In their model, they chose Hubner and Stanton's (1976) self-concept which is defined as "a person's perception of himself, formed through environmental experiences and significant others. In their study, they referred to Deci and Ryan's (1985 and 2000) study that self-determination can either be intrinsically motivated, extrinsically motivated or amotivated. This theory states that motivation ranges from being self-determined to being helpless (Abramson, Seligman & Tseadle, 1978 cited in Ahmed & Bruinsma, 2006). The Self-Determination theory proposes three different kinds of motivation: intrinsic motivation, extrinsic motivation and amotivation. Intrinsic motivation refers to doing a task for the sake of doing it - for the pleasure and satisfaction derived from the task (Deci, Vallerand, Pelletier & Ruan, 1991; Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand, Pelletier, Blais, Briere, Senecal & Valleries, 1992 as cited in Ahmed & Bruinsma, 2006). Extrinsic motivation refers to behavior acted out for instrumental purposes (Deci and Ryan, 1985 as cited in Ahmed and Bruinsma, 2006). Deci and Ryan (1985 cited in Ahmed & Bruinsma, 2006) stated that the third type of motivation which is the least self-determined occurs when individuals do not perceive the relations between their action and their outcome. Amotivated individuals feel a lack of competence and lack of control over outcome of behavior (Ryan & Deci, 200; Vallerand & et al., 1992 cited in Ahmed & Bruinsma, 2006).

Deci and Ryan (2000) in their Self-Determination theory postulated three innate psychological needs: competence, autonomy, and relatedness. When these true needs are satisfied, they enhanced self-motivation and mental health, and when not satisfied, they lead to diminished motivation and well-being. Autonomy refers to regulation by the self (2006).

Research have shown the importance of self-efficacy beliefs (Bandura, 1986 & Pajares, 1996) and achievement goal orientation to motivate student self regulation. The Theory of Planned Behavior (Ajzen & Fishbein, 1980) discusses the importance of beliefs in influencing the intentions to act. Findings from Bandura (1986) and Pajares

(1996) revealed that, when beliefs were assessed and criterial task were matched, prediction is enhanced. Moreover, researchers have shown that self-efficacy perceptions are also good predictors of reasonably generalized performances such as obtained grades (Bandura, 1993; Zimmerman, Bandura, & Martinez-Pons, 1991). Therefore, if students can be motivated to regulate their metacognitive knowledge, they can improve their academic achievements.

The motivation to self-regulate depends on goal achievement orientation and student self-efficacy beliefs. Large scale correlational studies by Eccles, Eigfield and their colleagues (cited in Pintrich & Schunk, 1996) on the role of expectancy constructs in achievement have consistently shown that students' self-perceptions of ability and their expectancies for success are the strongest predictors of subsequent grades in Mathematics and English especially for the later grades. These studies showed the importance of student beliefs and the constructivist nature of motivation. They highlighted the importance of students' expectancies and self-perceptions of competence as mediators between the environmental context and actual nature of motivation. Pintrich and his colleagues in numerous studies have consistently found that high levels of expectancy and perceptions of competence are correlated with more reported use of cognitive and metacognitive strategies in both junior high and college student samples (Pintrich & Schunk, 1996).

2.7 Metacognition and Self-Regulated Learning (SRL)

Self-regulation is a cyclical process involving forethought, performance and reflection (Zimmerman, 2000). These three factors influence the quality of students' self-regulation. Zimmerman and Martinez-Pons's (1988) study predicted high school students' academic achievement with 93% accuracy simply on the basis of how extensively students regulated their learning behavior. Figure 2.2 shows the three phases of Self-Regulated Learning (SRL), i.e., forethought, performance, and self-reflection.

Phase I: Forethought provides the necessary conditions for learning such as goal setting and planning. Zimmerman (2000) divides the forethought phase into two: task analysis and self-motivational beliefs. Task analysis consists of goal setting and strategic planning. Self-motivational beliefs such as self-efficacy, outcome expectations, intrinsic interest or valuing and goal orientation, are underlying forethought processes of goal setting and strategic planning.

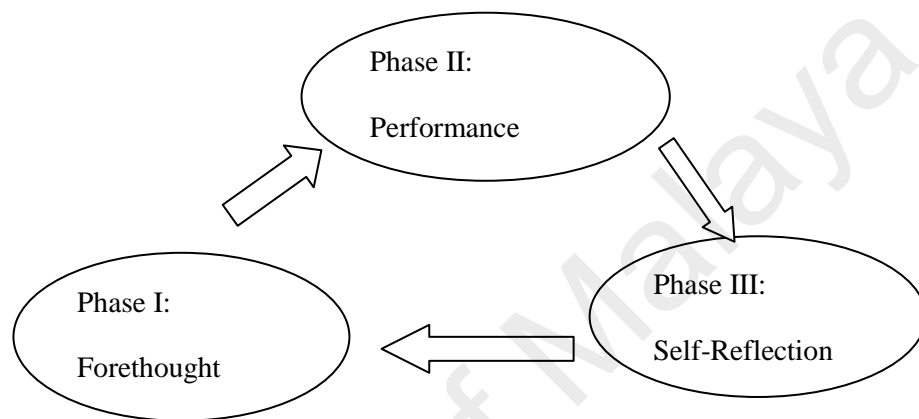


Figure 2.2. Self-regulated learning cycle: three phases (adopted from Zimmerman, 2000).

Phase II: Performance involves processes that occur during learning efforts and which guide and regulate the learning process. Zimmerman (2000) classified two types of performance, self-control and self-observation. Self-control processes, such as self-instruction, imagery, attention focusing and task strategies, help learners and performers to focus on the task and optimize their effort (Zimmerman, 2000). The general observations by teachers are that students who are weak academically failed to regulate their learning efforts consistently. If instructional task designs in class can provide a spatial temporal self-control and allow self-observation as part of the lesson, then learning performance can be supported by the existence of formal lessons.

Phase III: Self-reflection involves processes which occur after the learning experience and which influence reactions to that experience. Bandura (1986) has identified two self-reflective processes that are closely associated with self-observation:

self-judgment and self-reaction. Self-judgment involves self-evaluating (comparing self-monitored information with a standard or goals) one's performance and attributing causal significance to the results (Zimmerman, 2000). Any lesson is not permanent without time for self-reflection. If self-judgment or evaluation is benchmarked by peers in a classroom lesson, and self-reaction to such evaluation is embedded in the instructional tasks, then there is a high chance that the content of the lesson is assimilated and accommodated from sensory to short-term(working) memory, and finally to long-term memory as explained by the best known example of the information-processing approach (Atkinson-Shiffrin,1968, cited in Matlin, 2002).

Zimmerman categorized self-regulatory skill into four developmental levels, i.e., observation, emulation, self-control, and self-regulation. (cited in Boekaerts, Pintrich, & Zeidner, M. ,2005). O'Donnell, Reeve, and Smith (2005) defined self-regulation as the deliberate planning, monitoring, and evaluating of one's cognitive and emotional processes during the undertaking of an academic work. They found that a self-regulated student is one who sets goals, uses effective strategies, monitors effectiveness and makes adjustments as needed. O'Donnell et al. (2005) concluded that the more students regulated their own learning, the better they do in school. If teachers can design tasks that train students to regulate their own learning, they will develop graduate qualities that will help them succeed in their career. Self-regulated learners are the type of professionals many organizations seek because of their ability to adapt to a changing environment. Self-regulation is not complete without an understanding of how students can improve their metacognition. Self-monitoring and self-evaluation of one's academic work requires students to think about their cognition of a task.

Research have shown that students do not engage in metacognitive thinking unless they are explicitly encouraged to do so through carefully designed instructional activities (Berardi-Coletta, Buyer, Dominowski &Rellinger, 1995; Bransford et al., 1999; Chi, Bassok, Lewis, Reimann, & Glaser, 1989; Lin & Lehman, 1999 cited in Lin,

2001). Lin argued that it is important to include metacognitive support in the design of learning environments. Therefore, there is a need to design tasks that encourage use of metacognitive strategies and how to self-regulate one's cognition. Metacognition or reflections of one's thoughts require self-regulating or self-monitoring of own thoughts. There are four phases of self-regulation of any mental or physical behavior. The four phases of self-regulation involving observation, imitation, self-control and self-regulation are only the beginning of becoming an expert. Two important factors that affect the success of training self-regulation in learners: deliberate practice and the benefit of a mentor who models how to plan, monitor, and evaluate the overall goal-setting process (Tan et al., 2003).

Instructional task in classes should include opportunities for students to reflect on their learning. Recent studies have shown that reflections on what they have learned helped them to organize their schema or mental representations of their interpretation of the lesson learned. According to Tan et al., self-regulated learners tend to be recursive and reflective on their own learning. They constantly self-observe, self-monitor and self-evaluate their self-efficacy in the subject learned. Self-regulated learners tend to practice more critical thinking and thereby continue to grow mentally.

Conti and Fellenz (1991) argued that learning strategies differ from learning style as the latter refer to stable traits while the former refer to techniques and are selected for a specific task. Although learning strategies have grown out from learning styles, it can be based on an emerging cognitive theory of human learning and memory (Mayer, 1988). Conti and Fellenz (1991) proposed that instead of focusing on skills in note-taking, outlining, and passing tests, learning strategies need to focus on solving real problems involving metacognition, memory, motivation, and critical thinking.

Boekaerts (1996) developed a six-component model of self-regulated learning with focus on two basic mechanisms of SRL: cognitive self-regulation and motivational self-regulation. She wanted to address the complementary nature of cognitive and

motivational regulatory strategies in students' attempts at SRL. She concluded that there is a need for research in describing the process through which SRL develops and finding out the factors that motivate some students to self-regulate their own learning.

Garner (2009) found that self-regulated learning overlap with executive functions. Executive functions are defined as goal-directed neurocognitive processes that allow for the control and coordination of cognition and behavior (Luria, 1966; Welsh and Pennington, 1988). According to Garner, the key executive functions are planning, organizational skills, impulse control, motivation and empathy. Garner's findings showed that executive functions and self-regulated learning share a degree of commonality. Firstly, she found that executive functions of planning, organization, impulse control and motivation is correlated with metacognitive self-regulation in terms of strategy use and effort regulation. Secondly, she found that intrinsic motivational drive was closest to the executive function of general motivational drive and that motivation should be considered as a theoretical conceptualization of executive functions. Thirdly, she found sources of divergence between executive functions and self-regulated learning. Based on her findings, she suggested several perspectives on the relationship between the two measures. She observed numerous significant correlations between executive functions subscales and those assessing metacognitive self-regulation. However, a substantial variance was unaccounted for in her study. The results in Garner's study supported that all aspects of executive functions were correlated with self-regulated learning, but not all aspects of self-regulated learning were correlated with executive functions especially control of learning beliefs and critical thinking. However, a more balanced perspective as suggested by Garner is to consider executive functions and self-regulated learning as two groups of overlapping constructs, with areas of convergence and divergence.

2.8 Metacognitive Motivated Intentions to Regulate Learning

Max Weber, the founder of Social Action Theory argued that all social actions have meaning and each act requires a subjective motive before any conscious action takes place (Gerth & Mills, 1948). Weber, Blumer, & Mead view meanings as social products of social interactions (cited in Cuff, Sharrock, & Francis, 1992). Blumer stated that human beings act toward things on the basis of the meanings which are interpreted from social interactions. Mead, founder of Symbolic Interactionism believed that learning is a social experience consisting of a continuous two way process of action and response in the construction of meaning in everyday events such as learning.

The Theory of Planned Behavior by Ajzen and Fishbein (1980) stressed on the importance of beliefs in influencing the intentions to act. The motivation to act or intention to engage in any behavior is affected by the individual's attitude, subjective norms, and the perceived behavioral control (Ajzen & Fishbein, 1980). All three components are measured by the individual's beliefs system of his personal, social, and perceived behavioral control respectively. An individual's beliefs system depends on the levels of metacognition that he engages in.

Thus, an individual's planned action depends on his metacognition of his motive for action which in turn is dependent on his metacognition of that action. If the action is successful, his further metacognition will be more positively inclined as his self-efficacy beliefs are strengthened and he is more motivated to such a course of action in the future. The relationship between instruction and learning is closely linked and each process feeds on the other through metacognition as a mediator, thereby creating a cyclical flow between them. Metacognition is in turn influenced by student motivation and the strategies to self-regulate to initiate planned action to learn.

2.8.1 Extrinsic Motivation: Positive Classroom Environment and Use of Sanctions

Many students have commented on the need for structuring a positive classroom environment to create positive educational outcomes such as student motivation and performance. According to Kearney, Plax, Richmond, and McCroskey (1985) as cited in Putwain and Roberts (2009), teachers who create a positive classroom environment produced high level of student motivation and involvement. They reported that teachers who used reward-based behavior alteration techniques (BATS) emphasizing regards, self-esteem, and personal; responsibility rather than fear appeals (threat-based messages) were more effective in achieving student compliance in the classroom. Sprinkle, Hunt, Simonds and Comadena (2006) cited in Putwain and Roberts (2009) supported the view that the use of fear appeals has a negative effect when used in the classroom environment. When students were given efficacy messages such as, “if you put the required time and work into your work, you will dramatically improve” rather than given fear messages such as “you may need to retake the course” resulted in negative student outcomes and low student’s motivation (Putwain & Roberts (2009). Putwain and Roberts (2009) developed the teachers’ use of fear appeals questionnaire (TUFAQ) to measure whether fear appeals works as motivational device in the course of classroom instruction. Their results showed a three-factor structure provided a reasonable model fit and all factors demonstrated acceptable reliability. Factors one and two described the perceived frequency of fear appeals made in relation to educational occupational consequences and the third factor described the perceived threat of fear appeals. The instrument demonstrated sufficient convergent validity, discriminant validity and reliability to be used in future research to investigate the role of positive classroom environment and less use of fear appeals in instructional design. Positive classroom environment and teacher’s use of positive behavioral alteration techniques

may have consequences on students' motivation which in turn affect their cognition and metacognition.

2.9 Assessment Model: Evidence of Student Cognition

The main outcome of teaching is evidence of learning. Research question five investigates the relative contribution of metacognition, motivation, and instructional task toward student achievement in Sociology as evidence of learning. All successful learning requires transfer. Transfer of learning occurs when students can apply what they learn. The ability to apply what they know is part of the six cognitive process dimension of learning in the Bloom's taxonomy of learning (Anderson and Krathwohl, 2001). Transfer of learning is described by Haskell (2001) as the influence of past learning on current and future learning and to the application to similar or different context. Most current learning requires some reflection on past learning and this shows the importance of metacognitive awareness of what and how a learner learns for him to apply past information to current situation to make sense of the new information learnt. Calais (2006) agreed with Haskell that virtually all learning relates past learning to new situations. However, Calais argued that since most learning contexts are not identical, there arises the problem of effective transfer of learning. Successful transfer of learning occurs only when the learner can perceive what, how, when, and why something is similar or different to some other learning contexts. Metacognition acts as a mediator for successful transfer of learning. Failure of transfer of learning occurs among students who may have low metacognitive awareness are they are unable to relate past learning situation to current and future learning needs. They lacked knowledge of cognition such as declarative knowledge, procedural knowledge, and conditional knowledge to make sense of current learning situation. In addition, they lacked regulation of cognition to increase their knowledge of cognition which is highly important for transfer of new learning.

An in-depth evaluation of the contribution of Haskell's Taxonomies of Transfer of Learning (2001) would require a comparison to Bloom's Taxonomy of Knowledge. In 1956, Benjamin Bloom and a group of educational psychologists developed six classifications of levels of intellectual behavior of learning. Bloom's taxonomy consisted of six levels: knowledge, comprehension, application, analysis, synthesis and evaluation. Haskell has expanded Bloom's application level of the hierarchy of knowledge to six levels of transfer and fourteen kinds of transfer. Haskell's taxonomy is an in-depth analysis and deconstruction of the various types of transfer of learning that takes place in classroom instruction. When one discusses the meaning of transfer of learning, an instructor usually refers to the student's ability to apply what he has learnt to various situations. Understanding the many kinds of specific transfer of learning will equip an instructor to plan his learning objectives better and for successful transfer of learning to occur. The student's ability to transfer what he has learned to similar or different situations requires higher order thinking skills such as analysis and evaluation that forms the higher level of Bloom's taxonomy of knowledge. Haskell (2001) has provided a more detailed investigation to the different levels and kinds of transfer. He has increased our knowledge and curiosity to study further on how to bring about successful transfer of learning.

But how do we know if transfer has occurred and the type of transfer that has occurred in any lesson. Mayer (1987 cited in Calais (2006) stated that research have suggested that transfer of learning differs in kind and occurs at different levels. This transfer of learning influences all learning, memory, problem-solving, and cognitive processes. Calais (2006) summarized Haskell's taxonomies of transfer of learning into two taxonomies. The first taxonomy specifies six levels of transfer and the second taxonomy consists of two components: five types of knowledge and fourteen specific types of transfer. In the first taxonomy the six levels consists of: nonspecific transfer, application transfer, context transfer, near transfer, far transfer, and displacement or

Figure 2.3 shows the changes to Bloom's taxonomy. Synthesis is renamed as creating and is put on a higher level than evaluation. Creation refers to the ability to construct or produce or invent something new and is considered the most difficult mental function in the new taxonomy.

Krathwohl (2002) discussed how the revised Bloom's taxonomy differed from the original Bloom's taxonomy. The original taxonomy consists of only one knowledge dimension but the revised version is two dimensional. The more holistic revised version measures both the knowledge dimension and the cognitive process dimension. Table 2.1 illustrates how the revised Bloom's taxonomy is used as a rubric to assess student metacognition based on the student's ability to remember, understand, apply, analyze, evaluate and create.

2.10 Metacognitive Instructional Tasks

Past research has shown that students do not engaged in metacognitive thinking unless they are explicitly encouraged to do so through carefully designed instructional activities (Berardi-Coletta, Buyer, Dominowski & Rellinger, 1995; Bransford et al., 1999; Chi, Bassok, Lewis, Reimann, & Glaser, 1989; Lin & Lehman, 1999 cited in Lin, 2001). Lin argued that it is important to include metacognitive support in the design of learning environments. Brown (1997 cited in Kuhn, 2001) suggested a community of learners' curriculum would benefit from creating reflective activities in the classroom such as constructive discussion, questioning, querying, and criticism as the norm. Therefore, there is a need to design tasks that encourage use of metacognitive strategies and how to self-regulate one's cognition. Research question 4 looked at the types of instructional tasks that engage and enhanced student metacognition to sharpen their role as a mediator between instruction and student cognition of learning.

There are four phases of self-regulation of any mental or physical behavior. The four phases of self-regulation involving observation, imitation, self-control and self-regulation are only the beginning of becoming an expert. Two important factors that

affect the success of training self-regulation in learners: deliberate practice and the benefit of a mentor who models how to plan, monitor, and evaluate the overall goal-setting process (Tan et al., 2003). Self-regulated learners tend to be recursive and reflective on their own learning. They constantly self-observe, self-monitor and self-evaluate their self-efficacy in the subject learned. Self-regulated learners tend to practice more critical thinking and thereby continue to grow mentally.

Tan et al. suggested that a strategy for helping learners acquire critical thinking skills includes a metacognitive approach where learners think about their own thinking. This approach consists of explanation by the teacher, modeling by the teacher or modeling by the learner. Teachers can help facilitate students' use of metacognitive learning strategies by methods such as self-questioning, KWL, PQ4R, and IDEAL which are gaining popularity in Japan, Australia and American students (Tan et al, 2003). Class room contexts that encourages students' use of metacognitive strategies should incorporate tasks, opportunities and time allocation for students' self-assessment, self-explanation, monitoring, or revising (White & Frederiksen, 1998 cited in Lin, 2001).

Two similar instructional model of the mind that can help to enhance metacognitive awareness are the DIVE approach and DIE approach (Grossman, 2009). Kiran Cunnigham (2007) asked students to use the DIVE approach which stands for Description, Interpretation, Validation, and Evaluation. It was adapted from the DIE approach developed by Janet and Milton Bennerr, with Kathryn Stillings (1977), which stands for Description, Interpretation and Evaluation. Validation was a category that Cunningham added to include how a student check one's interpretation of one's learning.

Schraw (2001) examined four general ways to increase metacognition in classroom settings as suggested by Hartman and Sternberg (1993). Firstly, it was suggested that there was need to promote general awareness in the classroom such as

teachers taking the time to discuss the importance of metacognitive knowledge and regulation including the role it plays in self-regulated learning (Schon, 1987 cited in Schraw, 2001); the need for teachers and expert students to model both cognitive and metacognitive skills for other students, and teachers should allot time for group discussion and reflection despite curriculum coverage time constraint (Rogogg, 1990 cited in Schraw, 2001). There is a need for extended practice and reflection in the construction of metacognitive knowledge and regulatory skills. Secondly, Schraw suggested using a strategy evaluation matrix (SEM) for improving knowledge of cognition and a regulatory checklist (RC) for improving regulation of cognition. Lastly, Schraw suggested the need to foster conducive mastery learning environments and not just goal performance orientation by focusing on increasing a student's current level of performance, rewarding increased effort and persistence, and a broader use of strategies (Schraw, 2001).

Mislevy et al. (1998) believed that evidence-based task can produce student behavior or performance that should reveal the targeted cognitive constructs. These tasks assigned to students are to help them regulate their metacognition and knowledge of cognition. These student constructed response in the form of essays or outlines are the evidence of their regulation of their metacognition and their knowledge of cognition. Whereas those self-reports that they write on how they construct such evidential responses are ways of helping them to reflect on their strategies at the same time used as a form of assessment of their metacognition with work in progress. Self-reports of their metacognition is different from the student constructed evidential response of their cognition. In summary, Mislevy et al. (1998) and Schlechty (2004) argued that task should focus on the quality of evidence produced to allow student reflections to self-regulate their learning by formative assessment of their documentation of the curriculum learnt.

2.10.1 Characteristics of Instructional Tasks

Many teachers focus on preparing notes for delivery of knowledge. Delivering a lecture is a process of transferring the teacher's thoughts onto the student's notes but it may not result in student learning. There is no transfer of learning from teacher to student. No cognitive processing has occurred in the mind of the students. Teachers may become experts at construction of knowledge in their field of specialization but the student may not understand the teacher's thought processes. Research has shown that student learn more when they construct the knowledge themselves and they show more interest in the challenge of learning new things at their own pace. This is well supported by a constructivist approach to learning. Student cognition form and develop in a social, cultural and interactive environment during the production of a learning product in completion of a task. Task is defined by Haertel and Wily (cited in Mislavy et al., 1998) as a "goal-directed human activity to be pursued in a specified manner, context, or circumstance."

In Kolb's (1984) experiential learning styles, there are two types of individuals who prefer a task oriented method of learning by doing. These two learning styles are the accommodator and the converger. The accommodator is an individual who learns by feeling and doing while the converger learns best by thinking and doing (Kolb, 1984). Therefore, learning based on task designs can help to improve learning by matching tasks to individual learning styles.

Lee (2000) proposed that the instructor must abandon the need for full control and allow students to construct meaning from their interaction with others in the classroom. Lee rejected the traditional form of teacher questions and students answer communication in the classroom as it is unproductive and create moments of uncomfortable silence during lessons. Instead, there is a need for a more social view of communication in the classroom that allows for expression, interpretation and negotiation of meaning by the students. Lee believes that tasks will allow the classroom

to be more productive, interactive and communicative where real learning takes place. He claims that quality design of tasks following four stages are important for a successful teaching and learning process to take place. The four stages are identifying a desired outcome, breaking down the topic into sub-topics, creating and sequencing concrete tasks for the learners to do, and finally building in linguistic support (Lee, 2000). Lee's view concurs with Vygotsky's Sociocultural Learning Theory and Schlechty's Engagement theory (2004). These studies concurred that the design of tasks in a socio-cultural context allows for authentic learning to take place.

2.10.2 Evidence-based Instructional Task

Research by Schlechty (2004) and Mislavy et al., (1998) focus on tasks as evidence of learning. Schlechty (2004) suggested that teachers spend more time designing quality instructional tasks that focus on evidential product of learning. While Mislavy et al., (1998) recommended that teachers produce a task bank composed of activities that will provide evidence of learning for assessment and feedback.

According to Mislavy et al. (1998) tasks are the most observable element in any educational assessment. Tasks provide evidence where inference can be made about the student examinees. This paper presented by Mislavy et al. concerned issues in assessment design of tasks effectively and efficiently. Their conceptual framework for assessment design includes a model for tasks. Other models are student model, evidence models, an assembly model, a presentation model and environment model. They focused on the task model which plays an important role to achieve the desired learning outcomes.

Tasks are the central focus in any educational assessment as they produce the evidence for feedback, decisions, predictions or placements. Task design is becoming a science. Mislavy et al. asserted that tasks must be created with a clear structure for aspects of knowledge and skills of how they will be produced, presented and evaluated with the aim for providing evidence of students' behavior about targeted aspects of

proficiency. Both Mislevy et al. and Schlechty argued that task should focus on the quality of evidence produced to allow student reflections to self-regulate their learning by formative assessment of their documentation of the curriculum learnt.

2.10.2.1 Characteristics of evidence-based metacognitive tasks

There are many characteristics of effective tasks that will bring about learning gains. Schlechty (2004) found that task must be engaging while Hung, Cheah, Hu, and, Cheung (2004) discussed about designing authentic learning tasks. Schlechty discussed ten criteria in his Work On Work (WOW) framework. Both Schlechty and Mislevy et al. focused on evidential work products of tasks as the most important criteria to provide a goal that motivates student action and as an observable evidence of students' effort, ability, and performance.

Task is differentiated from activity. Lee (2000) claimed that the following characteristics are important for task-based learning: social interaction, mediation and regulation through talk, and freedom to interact for learners to have control of their learning. Lee stated that through interaction in the classroom, students will justify and redefine the task, scaffold and communicate. Myers (2000) also discusses four major ways to structure group interaction in tasks. They are leader cum follower, turn-taking, cooperative production, and individual production. Myers' findings showed that in evidence-based task, there was a significant amount of time and effort in meta-task talk that is talking about the task and speech were used as mediation of task, appeal to others for help and scaffolding where students would negotiate meaning and form in order to come up with the right answer. The interesting finding from scaffolding in this task-based learning was that students who work together were able to come up with an answer that none of them knew at the beginning. This finding concurs with the Zone of Proximal Development theory discussed in Vygotsky's sociocultural learning theory (Myers, 2000).

Lutz and Huitt (2004) discussed three characteristics for successful instructional tasks as consisting of taking into students' readiness to learn, allowing for social interaction and cooperative learning skills. Both believed that task should take into consideration the students' interest and readiness to learn. Students' readiness to learn depends on their present stage of cognitive development. Their views agreed with many supporters of mastery learning where learning is based on a set of criteria for each group's level of capabilities. This will help to motivate the students as they will feel a level of satisfaction of accomplishment of reachable goals set by appropriate tasks. This will improve students' self-efficacy. If tasks can draw information from previous knowledge and experience and provide opportunity for high level thinking, then progress in learning can be achieved (Lutz & Huitt, 2004) .

Lin (2001) emphasized both cognitive and social development in designing metacognitive activities. He stated that a balanced approach should include the self-as – learner as well as the creation of a supportive social environment for metacognition. He stressed that two kinds of content should be taught: knowledge about a specific domain and knowledge about the self-as-learner. Lin set out four high level design principles:

1. To provide frequent opportunities for students to self-assess what they know and do not know.
2. To help students articulate their own thinking.
3. To foster a shared understanding of the goals for metacognitive activities.
4. To develop knowledge of the self-as-learner with respect to one's role in a specific culture.

One of the most difficult tasks any teacher will find is keeping students engaged. Engagement refers to the behavioral intensity, emotional quality, and personal investment in a student's involvement during a learning activity (Connell & Wellborn, 1991; Fredericks, Blumenfeld, & Paris, 2004; Furrer & Skinner, 2003; Welborn, 1991 as cited in O'Donnell et al., 2005). Schlechty (2004) argued that an engaging teacher may

not necessarily improve student learning but an engaged student will improve academic achievements. The WOW framework by Schlechty theorized that when teachers work on the quality of work they give students, the work will engage more students more of the time. He believed that student engagement in learning will achieve learning gains.

Slechty theorized that qualities in the work teachers design for students are important to engage student. He grouped them into ten categories: Content and Substance, Organisation of Knowledge, Product Focus, Clear and Compelling Product Standards, Safe Environment, Affirmation of Performance, Affiliation, Novelty and Variety, Choice and Authenticity. According to Schlechty, students who are engaged are involved in their own learning, showed skills working with others and able to transfer knowledge to solve problems. Work that was considered un-engaging is repetitive, required no thought, or was forced on them. Engagement is not just keeping busy and engaged learning is intrinsically motivated.

O'Donnell et al. (2005) added that to bring about the extent of engagement, task must nurture three key psychological needs. They are autonomy, competence, and relatedness. These three factors are similar to a few of Schlechty's ten criteria. O'Donnell et al. labeled it autonomy whereas Schlechty labeled it as giving choice or giving some control to students. This key factor is supported by Zimmerman's (1990) self-regulated learning model discussed earlier as giving control to students so that they have ownership of their own learning. Similar to O' Donnell et al.'s concept of competence is where Schlechty focus on the need for a clear and compelling standard of expectations of work based on the tasks difficulty level. In addition, Schlechty stated that where social affiliation is allowed in the completion of task assigned, learners are more motivated to engage in the task whereas O'Donnell et al. focused on relatedness as social interaction with peers. Although the factors are labeled differently, the meanings of what makes a quality task design are the same.

Furthermore, Bruner, cited in Lutz and Huitt, (2004) described a spiral curriculum based on levels of abstraction and complexity by tying new concepts to previous learning rather than being separated into isolated units. Interrelatedness of topics covered and tasks difficulty level is important for students to be able to have a holistic perspective of the subject and to be challenge to improve their metacognition.

In a study by Dowson and McInerney, cited in Bowen, (2007) of 86 middle school students during 114 interviews and 24 structured observation periods, it was found that students' work avoidance behavior was due to laziness, boredom, inertia, anger, and lethargy. It included copying, cheating, asking the teacher for help on an easy task, or other off- task behaviors like talking (Day, 2002; Means, 1997; Plucker & McIntire, 1996, cited in Bowen, 2007). Furthermore, Tan, Hung, Cheah, and Cheung (2004) proposed a case study of how engaged learning can interact with E-learning technology. They suggested the use of technology as a tool can help to engage the contemporary students who are technology savvy. There are ways to vary a task that can engage student learning

2.10.2.2 Limitations of evidence task-based learning

Myers (2000) observed limitations in task based learning, e.g., time-consuming, instructor loss of control of the classroom interaction, wrong answers and conclusions were derived, and unproductive 'off-task' talks. However, he argued that the time spent interacting to negotiate is useful as through social interaction, students were able to internalize meaning, evaluate ideas in-depth through active construction and reinforced learning through communication.

Janssen, J., Erkens. G., Kirschner, P.A. and Kanselaar, G. (2010) investigated how students' collaboration affected group performance. They categorized their findings into four categories: discussion of information, regulation of task-related activities, regulation of social activities, and social activities. They found no effect of discussion of information and regulation of task-related activities. But, there was a

positive correlation between regulation of social activities and group performance. There was a negative effect on group performance from social activities created by group work. They were aware of their limitations of not looking at the processes of group work over time and given time perhaps there may be some effect in terms of discussion of information and regulation of task-related activities. Groups needed time for forming, grounding, tuning, storming, and norming before more positive effects can come from the collaboration. They were aware of their limitations of not analyzing the effects of having teachers facilitate collaborative work to keep performance focus on the task. This study provided some realistic and real problems in collaborative task designs. They agreed with De Jong et al. (2005) that metacognitive activities such as coordination or regulation of task-related activities such as planning, monitoring task progress, evaluating plans or ideas are considered important to effective online collaboration.

2.10.2.3 Summary of evidence-based learning

Meltzer (2007) stated that contemporary educators are concerned with identifying key causal variables that promote student success in a self-regulated learning context. There is an increasing need in today's contemporary modern society to equip students with the essential skills, knowledge, and ability to perform in their career. Gardner (2007) describes five kinds of minds of thinking or acting for employability of the 21st. century. He stated that three kinds of mind (disciplined mind, synthesizing mind, and creating mind) will enhance intellectual development and two kinds of minds (respectful mind and ethical mind) will enhance personal character-building. The Ministry of Education in Singapore employs the framework from Collaborative for Academic, Social, and Emotional Learning (CASEL) to enhance the five core Social-Emotional Learning (SEL) competencies. The five cores of SEL are self-awareness, social awareness, self-management, relationship management, and responsible decision-making. Ee (2009) stated that to develop SEL competencies, then

relevant metacognitive strategies must be taught so that students are metacognitively conscious and reflective of their actions. She stated that metacognition involves conscious awareness of the processes of learning. It consists of monitoring our progress and adapting our strategies through self-reflection, self-responsibility and initiative. Ridley, Schutz, Glanz, and Weinstein (1992) described metacognitive skills as taking conscious control of learning, planning and selecting strategies, and changing learning behaviors and strategies when required. Ee (2009) described five metacognitive strategies of enhancing student metacognitive awareness. They are cognitive strategies, critical thinking strategies, creative thinking strategies, cooperative thinking strategies, cooperative learning strategies, and decision making strategies. However, before developing student metacognitive awareness, we must know what student know. Evidence based task design instruction is one way of helping students know what know.

2.11 Summary of Literature Review

The review of literature on metacognition, motivation, and instruction showed that the three concepts are related and must be viewed together to provide a deeper understanding of the learning process. Pellegrino (2006) and Lin (2001) argued there is a need to relate metacognition to instructional design. Thus, the focus on instructional design needs to be directed onto how the mind of the learner perceives instruction. Research has shown that students do not engage in metacognitive thinking unless they are motivated through carefully designed instructional tasks (Berardi-Coletta, Buyer, Dominowski & Rellinger, 1995; Bransford et al., 1999; Chi, Bassok, Lewis, Reimann, & Glaser, 1989; Lin & Lehman, 1999 cited in Lin, 2001). There is a need to understand the relationship between metacognition and motivation to plan a metacognitive approach to instruction. There is a need to design instructional metacognitive tasks that engage students' use of metacognitive monitoring and regulating strategies. Metacognition or reflections of one's thoughts require self-regulating or self-monitoring of own thoughts. In conclusion, the review identified the

areas of overlap between the three main concepts and their relationship to implement a metacognitive approach to learning. As educators, if we do not know what students know, it will be an uphill task to prepare graduate qualities that will fit the ever changing needs of our developing society. Recent literature shows that educators are more aware of the role of metacognition in learning but much more research is needed to understand how a metacognitive approach to instruction of learning can be shaped more effectively.

University of Malaya

CHAPTER 3

METHODOLOGY

3.1 Introduction

This study focused on the metacognitive processes of student learning among Sociology pre-university students in a private college in Malaysia. It examined how student metacognition influenced student learning. It studied how knowledge of cognition and regulation of cognition influenced student metacognition. This study described and explained the processes that link knowledge of cognition and regulation of cognition as part and parcel of student metacognition. It helps us to understand how student account for, construct, and give meaning to learning and instruction. In addition, the study explored the extent of student metacognition as a mediator between instruction and student cognition among high, average, and low achievers. It also investigated the degree of student metacognitive awareness and the different types of metacognitive strategies used by students of various academic abilities and whether their metacognition affected their level of academic achievements. Furthermore, this study helps instructors to access and assess the extent of student metacognitive awareness. It also describes and explores the dynamics of student metacognitive strategies and how it changes as degree of student metacognitive awareness changes over time.

3.2 Research Design

The research strategy for this study is based on a detailed qualitative case study complemented by quantitative data analysis of pre-university students' metacognition and motivation in the domain of Sociology in relation to instructional tasks performed over an eighteen months period. The qualitative case study approach was chosen as it takes time and intensive effort to discover the complex, unobservable meta or subjective level of the underlying patterns of how students make sense of the learning process. This strategy helped to provide an in-depth, detailed, and valid approach rich in data to

validate the underlying patterns of how students know what they know and what they do not know. The research design in this study is geared towards theory building of students' planned learning action guided by theories such as Social Action Theory, Theory of Planned Behavior, and Self-Regulated Learning Theory. This study discovered the underlying patterns of students' metacognition and motivation of their planned action to regulate their learning action. It described and explained the metacognitive learning processes and strategies of high achievers in the subject. This provided the metacognitive profile of a high achiever in Sociology.

The research design of this case study of students' metacognition and motivation is based on evidence of students' self-reports from in-depth interviews and questionnaires, their work-products in their subject portfolio, and their grades in the course. Both qualitative and quantitative data are collected to provide triangulation of sources of data to provide richer evidence and more in-depth information on students' metacognition and motivation. Since students' metacognition and motivation are latent variables, we can only measure them when they are manifested in measurable indicators such as self-reports, work-products, or grades in the course.

The limitation of case study is the low reliability expected of qualitative research as it is difficult to replicate the interview situations and also the learning context. However, the longer period of the study and the large number size of the sample consisting of 53 interviewees out of a total of 175 Sociology student population during the 18 months period helped to reinforce the validity and reliability claims of this study. The number of sample size was reached when saturation of data occurred over and over again among the last few interviewees. There is also the possibility of a gap of knowledge in what students self-reported and what they actually do in the process of learning. But this gap is addressed through triangulation of methods and source of data from observable evidences such as self-reports in interviews and questionnaires, student work-products, and their grade in the subject.

3.2.1 Rationale for research design

Yin (1993) a respected authority on case study design argued that both qualitative and quantitative data are relevant to case study and that it is irrelevant to distinguish between the two methods of data collection in seeking evidence to answer a research problem. This argument is supported by Marsh (1982) that even quantitative surveys that include meaningful dimensions in the study design can provide information and explanations. A pragmatist approach to mixed methods is applied in this case study as a practical and logical approach in answering the research questions. Tashakkori and Teddlie (2003) stated that pragmatism supports the use of both qualitative and quantitative research methods which rejects the incompatibility thesis and pragmatist researchers consider the research questions to be more important than either the method use or the paradigm that underlies the method. They refer to the “dictatorship of the research question.” Pragmatists also do not choose between the postpositivism or constructivist approach as long as they helped answer the research questions. The paradigm and methods of research chosen depends on the suitability of the method to answer the research questions (Tashakkori & Teddlie, 2003).

A sequential explanatory strategy of inquiry was chosen as the nature of each research questions requires different research approach and method (Creswell, 2009). A qualitative approach was chosen for research questions 1, 1(a), 2, 3, and 4 through in-person, on-site in-depth interviews helped uncovered the underlying patterns of student metacognition that would be difficult to achieve with quantitative approach. Students described their metacognitive levels and degree of motivation in relation to the types of types performed in rich details and this qualitative approach help to achieve the objectives of the research. The complementary quantitative approach chosen for their suitability to answer research question 1 (b) and research question 5 provided numerical statistical analysis to compare how different metacognition levels influence student

achievement score in Sociology and also to compare whether metacognition, motivation, or instructional tasks is a better predictor of student achievement.

Guba and Lincoln (1981) substituted reliability and validity with the parallel concept “trustworthiness” which consists of credibility, transferability, dependability, and confirmability to ensure qualitative methods maintain the rigor required for research. They developed strategies for maintaining rigor in qualitative research such as audit trails, member check when coding, categorizing, or confirming information with participants, peer debriefing, negative case analysis, structural corroboration, and referential material adequacy. Although, Morse, Barrett, Mayan, Olson, and Spiers (2002) acknowledged the contribution of Guba and Lincoln (1981) to the rigor of qualitative research, they emphasized the importance for qualitative research should reclaimed responsibility for validity and reliability by implementing verification strategies during the research itself. They argued that without rigor, research is worthless, becomes fiction, and loses its utility. They stated that over the past two decades, reliability and validity issues have been replaced by criteria and evaluation of the significance, relevance, impact and utility of completed research.

The criteria to reach rigor in quantitative rationalistic paradigm consists of internal validity, external validity, reliability, objectivity, representativeness, and generalizability. On the other hand the criteria to reach rigor in qualitative research consists of credibility, fittingness, auditability, and confirmability based on Guba and Lincoln’s (1981) work but were later refined to credibility, transferability, dependability, and confirmability. They suggested specific strategies to attain trustworthiness such as prolonged engagement, persistent observation, members check, audit trails, negative cases and peer debriefing. Lastly, they recommended that the researcher, who is the instrument in qualitative research, must maintain neutrality and at the same time be responsive with traits of adaptability, sensibility, immediacy, and ability for clarification and summarization. Since, Guba and Lincoln’s (1981) study,

qualitative research has focused on tangible evidence or outcomes of the study.

Maxwell (2004) provided a comprehensive justification on the use of qualitative research methods can be used to identify and develop causal explanations. He discussed recent philosophical development and research strategies that qualitative researchers can use in causal investigations. He realized that justification for qualitative research methods and causal explanation requires two tasks: to develop a philosophical credibility and address how qualitative methods can identify causal explanations, and at the same time rule out alternative explanation as a key tenet to scientific inquiry. Firstly, he suggested a realist philosophical approach that avoided many of the difficulties in a positivist/empirical or constructivist approach on causal explanations in qualitative research. Secondly, he focused on the process-oriented approaches in causal explanation. He argued that, just like quantitative research methods, qualitative research methods have to deal with validity threats with strategies such as variance approaches using intervention and comparison. Maxwell discussed how to develop causal explanation in qualitative research such as Becker's (1966) observation and analysis of process approach which involved intensive long term observation, rich data collection, and narrative cum connecting analysis as strategies to reduce validity threats in qualitative research. Maxwell further discussed how qualitative data are compared, differentiated, grouped and labeled. Subsequently, the similarities and differences are grouped into clusters of concepts which are then organized into more abstract categories and finally hierarchical taxonomies (Smith, 1979). These narratives helped to develop profiles through content and thematic analysis (Seigman, 1991). Maxwell suggested four strategies to deal with alternative explanations in qualitative research by using *modus operandi* approach, negative cases, triangulation, and member checks. Scriven (1974) first suggested the *modus operandi* approach which deal with validity threats as processes rather than variables.

Similar to Maxwell, Morse et al. (2002) argued that the focus should be more on the verification strategies during the research. He described verification as the process of checking, confirming, making sure, and being certain. They stated that in qualitative research, verification refers to the mechanism during the research to incrementally increase validity and reliability and thus maintain the rigor of the study.

The verification strategies suggested by Morse et al. are methodology coherence, sampling sufficiency, developing a dynamic relationship between sampling, data collection and analysis, thinking theoretically, and theory development. Firstly, methodological coherence of ensuring congruence between research questions and the research method has been considered in the research design for this study. Secondly, appropriate sample consisting of participants who are mostly similar in characteristics to demonstrate the need or lack of metacognitive awareness to represent the research topic was obtained. Sampling adequacy of 53 interviewees in this study was obtained to ensure saturation and replication, meaning that sufficient data was obtained in all aspects of the phenomena (Morse, 1991). Negative cases were identified such as students with low metacognition or low achievers to show the developing analysis of the research at the end of the data collection based on their actual final performance in the course to reduce subjectivity in selection or inaccurate assumptions of student ability. According to Morse et al., the large number of interviewees indicates saturation to ensure replication and replication verifies and ensures comprehension and completeness. Thirdly, collecting and analyzing data concurrently forms a mutual interaction between what is known and what the researcher needs to know. Fourthly, thinking theoretically requires linking the old and new ideas in a micro and macro analysis to build a solid framework of the data obtained. Lastly, Morse et al. discusses the need for theory development in qualitative research from two mechanisms: outcomes from the research or comparison of theories.

Qualitative research is iterative rather than linear. Morse et al. emphasized that a good qualitative research requires the researcher to go back and forth between design and implementation to seek congruence between research questions formulation, literature, and data collection methods, strategies, and analysis. The research design has tried to closely follow the verification strategies suggested by qualitative research literature to ensure standards of rigor is maintain in this research.

The data collected using qualitative method such as in-depth interview provided high internal validity for the sample population of pre-university Sociology students in a private college in Malaysia. Prolonged engagement through repeated in-depth interviews and general observation with the interviewees over an eighteen month period increases the validity of this research. The students were interviewed during the course in a college environment that gave it ecological validity as well. In addition, the in-depth interviews were carried out at least twice on each sample to allow the researcher to probe further for in-depth information that may have been left out in the first interview. This increases the reliability of the data collected through members check strategies as the researcher can verify with the respondent on any unclear descriptions and explanations. In addition, the flexible face to face interaction in an in-depth interview allow the researcher to probe deeply into the metacognitive processes of student learning which is not possible with quantitative methods such as a close-ended questionnaire. Furthermore, the researcher is able to gain the students' trust and rapport during their eighteen months course. The students were more likely to volunteer important data that would have been difficult to obtain or data that the researcher would not have thought to collect in the first place. Qualitative methods such as in-depth interview adapted from reliable and validated instruments such as The Metacognitive Awareness Inventory (MAI; Schraw & Dennison, 1994) and the Motivated Strategies for Learning Questionnaire (MSLQ: Pintrich, Smith, Garcia, & McKeachie, 1991) enable the researcher to gain invaluable insights into the students' mental process first

hand. This increases the construct validity of the Planned Action interview protocol used.

In addition, this research strategy enabled the researcher to discover new and valid ideas about the student metacognitive processes that would have been difficult to access with other methods. At all times, the researcher remained neutral during the study to allow free association of ideas during collection and analysis of data. This qualitative method enabled the researcher to reduce his or her own taken-for-granted assumptions of student learning and hope to discover new insights into the metacognitive processes of student learning.

Furthermore, the research design has included a quantitative approach and statistical techniques, such as correlational analysis, analysis of variance, simultaneous multiple regression, and hierarchical multiple regression were used on a larger sample size of 115. This increases the external validity of the study. In addition, the rigorous testing of the quantitative data collected through the planned action scale had added to the increase reliability of the data collected.

The triangulation of sources of data from 53 interviewees, and the triangulation of methods from qualitative to quantitative methods such as in-depth interviews, student work products from their portfolio, self-reports closed-ended questionnaires, student achievement grades and general pro-longed observation over the eighteen months of data collection increases the reliability and validity of the findings of this study.

Research question 1 focuses on the metacognitive process of student learning and their changes in strategies as their metacognitive awareness increase. Research question 1 (a) described the metacognitive characteristics among high, average, and low achieving Sociology students and research question 1 (b) investigated whether there is a significant difference in the achievements scores of Sociology students with high, medium, and low metacognition. Research question 2 developed the metacognitive profile of high achieving Sociology students. Research question 3 identified the factors

that motivated Sociology students' use of their metacognition. While Research question 4 described the characteristics of instructional task in Sociology that can enhance student metacognition and Research question 5 focused on the correlation and criterion outcomes of metacognition, motivation, and instructional task on student cognition of learning. The various data collected from qualitative and quantitative methods supported the conclusions drawn from the micro analysis of 53 students' metacognitive process point of view and the more representative and generalizable outcomes of student learning on a larger sample of 115.

Table 3.1

Mixed Methods Research Approach: Knowledge claims, strategy of inquiry, methods, and types of data

Research Approach	Mixed Method
Knowledge claims	Pragmatic Assumptions
Strategy of Inquiry	Mixed methods case study design
Methods	Qualitative method: In-depth Interview Quantitative method: Close-ended Questionnaire
Types of data	Collection of mainly qualitative data complemented by collection of quantitative data.

Adapted from Creswell (2009).

Table 3.1 summarized the rationale for mixed method design in this study as it benefits from triangulating qualitative method with quantitative methods. Qualitative method consisting of description in words has high descriptive, evaluative, interpretive, and internal validity of a case study (Tashakkori & Teddlie, 2003). It is able to provide an accurate account of students' metacognitive processes and how it changes in relation to student motivation and instructional tasks. However, qualitative methods have lower reliability than quantitative methods as it lacks in consistency in replication.

Quantitative methods have lower validity than qualitative methods although it may have high external, face, content, and construct validity if concepts are precisely

operationalized into measurable indicator (Tashakkori & Teddlie, 2003). The two methods can compensate for each other's limitations. Mixed method approach enjoys the strengths of qualitative and quantitative methods when both are applied in accordance to their assumptions underlying their practices.

3.2.2 Summary of instruments and methods

Table 3.2 summarized the qualitative and quantitative methods, instrument, and sample size used for each of the research questions in this research.

Table 3.2

Summary of Instruments and Methods Used for Each Research Questions

Research Question	Research Method	Instrument	Sample Size
1	Qualitative (In-depth Interview)	PAI (Appendix A)	53
1 (a)	Qualitative (In-depth Interview)	PAI (Appendix A)	53
1 (b)	Quantitative (Close-ended Questionnaire)	PAS (Appendix B)	115
2	Qualitative (In-depth Interview)	PAI (Appendix A)	8
3	Qualitative (In-depth Interview)	PAI (Appendix A)	53
4	Qualitative (In-depth Interview)	PAI (Appendix A)	53
5	Quantitative (Close-ended Questionnaire & Student Portfolio)	PAS (Appendix B) Appendix C	115 115

Table 3.3

Summary of Characteristics of Interviewees (N=53)

Interviewee Name	Interviewee No	Academic Achievement	Sex	Nationalities
Ying	2	Low	Female	Malaysian
Vicky	30	Low	Female	Malaysian
Rav	34	Low	Female	Malaysian
Ling	39	Low	Male	Malaysian
Tan	9	Low	Male	Malaysian
Jenny	20	Low	Female	Malaysian
Meng	44	Low	Male	Malaysian
Brandon	25	Low	Male	Malaysian
Lee	40	Low	Male	Malaysian
Ajah	47	Low	Female	Malaysian
Angie	12	Low	Female	Malaysian
Sam	4	Low	Male	Malaysian
Fay	5	Low	Female	Malaysian
Wan	53	Low	Female	Malaysian
Faz	17	Low	Male	Malaysian
Azrin	26	Low	Female	Malaysian
Joey	46	Low	Female	Malaysian
Ash	43	Low	Female	Maldivian
Christie	14	Low	Female	Malaysian
Lew	35	Low	Female	American
Ting	38	Low	Male	Malaysian
Suk	10	Average	Female	Malaysian
Leng	11	Average	Female	Malaysian
Kit	33	Average	Male	Malaysian
Seng	27	Average	Male	Malaysian
Cindy	28	Average	Female	Malaysian
Shan	31	Average	Female	Malaysian
Sef	24	Average	Male	Malaysian
Ching	41	Average	Female	Malaysian
Li	42	Average	Female	Malaysian
Min	49	Average	Female	Korean
Shana	8	Average	Female	Maldivian
Ken	3	Average	Male	Malaysian
Jo	21	Average	Female	Malaysian
Lynn	18	Average	Female	Malaysian
David	16	Average	Male	Korean
Flo	15	Average	Female	Malaysian
Kim	23	Average	Male	Korean
Tay	45	Average	Male	Malaysian
Ira	19	Average	Male	Malaysian
Soo	1	High	Female	Malaysian
Kamala	36	High	Female	Nepalese
Yee	6	High	Female	Malaysian
Yuan	7	High	Female	Malaysian
Kay	22	High	Female	Malaysian
Lund	52	High	Male	Zambian
Bill	13	High	Male	Malaysian
Bee	37	High	Female	Malaysian
Tai	29	High	Male	Malaysian
Mira	48	High	Female	Indonesian
Zara	32	High	Female	Malaysian
Oz	50	High	Male	Malaysian
Reen	51	High	Female	Malaysian

3.3 Sample

The participants of this study consisted of Cambridge A level Sociology students who were sampled from the student population of a private college taking Sociology from four intakes of students starting from January 2008 intake, March 2009 intake, June 2009 intake and March 2010 intakes. The 53 Sociology students were quasi-randomly selected for in-depth interviews using the PAI protocol from 115 Sociology students who participated in student subject portfolio instructional tasks. In addition, this is the largest international campus provider of Cambridge A level international examination. The interviews were conducted from mid-2009 to Jan 2011 before the major final examination. Before the interview, consent was obtained from each student interviewed. They were asked to fill the form as in Appendix D. All the interviewees' actual names were changed for confidentiality.

The 53 students, aged 18 to 19 years, and are shown in Table 3.3. There were 20 (38%) males and 33(62%) females. This sample closely represented the number of males to females in the student population taking Sociology, with more female students taking this subject compared to male students. There were 8 international students and 46 Malaysian students. The international students consisted of 3 from South Korea, 1 from Indonesia, 1 from America, 2 from Maldives and 1 from Zambia. Of the 45 Malaysians, 3 were from East Malaysia and 43 from West Malaysia.

Adequate sampling requirement were obtained from three groups of low, average, and high achievers to ensure reliability and validity to maintain rigor of the study. The 53 interviewees were categorized under low, average and high academic achievers based on their final grade in the course. Students who obtained a grade of D or less were placed in Group 1, the low academic achievers. Students who obtained a grade of B or C were put in Group 2, the average academic achievers. Finally, students who obtained a grade of A or A* were placed in Group 3, the high academic achievers. There were 21 students in Group 1(low achievers), 19 students in Group 2(average

achievers), and 13 students in Group 3 (high achievers) sorted based on their final examination course grade. During the interviews in the first two semesters, the academic potential of the students were not yet known. They were only known after the final external course grades were released. The large number on interviewees ensures saturation and replication of data collected so that the research is intensively and extensively rigorous. Therefore, this reduces the likelihood of interviewer bias or interviewer effect in this study. A total of 115 Sociology students were sample for the quantitative survey using the PAS closed-ended questionnaire that consists of a 7 point Likert scale.

3.4 Evidence to Access and Assess Student Cognition of Learning

3.4.1 Student's Self-Reports

Samuelstuen, and Braten (2007) believed that it is difficult to assess how students processed the information learned and one of the few tools one can rely on to measure students' cognition and how they construct data are based on self-reports. In this study the data were also collected from self-reports, i.e., the unstructured Planned Action Interview (PAI) protocol and the Planned Action Scale (PAS) on the assessment of their metacognition and motivation.

3.4.2 Student's Portfolio of Their Work Products

There are many evidential learning products such as the traditional test grade which only satisfy the criteria set up by the test objectives. It does not show the full potential of a student's knowledge, skills or ability neither does it show the processes of the student mental development or schema. Alternative assessment such as student portfolio was used in this study to provide a more in-depth assessment of the student level of cognition from suggested topics of work products as in Appendix C. Students were required to complete a maximum of 20 argumentative essay topics from a list of suggested topics posted on the college 'Blackboard 7' online portal for easy reference for the duration of the course.

Student portfolio is used as an authentic assessment of student performance in the subject (Tan et al., 2003). Nitko (1996) discussed how evidence of learning products will be used as a monitoring, evaluating, communicating, daily instruction and reflection tool for student to improve their metacognition and thereby improve their achievement in the subject. Nitko (1996), Orland-Barak (2005) and Smith, Smith, and Delisi (2001) discussed student portfolio as a form of assessment.

Meeus, Petegem, and Meijer's (2008) quasi-experimental study to determine the usefulness of portfolio as a means of promoting autonomous learning found that students acquire greater metacognitive knowledge. They also found that students only get the chance to use their metacognitive skills when supervisors give them sufficient autonomy. They concluded from their study that students will only learn autonomously when they are given the freedom to learn autonomously. Teachers need to transfer control from teacher to learner control. In this study, students are given the flexibility to do as many essays in the student portfolio suggested and were given the freedom to complete as fast as they can. Although a suggested timeframe of one essay submission per week was suggested as a form of time and effort regulation without stressing the students out too much.

Portfolios are collections of student work representing a selection of performance. A portfolio may be a folder containing a student's best pieces and the student's evaluation of the strengths and weaknesses of the pieces. It may also contain one or more works-in-progress that illustrate the creation of a product, such as an essay, evolving through various stages of conception, drafting, and revision. First drafts were no longer considered as final products. In building a portfolio of selected pieces and explaining the basis for their choices, students generate criteria for good work, with teacher and peer input.

Portfolios are evidence of the student cognitive construction of new knowledge. They can also be used to support cooperative teaming by offering an opportunity for

students to share and comment on each other's work. Portfolios are valued as an assessment tool and supplement tests. The content in portfolios is built from class assignments. Portfolios can improve students' analytical and evaluation skills by providing the structure in developing and understanding criteria for good efforts for their own and other students' work.

3.4.2.1 Advantages of portfolio as an authentic assessment

Research also shows that students benefit from an awareness of the processes and strategies involved in writing, solving a problem, researching a topic, analyzing information, or describing their own observations. Portfolios can serve as a vehicle for enhancing student awareness of these strategies for high order thinking skills.

Tan et al. (2003) argued that portfolio has several advantages compared to traditional assessments: First, they enable teachers to assess a wider range of assignments than do traditional tests. Second, they engage students in assessing their own work and establish ongoing learning goals. Third, portfolio assessment allows for individual differences. Fourth, portfolio captures student achievement, effort, and improvement. Lastly, portfolio link assessment to learning and teaching whereas traditional assessment separates the two processes. However, good portfolio projects do not happen without considerable effort on the part of teachers, administrators, and policymakers. Nevertheless, portfolios have been characterized by some teachers as a worthwhile burden with tangible results in instruction and student motivation.

Figure 3.1 showed that the learning processes goes through three dimensions from the unobservable metacognition dimension to the cognition dimension, and finally the observable and measurable behavioral dimension. As a researcher, dimensions of students' metacognition and cognition which are unobservable can only be accessed and assessed through self-reports such as interviews, questionnaire, think-aloud, self-reflective journals, student work products, breaching experiments or observational research methods.

The problem of teaching without evidential work product is the challenge of how do teachers and students know what students know. In this study the evidence-based task characteristics focuses on student work products as a continuous formative assessment (Gijbels & Dochy, 2006). This may provide the answer to assessing students' cognition and improving students' learning outcomes. This study is based on tangible evidence such as student portfolio consisting of self-reports from in-depth interviews, authentic student work products and their final grade in the course. Students' cognition can be measured when it becomes observable through their work products in the student subject portfolio, self-reports, formative class tests, and summative class tests performance. When students' cognition of learning is based on planned action learning behavior on tasks completed, it is a progressive and authentic assessment or evidence of student learning. A student's ability to finally put down on paper what he knows shows mastery of the lesson learnt. The students' interpretation and ability to construct meaningful relationships of the concepts of the lesson shows mastery of the concepts learnt. Each individual conceptual interpretation of a lesson is different from another as each individual has different life experiences and prior knowledge. Thus, each student's starting point of learning may differ. Although, the official curriculum's objective is set to achieve some consensus in learnt experiences that could be examined in standardized major examinations, there will still be a wide gap in actual curriculum learnt as each student and instructor's life experiences will produce a unique learning experience for every individual. The lesson delivered or taught will depend on the instructor's interpretation of the curriculum and his own life experiences. Thus, each student will generally develop a conceptual model that is different from another. Some students' mental model of a lesson will be clear and concise, some will be elaborated and detailed, while some will be blurred and confused.

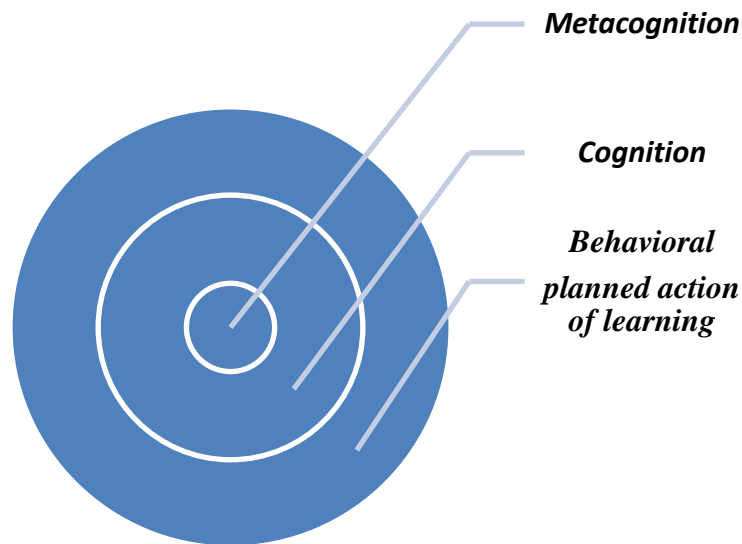


Figure 3.1. The three dimensions of learning.

3.5 Qualitative Methods

3.5.1 Description of Instrument One: Planned Action Interview (PAI) protocol

Firstly, the students were interviewed for about an hour during their free period or after class in their first semester using an adapted Planned Action Interview (PAI) protocol on the metacognitive strategies used in studying for the subject. The students were interviewed using an open-ended 18 item Planned Action Interview (PAI) protocol (Appendix A) which was adapted from two instruments: The Metacognitive Awareness Inventory (MAI; Schraw & Dennison, 1994) and the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991). Permissions were obtained to use and adapt the two instruments. Refer to appendixes E and F for the letters of consent from MAI and MSLQ respectively. The same 53 students were interviewed for a second time in the second semester using the second interview protocol consisting of an open-ended 13 items developed from ideas obtained during the first interview to see if there have been any changes in metacognitive awareness since the first interview and also to collect more detailed data.

3.5.2 Pilot study

The complete MAI was piloted by interviewing five students and found to be too lengthy and repetitious for in-depth interview method. Each pilot interview took two

hours and the information obtained was monotonous as the MAI was too structured in format and it would have been difficult to obtain new and in-depth details on the process of student metacognition. The original MSLQ and MAI were meant for obtaining quantitative data to validate the two instruments. Since much research in the past have already been conducted to validate the two instruments, a more open-ended or unstructured interview method was necessary to discover the in-depth process of student metacognition. Thus, the PAI was adapted from the MSLQ and MAI without fixed choice answers or scaled to allow respondents to speak freely about their motivation and metacognition. The 53 interviews were then conducted with much time saving for the respondents and the researcher. Each interview took about an hour for those students who like to elaborate on their answers and less than an hour for those who gave less detailed responses. There was more flow and ease of conversation between the researcher and the respondents. The researcher and the respondents were able to maintain a level of good rapport and rich data was obtained. The answers were not just mechanical responses and a rich database was obtained for analysis. The PAI proved to be useful for a quick and easy assessment of student metacognition. The students felt that they had benefited from the interviews and were willing to come for the second interviews.

3.5.3 Description of Instrument Two: Student Subject Portfolio

Students were asked to complete and submit a maximum total of 20 work products as their subject portfolio. This student subject portfolio was used as evidence to assess their ability to regulate their cognition of learning in the subject. It consisted of 20 argumentative essays to be completed by the end of the second semester in preparation for the AS final Cambridge International Examination. A list of suggested topics for the AS syllabus as in Appendix C were given to them in the first weeks of classes in the first semester. They were given the flexibility to complete them whenever they can. It was suggested to them to complete an average of one essay in two weeks to

help them make the dateline of 20 essays by October of the year or in a ten months duration.

Whenever an essay was submitted, the essay was presented the next day on LCD projector for peer evaluation to obtain suggestions and comments on how to improve on it. The students were encouraged to give constructive comments and even awarded grades on it to improve their judgment of learning. They were also asked to give their reasons for awarding the grade for each piece of student work product. Initially, they were shown how the grading system for an essay in Sociology is awarded, and what categories to look for based on the Bloom et al.'s (1956) Taxonomy of Knowledge. The taxonomy consists of six levels of classifications of cognitive learning objectives intellectual, i.e., knowledge, understanding, application, analysis, synthesis, and evaluation. The instructor facilitated the whole session by summing up the comments and grade at the end of the session which could be 20 minutes to 50 minutes depending on the inputs from the students and the quality of the essay.

Students were told that they would be awarded one mark for each essay completed. The maximum marks that can be obtained from their work products were 20 marks out of the total 100 marks for their second semester internal grade. This was to motivate them to regulate their learning habits.

3.5.4 Qualitative Data Analysis

3.5.4.1 Coding: Free notes

Data from the PAI was recorded and short notes were also made during the interview to ensure reliability of data recorded. After each interview, the data was transcribed as soon as possible from the recording and saved. After all the interviews were completely transcribed in Microsoft words files, member checks were conducted in the second interview for verification of the first interview. Subsequently, the data folder was exported to NVIVO 7 for filing, organization and coding. The data folder was printed out for peer review by my supervisor who is an expert in qualitative

research methodology and also a specialist in Sociology for verification and final analysis.

Initially, the interview data was coded in as many free notes categories as possible to avoid taken-for-granted assumptions. The free notes were based on categories like control of learning beliefs, self-efficacy beliefs, goal orientation or extrinsic motivation such as family, risk-taking behavior, willingness to take notes or construct own notes, distractions, cannot get started, rereading as a strategy and many more. These categories were based on patterns observed among the interviewees and also salient statements such as constant reflections on their lesson, willingness or not willing to take risks to reduce their note-making, willingness to construct own notes and why or just too much distractions that they cannot get started to regulate their cognition.

During the writing process later, this strategy was very useful as many interesting characteristics and contradictions appeared which differed from the current literature on metacognition. This ensured objectivity and discovery of new characteristics of students with different levels of metacognition and strategies.

3.5.4.2 Coding: Tree notes

Next, after being lost in a large amount of free nodes, I had to try out tree nodes to give myself some guidelines as to where I was going with the data. I decided to use the key constructs and sub-constructs in the PAI adapted from MSLQ and MAI to guide the main categories in my classification of the massive amount of data. The data were coded based on tree notes such as extrinsic and intrinsic goal orientation, control of learning beliefs, self-efficacy beliefs, task value, test anxiety for analysis of student motivation. The data were also coded based on tree notes such as declarative knowledge, procedural knowledge, conditional knowledge for student knowledge of cognition and planning, comprehension monitoring, information management system, debugging strategies, and evaluation for regulation of cognition. Under each category, there were subcategories such as family, peers, teachers, textbook, class climate for

extrinsic goal orientation and intrinsic motivation such as interest. For subcategories of task value, the type of tasks and their positive or negative student evaluation were noted. The subcategories for test anxiety, it was noted that students differentiated their degree of anxiety depending on whether it was a major examination or just a class test. The subcategories of comprehension monitoring consisted of ability to answer question, to apply, to tell or explain to their peers and many more such subcategories as will be explained in Chapter 4. Once I have finished coding the main categories branching out towards all the possible subcategories from the rich data obtained that were guided by the MSLQ and MAI main indicators, I could see more clearly where the data fitted in and where they did not fit in. For example, students who expressed lack of knowledge on how to get started were put under the category of lacked of procedural knowledge instead of a new category of distractions or lack of knowledge of how to get started. Although, I started out with more than 30 categories, I realized that some categories which I thought were new actually fitted in with the key constructs in the PAI. Another category like willingness to take risks to reduce their lengthy notes was a new category until I realized it could be classified under debugging strategies as volition to change learning strategies and to debug learning distractions or problems. Subcategory or free note like persistence was organized under motivation. In addition, some new categories and relationship between certain sub-constructs and the level of academic achievement were found too. After much organization and reorganization of the categories, I was able to develop a clearer and more concise approach to the data for a more pragmatic approach in instructional design. Organizing and reorganization of the categories and subcategories like tree branches from the main tree branch helps to provide a meaningful linking of the key constructs such as metacognition and motivation. The massive data finally makes more sense and intellectual coherence. The initial free nodes coding was very helpful and objective as there was not pre-conceptions about how the data would fit in the end. The tree nodes help to make sense of the large number of

similarities and difference among the free nodes. The free nodes avoided researcher bias in trying to fit the data into a fixed mould or theory. The final comparison of assimilating and accommodation of the free nodes into tree nodes helps to make sense of the data collected.

Then I found that many of the free nodes that I had categorized fitted into some of the main tree nodes, and these free nodes were the ones that helped me provide the elaboration and details needed for the key tree nodes. The free nodes helped tremendously in shedding new light into student metacognition and not just depended on past findings or research. This new data was able to shed more light into student's metacognitive processes that would not have been possible using only a structured interview. The unstructured PAI was able to collect rich, valid, and objective data. Students were at first surprised at questions like, "how do you know what you know?" or "how do you know that you understand what you learn in class?" This was the first time they were asked such questions and the surprise element in their facial expression and their responses were new and rich data for a researcher.

During the categorizing, it was found that many of the characteristics of key knowledge of cognition and regulation of cognition and within regulation of cognition, there were overlapping behavior patterns, e.g., checking or rereading that can fall under information management strategies, or comprehension monitoring and even debugging strategies. This showed the close relationship between knowledge of cognition and regulation of cognition, and also the close relationship between information management strategies, comprehension monitoring, and debugging strategies.

The data obtained were further analyzed and categorized to describe the metacognitive processes of student learning as in Research Question 1. In addition, the interview data was further analyzed for the metacognitive strategic changes as the degree of student metacognitive awareness changes over the two semesters as in Research Question 1. It was further used to identify any similarities and differences in the type of metacognitive

strategies that are used by high, average, and low academic achievers as in Research Question 1(a). This data were also used to develop the metacognitive profile of a high achiever as in Research Question 2.

The interview data was further analyzed to answer Research Question 3 on the contributing self-reported factors that bring about student motivation. The interview data from motivation were classified under categories from literature review of past validated research on motivation ranging from history of reflections, extrinsic goal orientations, intrinsic goal orientations, control of learning beliefs, self-efficacy learning and performance beliefs, test anxiety, and task value respectively.

The interviews were focused on discovering the characteristics of instructional task that can help student metacognition in Sociology as in Research Question 4. The positive or negative adjectives interviewees used to report the preferred instructional task were noted.

Subsequently, the data obtained from the in-depth interviews was triangulated with data from the instructional task of student portfolio of work products to reveal the level of student metacognitive regulation of cognition in self-regulated learning behavior. The student portfolio of their work products helped to triangulate the interview data obtained to check for validity and reliability of the data obtained from the interview. For example, in some instances a few students reported during the interview that they have high control over their regulation of cognition but the number of work products completed and submitted was very few. The number of work products completed from the student portfolio helped to measure how well each student can regulate himself or herself. It helped to gauge how the use of student portfolio task can help student to improve their regulation or study habits and thereby help to improve their academic achievement.

3.6 Quantitative Method

3.6.1 Description of Instrument Three: Planned Action Scale (PAS)

An 85 item Planned Action Scale (PAS) closed-ended questionnaire (see Appendix B) was adapted from two instruments. The two instruments consisted of The Metacognitive Awareness Inventory (MAI; Schraw & Dennison, 1994) and the Motivated Strategies for Learning Questionnaire (MSLQ: Pintrich, Smith, Garcia, & McKeachie, 1993) were administered to 115 pre-university students. This quantitative data was used to provide triangulation for the interview data for Research Questions 1, 2, 3 and 4 on student metacognition, student motivation, and instructional tasks. Triangulation of the qualitative and quantitative data helped to increase the reliability and validity of the study. For example if a student scored himself highly on the self-report questionnaire but reported differently in the qualitative in-depth interview, then further investigation is needed into the discrepancy or contradictions of the different sources of data obtained from the same interviewee. This will help to increase the reliability and validity of the data obtained. In addition, the larger sample size will provide more representative and generalizable findings. Only the motivation scale was adapted from the MSLQ and added to the MAI to develop the PAS to avoid overlapping subscales of metacognitive strategies from both scale. All 52 items in the MAI was adopted and adapted. The rationale for using the MAI is that metacognition is a more complete and specialized scale for measuring metacognition awareness.

3.6.2 Quantitative Data Analysis

3.6.2.1 Description and scoring of the MSLQ as part of PAS

Only the motivation scale of the self-report Motivated Strategies for Learning Questionnaire (MSLQ) instrument was used in the Planned Action Scale of this study. In the motivation scale, the main subscales used were value, expectancy, and affective components. The MSLQ was designed to assess college students' motivational orientations and their use of different learning strategies. The value component

consisted of intrinsic, extrinsic goal orientations and task value. The expectancy component consisted of students' control of learning beliefs and self-efficacy of learning and performance beliefs. The affective component measure test anxiety. Students rated themselves on a seven point Likert scale from 'not at all true of me' to 'very true of me'.

PAS consists of an 85-item Questionnaire composed of two parts measuring two constructs: motivation and metacognition. Participants responded on a seven-point scale ranging from Strongly Disagree (1), to Neither Agree nor Disagree (4), and to strongly Agree (7). Scores were summed to obtain a component score for each subscale in the questionnaire.

The first part of the PAS measuring motivation adapted from MSLQ consists of 33-items measuring six sub-scales:

1. Intrinsic goal Orientation (four items);
2. Extrinsic Goal Orientation (six items);
3. Self-Efficacy Beliefs (eight items);
4. Task Value (six items);
5. Control of Learning Beliefs (four items); and
6. Test Anxiety (five items).

Table 3.4

Internal Consistency Reliability of the MSLQ Subscales and Correlations, r with Final Course Grade (Pintrich et al., 1993)

Subscale	Cronbach alpha (α)	r
Motivation scale		
1. Value Component		
Intrinsic Goal Orientation	0.74	.25
Extrinsic Goal Orientation	0.62	.02
Task Value	0.90	.22
2. Expectancy Component		
Control of learning behavior	0.68	.13
Self-efficacy for learning and performance	0.93	.41
3. Affective Component: Test Anxiety	0.80	-.27
Learning strategies		
1. Cognitive and Metacognitive Strategies		
Rehearsal	0.69	.05
Elaboration	0.76	.22
Organization	0.64	.17
Critical Thinking	0.80	.15
Metacognitive Self- regulation	0.79	.30
2. Resource management Strategies α		
Time and Study Environment	0.76	.28
Effort regulation	0.69	.32
Peer Learning	0.76	-.06
Help Seeking	0.52	-.02

3.6.2.2 Reliability and validity of the MSLQ

The internal consistency reliability indices for the 15 subscales in the MSLQ based on data gathered from a sample of 380 Midwestern college students in the United States ranged from 0.52 to 0.93 ((Pintrich, 1993 cited in Kosnin, 2007). Pintrich et al. (1993) correlated the MSLQ subscales with the students' final course grades to determine predictive validity of the scale. They found a significant correlation of the scale with the students' final grades thus supporting the predictive validity of the MSLQ scale. These correlations are presented in Table 3.4.

3.6.2.3 Description and scoring of the MAI as part of PAS

The second part of PAS measuring metacognition adapted from the MAI composed of two main subscales: knowledge of cognition and regulation of cognition of metacognition consisting of 52 items. The two main sub-scales of MAI consist of:

1. Knowledge about Cognition (18 items) measuring declarative knowledge (8 items), procedure knowledge (5 items), and conditional knowledge (5 items);
2. Regulation of Cognition (34 items) measuring planning (8 items), information management strategies (9 items), comprehension monitoring (6 items), debugging strategies (5 items), evaluation (6 items).

Table 3.5

Distribution of Items in the MAI

Scale	Number of Items	Item Number
1. DK-	8	5, 10, 12, 16, 17, 20, 32, 46
2. PK -	5	3, 14, 27, 28, 33
3. CK -	5	15, 18, 26, 29, 35
4. P -	8	4, 6, 8, 22, 23, 41, 42, 45
5. IMS-	9	9, 13, 30, 31, 37, 39, 43, 47, 48
6. CM -	6	1, 2, 11, 21, 34, 49
7. DS -	5	25, 40, 44, 51, 52
8. E-	6	7, 19, 24, 36, 38, 50

Table 3.5 shows the distribution of the items within their respective sub-scales in the MAI. These items were randomly arranged. Participants responded to each item on a 7 – point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree).

3.6.2.4 Reliability and validity of the MAI

The MAI, used as part of PAS in this study, was adapted from the Metacognitive Awareness Inventory by Schraw and Dennison (1994). Past studies have found strong support for the knowledge of cognition and regulation of cognition components in the MAI (Schraw & Dennison, 1994). These studies have also found positively significant correlation between total score on the MAI and achievement grade in the courses (Young & Fry, 2008). Schraw & Dennison (2002) stated that metacognition refers to the ability to reflect upon, understand, and control one's learning. They found two main components in metacognition: knowledge about cognition and regulation of cognition. They conducted two experiments which supported the two-factor model of metacognition with Cronbach alpha internal consistency of .90 and intercorrelation, $r=.54$ between knowledge of cognition and regulation of cognition.

3.7 Administration and Scoring of PAS

The PAS consisting of both MSLQ and MAI were administered to the sample group during their Sociology classes. Before the test was given, the test administrator emphasized the importance of responding to the items using the correct rating on the Likert scale, that is, a rating of 1 if they very strongly disagree with the statement, and a rating of 7 if they very strongly agree with the statement. The students were also advised to consult the test administrator if they do not understand the intended meaning of certain items due to imitations in their vocabulary or needed certain clarifications on the Likert scale. The students were given 20-30 minutes to complete the PAS.

The mean score for each of the three components (DK, PK, CK) was computed and their summative score provided the score for the Knowledge of Cognition (KC)

construct. Similarly the mean score for each of the five components (P, M, E, IMS, DS) were computed and summed to obtain the composite score for the regulation of cognition (RC) construct.

The students' total score of knowledge of cognition were summed up for sub scales items (DK): 5, 10, 12, 16, 17, 20, 32, 46; (PK): 3, 14, 27, 28, 33 and (CK):15, 18, 26, 29, 35. The students' total score of regulation of cognition were summed up for the sub scale items (P): 4, 6, 8, 22, 23, 41, 42, (IMS): 9, 13, 30, 31, 37, 39, 43, 47, 48; (CM): 1, 2, 11, 21, 34, 49; (DS): 25, 40, 44, 51, 52 and (E): 7, 19, 24, 36, 38, 50.

3.8 Analysis of Variance Among High, Medium, and Low Student

Metacognition

Research Question 1(b) analyzed if there is a significant difference in the achievement scores among Sociology students with high, medium, and low metacognition. This analysis is to gauge if levels of metacognition can positively influence achievement scores. A one-way between subjects ANOVA using SPSS 16 was conducted on 115 students to compare the effect of metacognition on achievement scores among students with low, medium, and high levels of metacognition. The students were divided into 3 groups of low, medium, and high metacognition based on their total MAI scores. Group 2, the medium group (moderate metacognition) was selected based on their scores lying within plus or minus half a standard deviation of the mean of the MAI scores. Students with scores less than half a standard deviation below the mean of the MAI scores were placed in Group 1 (low metacognition). Students with scores more than half a standard deviation above the mean of the MAI scores were placed in Group 3 (high metacognition). A post hoc comparison using the LSD test was conducted to indicate whether the mean achievement score of students with low metacognition was significantly different than that of medium metacognition, and high metacognition. The effect size, d , for the difference between Group 1 and 2; Group 1

and 3; and Group 2 and 3 in terms of their levels of metacognition on the students' achievement scores can be calculated based on the formula :

$$\text{Effect size} = \frac{\text{Mean of group 1} - \text{Mean of group 2}}{\text{Mean SD}}$$

If the effect size for the low and high metacognitive levels is large, it shows any differences between low and high metacognitive group were unlikely to have arisen by sampling error. If the effect size is small between two groups, then the difference could be due to sampling error.

An examination of the skewness and kurtosis of the observable variables student metacognition and student achievement scores were conducted to check if the data was normally distributed. The means, standard deviations, skewness and kurtosis of the observable variables for the 4 main constructs: Metacognitive Awareness, Motivation, Portfolio, and Score; and 2 sub-constructs: Knowledge of Cognition and Regulation of Cognition were used as indicators of central tendency and spread of data.

3.8.1 Concurrent Reliability of Two Examination Scores

Two achievement scores were conducted to test for concurrent reliability before selecting one of the test scores as a final score for comparison with the MAI scores among the 3 groups. The two final examinations adhered to the syllabus covered for the Cambridge International Examination and were conducted within 5 months of each other for the same set of students ($N=115$). A strong and significant correlation of .70, $p < .001$ was found between the two test scores for this sample. This result supported the concurrent reliability of the two examination scores and, thus the achievement scores could be used for comparison with the MAI total scores among the three groups in Research Question 1(b), and also used as the dependent variable for the hierarchical regression analysis in Research Question 5.

3.8.2 Simultaneous Multiple Regression Analysis

The relative contribution of metacognition, motivation, and instructional task toward student achievement in Sociology was analyzed in Research Question 5. A

simultaneous multiple regression analysis using SPSS 16 was conducted on 115 students for Research Question 5 to test how the three independent variables: student portfolio, student metacognition, and student motivation relate to the dependent variable of student achievement scores. Multiple regression is an extension of linear regression. This technique is used to discover the ways in which several independent or predictor variables are related to a dependent or criterion variable. Initially in this study a simultaneous multiple regression analysis was conducted to predict scores on the dependent variable from knowledge of the scores on the three independent variables to determine if the joint effect of the three independent variables of student achievement score in the subject is significant. If the effect is significant, then a further hierarchical multiple regression analysis is performed to determine which of the three independent variables: portfolio, metacognition, and motivation is a better predictor of student achievement scores.

3.8.3 Hierarchical Multiple Regression Analysis

Subsequently, a hierarchical regression analysis using SPSS 16 was conducted on 115 students for Research Question 5 to compare how each of the three independent variables: student portfolio, student metacognition, and student motivation relate to the dependent variable: student achievement scores. A hierarchical regression analysis was conducted to predict scores on the dependent variable from knowledge of the scores on one or more of the three independent variables to determine which independent variable best predict student achievement score in the subject. The associations between the dependent and independent variables were indicated by their respective correlations.

Five main assumptions were met when using the hierarchical regression analysis on the sample of 115 students. Firstly, there were enough participants for the three independent variables. The sample size of 115 met the criteria for at least 15 participants for every variable tested using multiple regression analysis to allow for

generalizability and for validity of any conclusions drawn later. The sample size of 115 was large enough for external validity or generalization to similar samples.

Secondly, the variables were drawn from a normally distributed population of scores. An examination of the skewness and kurtosis of the observable variables student metacognition and student achievement scores were conducted to indicate if the data was normally distributed. The means, standard deviations, skewness and kurtosis of the observable variables for the 4 main constructs: Metacognition, Motivation, Portfolio, and Score were analyzed for central tendency and spread of data.

Thirdly, the three independent variables: metacognition, motivation, and portfolio were checked for linear relationship to the dependent variable, score. Fourthly, outliers were eliminated. Lastly, the independent variables were checked for non multicollinearity which is the best situation for multiple regression analysis to ensure that the independent variables have high correlations with the dependent variable, but not with each other.

3.9 Summary of Methodology

This study summarized the ontological research paradigm, epistemology, research methods, research strategy, research design, description of research methods, administration and scoring of quantitative instrument, and reliability of instruments used for data collection. Characteristics of the subjects in this study were tabulated. The software package NVIVO 7 and statistical methods using SPSS16.0 used for data analysis were explained. Analysis of variance among high, medium and low level of student metacognition was explained.

CHAPTER 4

FINDINGS

4.1 Introduction

Data from different sources such as in-depth individual interviews, student work products from their subject portfolio, and tests were used to access and assess the metacognitive processes of student learning. Findings on research question one on the metacognitive processes of student learning and how their metacognitive strategies changes as their metacognitive awareness increases is analyzed in Section 4.2 and 4.3. Metacognitive characteristics of high, average, and low achievers in Sociology are described in Section 4.4 and the difference in the achievement score among Sociology students with high, medium, and low metacognition is analyzed in Section 4.5. for research question one(a) and 1(b) respectively. Research question two on the metacognitive profile of a high achieving Sociology student consisting of their metacognitive processes and characteristics are described and explained in Section 4.6. Section 4.7 reported findings for research question three on student metacognition and motivation, and Section 4.8 described characteristics of instructional task in Sociology that can enhance student metacognition for research question four. Analysis of the relative contribution of metacognition, motivation, and instructional task to student achievement in Sociology answered research question five in Section 4.9. Section 4.10 summarized the findings.

Research Question 1. What are the pre-university Sociology students' metacognitive processes and their changes in strategies as their metacognitive awareness increase?

4.2 The Metacognitive Processes of Student Learning

An interesting and illuminating finding from this exploratory research in student learning found two levels of processes. One process occurs at the meta- level and the other process at the cognitive level. There is a mediator at each level of processes for student learning to occur effectively. At the meta-level, metamotivators (MM) mediated

between metacognitive knowledge (MK) and metacognitive regulation (MR). In addition, the findings showed that metacognitive processes could be categorized into three main phases: Metacognitive Knowledge (MK), Metamotivators (MM), and Metacognitive Regulation (MR). These three phases are shown in Figure 4.1. Whereas, at the cognitive level student metacognition (MC) mediated at the cognitive level between instruction and learning.

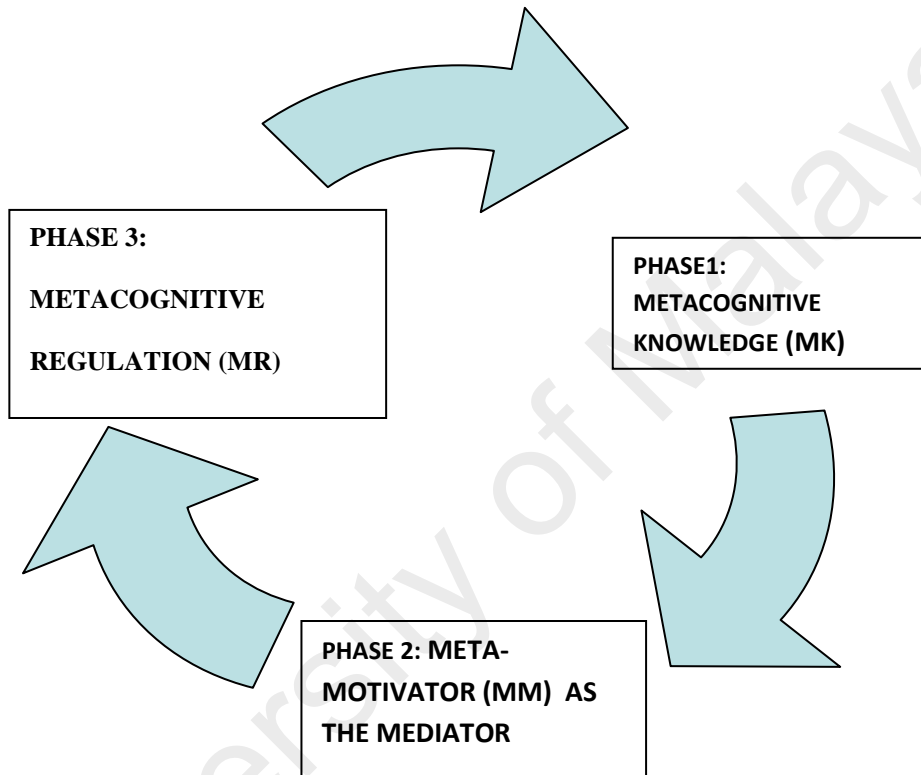


Figure 4.1. Metamotivator (MM) as the mediator between metacognitive knowledge (MK) and metacognitive regulation (MR).

4.2.1 Phase One: Metacognitive Knowledge (MK)

Going back and forth the in-depth interview data, three processes of student MK were categorized: declarative knowledge (DK), procedural knowledge (PK), and conditional knowledge (CK). The findings showed that declarative knowledge consists of knowing about factual and conceptual knowledge, procedural knowledge consists of reading and listening to learn how to perform tasks, and conditional knowledge consists of reflecting to know when and why they need to apply certain knowledge. Data from the interviews categorized the actions performed by students that led them to acquire

DK, PK, and CK which in turn led to their level of metacognitive awareness as shown in Figure 4.2.

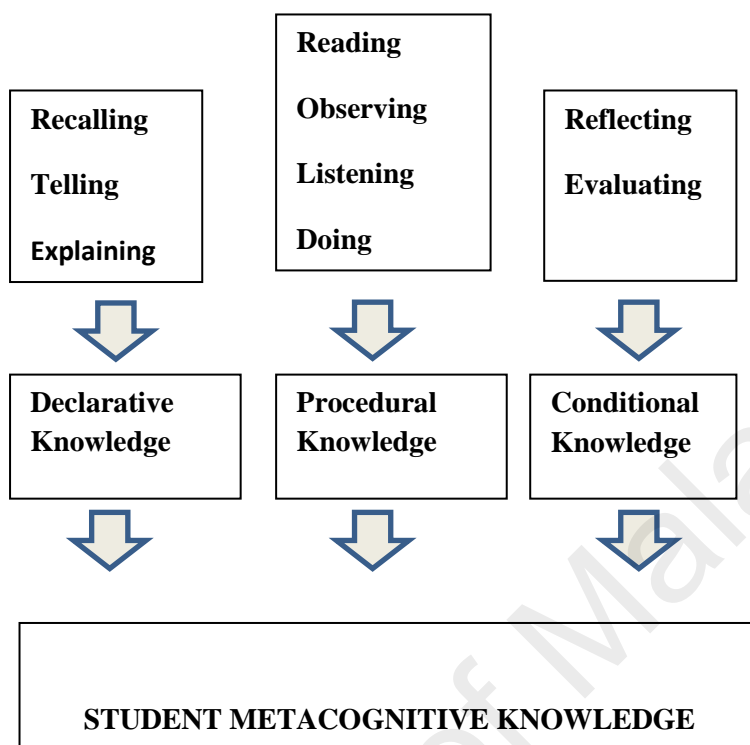


Figure 4.2. Phase one: Three components of metacognitive knowledge (MK).

In this course, all the students were new to the subject, and therefore had little prior knowledge. Many had difficulty defining the subject in the first week as they do not have the vocabulary to label their thoughts yet.

High achievers reported that they have a fair amount of domain - specific knowledge and knowledge of cognition. They possessed good content of declarative, procedural, and conditional knowledge in contrast to low achievers who lacked content knowledge and knowledge of cognition too. Some prior basic domain - specific knowledge and knowledge of cognition are essential for regulation of knowledge to take place to help increase the students' knowledge of cognition.

First, students need to feed their cognition with ideas, facts, concepts, and theories to increase their knowledge on the subject. Without domain - specific knowledge, there is nothing to think about. Next, students need to develop their awareness of what, how, and why they know, i.e., metacognition of their domain -

specific knowledge. However, the extent of knowing what they know is limited by how they know of what they learn.

4.2.1.1 Declarative knowledge key processes: Recalling, telling, and explaining

A majority of the students said that they know what the content of the course were, and a few could recalled the chapters and discuss their strengths and weaknesses of their content knowledge. A few said that they understood the content of the course, but had difficulty remembering, focusing, or lacked depth on the content. About ten students said that they were not sure of the content of the course or part of the course. Their metacognition were quite accurate in terms of their lacked of declarative knowledge.

High achieving students could report on what they know and what they do not know. However, low achievers either did not know what to respond and reported that they did not know or were weak in the subject. When questioned what they know about the subject, a few interviewees said the following.

Interviewee 1 (female, high achiever)

R: Yes, visual, can remember passages even the page number...concept mapping rather than mind-mapping...more systematic (Soo, 2010).

Interviewee 7 (female, high achiever)

R: AS syllabus very clear such as socialization, theories, methods, I read Tony Lawson, then read notes 3 to 4 times and go online for case studies (Yuan, 2010).

Interviewee 16 (male, average achiever)

R: better now about 60%. I try to understand and then read. If I cannot remember then I revise (David, 2010).

Interviewee 27 (male, average achiever)

R: Yah, 8 theories and methods (Seng, 2010).

Interviewee 42 (female, average achiever)

R: Investigate the society...8 theories-ok but methods not sure (Li, 2010).

Interviewee 12 (female, low achiever)

R: Topic okay but content cannot remember (Angie, 2010).

Interviewee 25 (male, low achiever)

R: Not sure. I just started on the methodology at the end of the first semester only (Brandon, 2010).

4.2.1.2 Procedural knowledge key processes: reading, listening, observing, doing

Data from the interviews showed that pre-university students did not have much procedural knowledge. Very few students have more than two ways of knowing how they know what they know. Many students just read and listen to gain procedural knowledge.

At this stage, students used reading as a process to acquire knowledge of new ideas, concepts, theories, and issues in the subject. Students reported that they know what they know mostly from reading rather than any other method of acquiring information. But, the low achievers and high achievers processed what they read differently. The low achievers tend to read and memorize these facts but the high achievers reported that they read for meaning to understand the concepts and ideas. Does this also mean that instructional task design need to include some stimulus reading material first and methods of reading before any tasks? Some interview excerpts on the importance of reading to know.

Interviewee 6 (female, high achiever)

R: I read, try to understand, just words that I read and think again. I make notes only on names and case studies as I forget them easily. I prefer reading the text for the contextual understanding rather than notes (Yee, 2010).

Interviewee 22 (female, high achiever)

R: Read everything, class notes, then memorize, picture a few times, practice essay. Before test, I read CIE textbook, notes and then class tests (Kay, 2010).

Interviewee 23 (male, average achiever, South Korean)

R: Read Haralambos about 2 times and then CIE textbook and also Tony Lawson's book based on diagrams. I try to understand the concepts first in the first reading and then second reading, I try to memorize them (Tim, 2010).

Interviewee 11 (female, average achiever)

R: Plan, read and practise past year questions. Make some notes but I haven't started (Leng, 2010).

Interviewee 15 (female, average achiever)

R: SPM different from A level. SPM mostly rote learned while for A level I read to understand then read to get the facts then make notes for main points (Flo, 2010).

Interviewee 9 (male, low achiever)

R: No specific strategies. Spend about half to one hour a day depends, Almost every day. I read to understand very important and try to answer the question, do exercises in class.

Interviewee 34(female, low achiever)

R: Read Haralambos, not really make notes as last time in SPM level, my tuition teacher provided all the notes and I merely add to it (Rav, 2010).

Interviewee 47 (female, low achiever)

R: I read CIE text, read all the notes from friends then I make my own. It depends on the hardness of the topic. If it's hard, I try to copy and write it back until I remember (Ajah, 2010).

A recurrent pattern observed among high achievers starts with reading extensively from various texts and active listening in the class. Students who listened actively in class practised better time management as they were aware of what to look for when they read later at home. During class, they listened for guidelines, key concepts, ideas, and issues that they should look for when they read later at home. These two processes, i.e., active reading and active listening were essential to developing high student metacognition to cope with the subject. A few said that they observe or pay attention in class. High achievers were aware of how to increase their declarative knowledge through these two processes. They made use of their audio and visual senses to learn actively. However, low achievers reported that they do not like to read nor listen to know. High achievers reported having one or both of these processes as can be seen from the interview excerpts below.

Interviewee 7 (female, high achiever)

R: I listen, read notes, read Tony Lawson, read workbook with colorful pictures and I do references for my notes with interesting facts, very brief notes from different perspectives. I know what is important and I select questions and answers, write notes, and refer to content page (Yuan, 2010).

Interviewee 13 (male, high achiever)

R: listen in class, do essays, one essay a week or every two weeks. Points summed into notes i.e. one page in my notebook, prepare 1 page for case study, gender, youth subcultures. Most useful is the acronym SLEPT and PET-very useful for organizing every essay (Bill, 2010).

Interviewee 19 (male, average achiever)

R: read generally, basic notes, messy maps, then read articles from news, I also observe and listen (Ira, 2010).

Interviewee 32 (female, high achiever)

R: I read briefly, then subtitle, then outline, key words. I make notes on areas I don't understand. If more time, I read the main text, if less time then notes. I can motivate myself to learn when I need to. Listening in lecture and thinking constantly about what I have learn (Tara, 2010).

Interviewee 45 (male, average achiever)

R: I firstly read the lecture notes at home, then come to class and listen, reflect and ask myself questions, test myself by open books (Kiat, 2010).

Interviewee 9 (male, low achiever)

R: Browse through the front of the text (CIE text). I like this text better as it is more concise. I don't like the Haralambos text as it is too thick (Tan, 2010).

Interviewee 12 (female, low achiever)

R: Read notes, reread notes, do not read the text (Angie, 2010).

Interviewee 14 (female, low achiever)

R: Go through the two chapters from H...textbook. Read and write notes on advantages and disadvantages in point form about one to two pages. But I usually don't finished. I don't understand and I don't want to write blindly so I give up (Christie, 2010).

4.2.1.3 Conditional knowledge key processes: reflecting and evaluating

About 40 % (21 out of 53) of students interviewed said they did not know when to apply different learning strategies. A majority of the 53 students interviewed reported difficulty knowing when and why they need to apply relevant theories, case studies or statistical evidence to support their arguments. Data from this sample group showed that these students' conditional knowledge (CK) generally ranged from hardly any to limited. Even the high academic achievers have limited conditional knowledge.

How do students account, construct, and give meaning to what they read and hear? The key process in acquiring conditional knowledge was reflection. Many high achievers said that they thought about what they learn in class all the time and frequently too. They read and think all the time just to account and construct meaning of what they learn for that day or week. They constantly reflect to account and construct mental images until their mental schema was stable. In the first few weeks, many students complained of difficulty coping with the course as many words or concepts were new to them. They needed incubation time for the association of the terms and the

meanings of such terms to make sense and achieve equilibrium or stability in their mental structures. They needed time to accommodate, and to assimilate new ideas, concepts into their existing mental models. Low achievers said they did not reflect or spent time thinking about what they had learned in class. They did not organize their cognition into a clear and concise mental model for easier retrieval for later use.

Interviewee 40 (low achiever)

Q: Do you know when to apply different learning strategies effectively?

R: No (Lee, 2010).

Interviewee 11 (average achiever)

R: Not really, fix myself what I finish today (Leng, 2010).

Interviewee 33 (average achiever)

Q: Do you know when each strategy you use will be most effective?

R: Not really (Kit, 2010).

Interviewer 39 (low achiever)

Q: Do you know when to apply different learning strategies effectively?

R: If boring, I will do something else e.g. last night I study for a few hours, so I go out to buy something and then cook something for myself like sandwich. Last week, Wesak holiday, very boring studying all Friday, so I went to the movies which I like very much (Ling, 2010).

A few students varied their strategies according to the urgency of examination schedule. As the examination dateline draws near, many students were more willing to expend time and effort on their studies. Very few individuals knew about various learning strategies, and very few apply different learning strategies depending on the situations. The following are interview excerpts from high and average achievers who reported that they knew something about their conditional knowledge of when and why they need to apply certain domain - specific knowledge on the subject:

Interviewee 1 (female, high achiever):

R: After trial, I will change my strategy. After trial, maybe one subject a day and try to reflect on what I learned, everything (Soo, 2010).

Interviewee 13 (male, high achiever)

R: Do notes, read notes, summarized teacher's notes, check against syllabus, modeling, look at heading and subheading of text. But closer to exam about 1 month, put more effort. Last 2 weeks I work harder (Bill, 2010)

Interviewee 3 (male, average achiever)

R: Read twice and one more time before final exam (Ken, 2010).

Interviewee 32(female, high achiever)

R: If more time, I read the main text, if less time then read notes. I can motivate myself to learn when I need to.

Q: Do you know when each strategy you use will be most effective?

R: Listening in lecture and thinking constantly about what I learnt (Tara, 2010).

Interviewee 49 (female, average achiever)

R: I have different strategies for different subjects. For sociology, reading and understanding, applying Korean culture, asks my Dad for examples...during class we learn about British Law such as abortion law...three months still legal or government housing for those with families (Min, 2011).

4.2.2 Phase two: Metamotivators (MM)

The data from the in-depth Planned Action Interview protocol showed two levels of motivation: internal motivation and external motivation. Students' internal motivation to regulate cognition requires epistemological beliefs about themselves such as self-efficacy beliefs and self-control beliefs as shown in Figure 4.3.

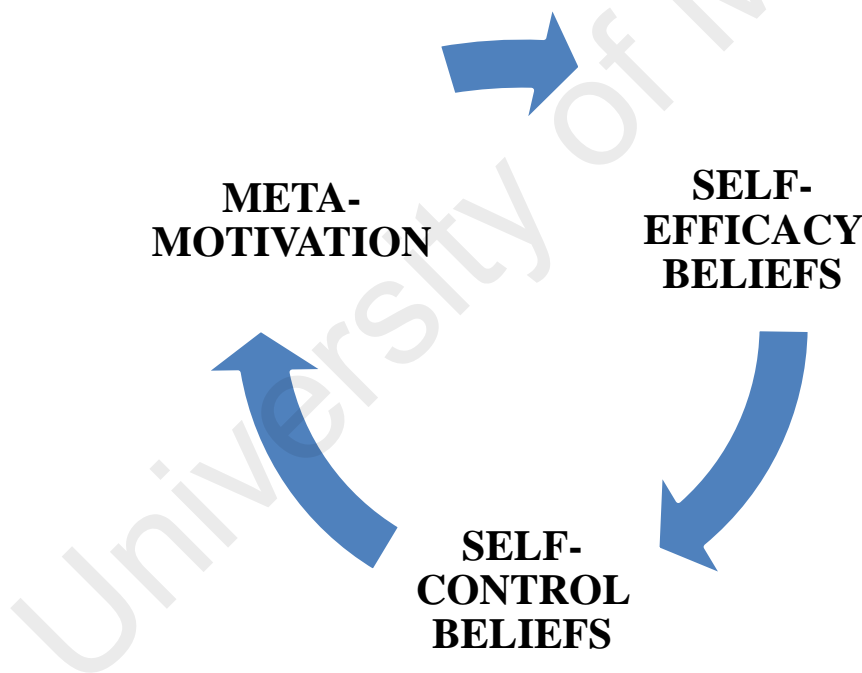


Figure 4.3. Phase 2: Two components of metamotivators (MM).

Before a student becomes aware of the need to regulate his or her cognition, he or she needs to be motivated to regulate his or her cognition. Internal motivation, referred in this study as metamotivator, is the first level and external motivator is the second level of motivation of self-regulated learning behavior (SRLB). Metamotivators

are the intrinsic first level motivators, and external motivators are the second level motivators. When both intrinsic and extrinsic motivators are present, they work together to bring about more effective self-regulated learning behavior.

Many students could report on their learning process but a few did not have the motivation as well as procedural knowledge on how to bring about the change needed, e.g., in Kit's case below:

Interviewee 33 (average achiever)

Q: Can you finish work on time?

R: Not really, live very far away and reach home late after seven hours of classes and a few hours of traveling to college... feel tired.

Q: Can you study when there are other interesting things to do?

R: No, easily distracted

Q: Do you arrange a place to study at home where you won't get distracted?

R: TV, Computer, PST (computer games), you can't stop yourself. If I want to study, I go out of the room... my house there is an area in the living room. I find it hard to concentrate for long...

Q: Can you motivate yourself to do schoolwork?

R: no (Kit, 2010).

Before any regulation of cognition is possible to improve current knowledge of cognition, students need to have ample knowledge of cognition to regulate as well as motivation to regulate. Without sufficient knowledge of cognition, regulation of knowledge would not be able to take place effectively. In the second phase of development of student metacognition, it is not enough just to have some knowledge of cognition, students need to be able to intrinsically motivate themselves to self-observe and self-regulate to enhance their knowledge of cognition. The students' ability to motivate themselves to self-regulate their cognition is known as metacognitive motivation which is the first level of motivation. Interview excerpts from students who have metamotivators:

One of the interviewees, Ming said, "if I want to, I can do. All the time I think about what I learned in class. Another student, Bill said, "B+ to A, enough control." More interview excerpts from students who have positive metamotivators and low achievers who do not have positive metamotivators:

Interviewee 1(high achiever)

R: Yes, if I got interest, I can really, really concentrate (Soo, 2010).

Interviewee 25(low achiever)

R: I think I am the weakest in the class. And I need to be told what to do (Brandon, 2010).

Interviewee 2(low achiever)

R: My attention span is really short... I do the one I like first. Then yeh..... i do the easiest one first. Then i do the second easier. Except for essay. That's the reason I am procrastinating with my second essay for my portfolio. Essay is a difficult task. Sometimes I worry that I may not understand.

Q: How well can you finish your sociology work on time?

R: Not really. I am rather slow.

Q: How well can you remember information presented in class?

R: Not very good. My memory is not that good.

Q: How well can you remember information read in your text books?

R: Not very good. I have to make my own notes and revise...(Ying, 2010).

Metamotivator occurred first before motivation of a planned behavioral change in learning may occur. A change in learning behavior rests upon the ability for student to first regulate their cognition known as meta-motivation. In the first level of student metamotivator, the students self-reported about the positive self-efficacy beliefs such as, "I know I can if I decide to do it." Or, I know I have enough control of how much to study." Whereas the students who have negative metamotivators such as "I am rather slow, I have to be told what to do", "I have poor memory"; tend to be poor regulators of learning as they just cannot get started. They are examples of learnt helplessness. This is the missing link between MK and MR of student metacognition. Students who reported high metacognition and also high academic achievements tend to report such strong self-efficacy and realistic self-control beliefs about their ability. The findings from self-reports of students showed a positive correlation between positive self-efficacy beliefs and performance in the subject.

However, high achievers reported lower self-control beliefs than that observed in their work portfolio. They set high standards and expectations for themselves and subsequently report that their self-control is positive but could be better. They are realistic in their judgment of the regulation of their learning schedule. However, low achievers reported very unrealistic high self-control beliefs and thus did not take action

to regulate their learning. This is an interesting finding that can illuminate teachers as to why students who reported good control of their learning do not seem to improve. The very low regulators were also low achievers. They set unrealistic expectations for themselves as shown below:

Interview 34

Q: Do you have control over how much you learn?

R: Yah, I do as it is up to myself and doing more research.

Q: How well do you think you will perform in the course?

R: Very interested. I will do well maybe an A. I want to become a writer (Rav, 2010).

Interview 35

Q: Do you have control over how much you learn?

R: Yah

Q: How well do you think you will perform in the course?

R: If I study with interest I will do very well... I wrote in my standard one assignment that I want to be a lawyer as I can argue verywell and get paid for doing so (Lew, 2010).

Interviewee 47

Do you have control over how much you learn?

R: I follow the schedule that I made and if cannot follow, i will make up for it the next day.

Q: How well do you think you will perform in the course?

R: trial: C Final AS: A (Ajah, 2010).

The interview data found how the second level motivator comes into the picture to reinforce the first level metamotivators. This will be further analyzed in the second research question on motivation in the later part of this chapter.

4.2.3 Phase three: Metacognitive regulation (MR)

The analysis of the findings showed that many students are still not aware of the numerous strategies to regulate cognition. The data showed only a few students who were able to regulate their cognition effectively to allow learning to take place. Regulation of cognition requires student to actively plan, monitor, check, and evaluate their learning. These students made the largest gains in learning outcomes such as interviewees, Tai, Tara, Bee, Mira, Kiat, Oz, Lund, Mala, Soo, Bill, Jo, Yee, Yuan,

Lynn, Tim, Kenny, and Kay. These are not the actual names of the students to maintain ethical concerns in research.

This phase of student metacognitive regulation (MR) consisted of planning, comprehension monitoring strategies, information management strategies, debugging strategies and evaluation. Each of these components of MR will be discussed. Some similar MR strategies were reported in more than one component.

This phase described students who have acquired the first two phases of student metacognition i.e. metacognition of knowledge and metacognition of motivation with the addition of MR strategies. A student's ability to accurately self-observe and self-evaluate provides the final feedback to implement further changes in cognition and subsequently a conceptual change in learning. The student is now aware of what he does or does not know, he is able to evaluate his strengths and weaknesses in certain areas of knowledge and is able to pursue a change in planning and monitoring strategies to further his learning.

However, many students had difficulty transferring their knowledge, skills, and experiences acquired to self-regulate their cognition. Many students were not sure, not confident, and had forgotten what strategies they used when asked whether they know when to apply learning strategies as shown in the interview excerpts below.

Interviewee 4 (male, low achiever)

R: Yes, When I have difficulty remembering, I will find different strategy and keep changing my strategy since I started my A levels. I am still not confident (Sam, 2010).

Interviewee 6 (female, high achiever)

R: not really (Yee, 2010).

Interviewee 8 (female, average achiever)

R: Not sure (Shana, 2010).

Interviewee 11 (female, average achiever)

R: Not really, fix myself what I finish today (Leng, 2010).

Interviewee 12 (female, low achiever)

R: Yes, cannot concentrate so I go library and find friends like, S.Q. to help (Angie, 2010).

Interviewee 39 (male, low achiever)

R: If boring, I will do something else e.g. last night I study for a few hours, so I go out to buy something and then cook something for myself like sandwich. Last weekend was Wesak holiday, very boring studying all Friday, so I went to the movies which I like very much (Ling, 2010).

Interviewee 41(female, average achiever)

R: Before exam, I make sure cover everything, stick to the points and concepts. After exam, forget everything (Ching, 2010).

4.2.3.1 Planning

Effective learning begins with planning for success but not many students planned and managed to follow through their plan. The interview data showed that some students have rigid plans, some have flexible plans, and some do not plan their learning at all. Some students disliked fixed study timetable and some said they study out of habits formed in their earlier schooling. A few students said they needed examination datelines as an external social control to guide their planning for how fast and how much they had to study. They kept the examination schedule as an end in mind, and varied their study schedule according to it.

Interviewee 2 (female, low achiever)

Q: Do you have a plan before you start studying?

R: I do, but I don't know if I can overcome my procrastination. I need some stress to get going or maybe a dateline coming (Ying, 2010).

Interviewee 44 (male, low achiever)

Q: Do you plan before you start studying?

R: I do timetable but for first two weeks after that I forget about it... no control (Meng,2010).

Interviewee 7(female, high achiever)

Q: Do you plan before you start studying?

R: Before exam about one month I study three to four times and sometimes long stretch for six hours on weekdays alone from 3pm-9.00pm in the college library before the AS exam (Yuan, 2010).

Interviewee 19 (male, average achiever)

Q: Do you plan before you start studying?

R: Yes, now about two hours average per week. But I am flexible (Ira, 2010).

Interviewee 27 (male, average achiever)

Q: Do you plan before you start studying?

R: This semester more on a daily basis about four-five hours per subject. I am quite flexible sometimes at least one hour (Seng, 2010).

Interviewee 29 (male, high achiever)

Q: Do you plan before you start studying?

R: Yes, according to topic and subtopic (Tai, 2010).

Interviewee 32 (female, high achiever)

Q: Do you plan before you start studying?

R: Sometimes, I have a timetable but don't follow exactly. I spent about two to three hours a week per subject (Tara, 2010).

4.2.3.2 Information Management Strategies

A few students reported that they hardly think about their information management strategies until they were interviewed. Many students just processed what they learn through automaticity without much awareness of what and how they select, perceive and retain the information learn in class. They have low metacognitive awareness of what they know, how they know, and when and why they need to process or manage the information they learn. A majority have little or a single information management strategy such as reading or listening. They used very passive information processing strategies. They do not reflect or evaluate the information learned and merely transfer from instructor's notes to their own notes without processing. These are the students who will experience a lacked of depth of understanding later in the course.

A few students reported on how they simplified and summarized their notes. They reported about how they selected what is important, and made notes on it. They were willing to let go and cut out irrelevant and peripheral facts. They frequently reflected on what they learn by categorizing and organizing the information in their mind until their mental schemas became as concise as possible. They could hold their ideas in the mind before writing them out in clear and concise notes. They were constantly looking for mental shortcuts. Examples of students who took extra effort to process the information learnt are shown in the interview excerpts below:

Interviewee 7 (female, high achiever)

R: I have changed my strategies. I now make notes about four pages per topic in point form, very colorful from Steve Chapman text.

I study for about two hours a day per subject. I read and memorize the facts. I read for the concept and then reread to remember. I form acronym such as e.g. VIOS or CIRRR those taught in class, none of my own (Yuan, 2010).

Interviewee 13 (male, high achiever)

Q: How do you study for this course?

R: listen in class, do essays, one essay a week or every two weeks. Points summed into notes i.e. one page in my notebook, prepare 1 page for case study, gender, youth subcultures. Most useful is the acronym SLEPT and PET-very useful for organizing every essay.

Q: How do you manage new information during the course?

R: I make my own notes in outline form and to prepare for finals I read and reread. For the coming trial I expect a B but for the finals an A. I study according to section and split them into smaller topics such as definition of family, functions or roles of family and so forth. I think I have enough notes about one page and I apply them. I write it out and I use the acronym SLEPT to help me organize my answers (Bill, 2010).

Interviewee 27 (male, average achiever)

R: I think about them in my mind and try to rewrite them and come with short way such as for Ann Oakley's four ways to gender socialization I came up with MCD Value meal to remember. I also apply into jokes with my peers during dinner time as we lived around here as outstation students.e.g, 'Notty is over-socialised and Tai is a capitalist as he comes from a very rich family.' I elaborate on my notes too (Seng, 2010).

But, very few students persevered through the whole process of developing their mental schemas on the lesson learn. A majority of the students just listened without much attention to what they have learnt, and assumed that they will be able to remember. Very few students took the trouble to map out their thoughts or ideas on paper. Students who go through the whole process of selecting, organizing, and writing out what they learn achieve more successful learning outcomes.

A few students were also willing to highlight, visualize and construct their own notes. A few try to hold the points or ideas in their mind and visualize them in their head. They tried their best to simplify into their own words and create their own examples and even songs to help them understand, relate and remember. They were willing to do extra mental processing of new information received to allow assimilation and accommodation. A few even tried applying what they learned to everyday events to help them understand and remember for the long term. The very high achievers tended to process the new information many times until it 'makes sense' and 'stick in their memory'. When that happens, they would have achieved mental equilibration.

Some students revised as many as ten times, and some until they understand through reading and rereading. Many high achievers such as Yee stated that just by reading and rereading a few times, she was able to understand better. Whereas, interviewee Tim said that he preferred to read and reread, then making notes and just reading from his notes as each reading gives him a different perspectives. This is an interesting point as most students just revised from their summarized notes. This raised the question whether reading and making new notes each time is better as one can gain new perspectives. But, of course this strategy will be very time-consuming. Rereading a second time will take more time than reading from a summarized set of notes.

Many students reported that they have a few general strategies and many have no strategies of how to handle large amount of information. Even when they have applied some strategies successfully, they could not remember which strategies worked before. One student, Meng stated that he applied many strategies before but did not know what works as he cannot remember which strategy he applied. He had not kept track or reflected on the strategies used before. A few students, when interviewed, said they have no strategies but found they had a few during the interview. They did not know what they know. There was no cognition of information management strategies as they have not thought about it before. They used strategies without any awareness. Many students have not thought about their study strategies or were not given opportunities to reflect on them. They have low levels of self-knowledge.

It was probably during the interview that someone had ever asked them what they know or what did they learn today or whether they ever thought about what they learn? Their awareness of their strengths and weaknesses improve just going through the PAI interview protocol. For some, it was the beginning of their journey towards more reflective learning strategies.

Many students do not highlight important facts. They said they tried to read from the beginning and do not construct any notes. They just attend class and cannot

wait for the class or semester to end. For them their physical attendance in class was enough. Many of them do not take down notes during class and do not read ahead or after class. They do not process the information learned in class or through their reading sessions. They do not like to take down notes on paper. In addition, if they do take notes, they do not simplify, summarize and translate into their own words as it takes too much time and effort. They are surface learners. One girl, Mira who was doing very well on assignments and projects, did badly in her AS finals examination. She came to be interviewed using the PAI protocol and realized that although she studied hard for the examination she could not remember much as she was stressed out by the time constraint. During the interview, she realized that her weakness in her learning strategy was taking down notes directly in long sentences from the text without processing deeper in her own words. When questioned why she had not summarized her notes in her own words, she said it took too much time processing them. But after the first examination, she realized the time saved earlier was not beneficial to effective retention of learning. She did very well on project and assignments but performed poorly in tests as there were time and memory constraints, and she could not finish on time because she had not found a concise mental schema to help her through examination. Thus, during the examination, it was difficult for her to reproduce what she had learned within the short time constraint. Since the interview, she had changed her information management strategy and tried to simplify and write concise notes during the third semester.

Two other students said when they studied they think in Chinese and tried to interpret in Chinese when the medium for instruction and examination was English. They had difficulty in doing well in written English examinations too.

A few students reported that they do not summarize and simplify their notes or what they had learned in class as they were afraid that they might choose the wrong ideas, so they tried to study everything. They were not rational calculated risk takers.

They did not know how to select what was important as they did not know what to guide them. However, some students would refer to the content page, or title, subtitle or teachers or peers or syllabus for a guide as to what to include in their notes. They listened actively in class, and from there they knew what to focus on, and selected facts or concepts for construction of their notes. Some students needed scaffolding. There was a need for instruction to include some guidelines to scaffold low achievers to assist them in their information management strategies.

4.2.3.3 Comprehension monitoring

A few students constantly monitored their comprehension of what they learn by checking the facts with the text, online, from their peers and teacher too. They were willing to ask and answer questions. Not only did they ask others questions but they constantly asked themselves questions too.

Some students created opportunities for themselves to allow learning to take place. They found solving problems challenging. Many students stated that they knew that they can understand if they can apply the theories, concepts, and ideas learn to problems. When asked during the interview at what point did you know that you understood, almost all students said at the point of application. This means that the students' comprehension monitoring of their cognition maybe too late to rectify any false assumptions or inaccurate understanding of the subject. Students only knew that they understood what they learnt at the point of application may meant that there is a long delayed time period of knowing that one understand. This level of metacognition may be too late if the application happened only during examination.

During interviews and after much probing, a few students were able to describe how they knew that they understand. One said when she was no longer confused. Another said when everything fell into place. Another student said when she asked and answered her own questions. Another student said when she could explain to others. Another student described when 'it sticks'. Very few students really thought about at

which point they were enlightened about what they have learned. The PAI interview questions provided this opportunity for them to start thinking along this line.

Very few students could described in detail how they knew they understood what they were reading or studying. Many students said that they knew that they understand what they have learned at the point of application. Some students said they do not know if they understand and a few said they just knew but could not describe how they knew. Some students said if they do not understand, they just gave up trying. They did not ask themselves or others questions, and they did not try to answer questions in class or after class. They did not give or create opportunities to find out if they knew. They needed hand-on tasks such as formative assessments to find out how much they know. They are externally controlled and left their chances of knowing to others, e.g., teachers to scaffold for them. They were not intrinsically motivated to self-regulate themselves as they found that the learning progress was slow and they were easily demotivated and gave up easily. They lacked patience and perseverance. They have difficulty regulating themselves, and were not motivated. When they managed to get down to writing notes, they tended to write lengthy notes. They were not willing to sum up and not willing to take risks to sum up even when they do not understand what they wrote down. They feared they might miss something important so they copied down everything. They were not willing to let go and faced anxiety in the examination trying to remember a whole lot of facts without understanding or finding mental shortcuts to remember key concepts. Unlike the high achievers, they did not organize and process the new information until the point where they can reproduce them. These students were not willing to let go and take risks. They made very long notes from irrelevant to relevant materials stretching ten pages long for a short essay assignment. When asked to reduce the bulk of facts to something relevant to the topic, they said they were scared that they might leave out something that is important. Such an

unwillingness to reduce the bulk of facts to a more reasonable amount that the mind can cope caused bottleneck and much examination anxiety.

During exam, some students reported anxiety and inability to remember.

However, many students reported that they did not feel stress from taking class tests as they said it was one way to find out their level of understanding and retention. They liked having formative class tests regularly.

During the course to increase student metacognitive awareness, firstly, there must be more opportunities for application such as problems or tests to apply one's knowledge. Secondly, students who asked themselves and others questions immediately and constantly created opportunities to check their understanding. Constant monitoring was essential to know if they understood what they were studying. Finally, a few students found constructing their own notes and solving essays questions were most satisfying and challenging. An ability to produce an output of what they learned was most satisfying as it provided concrete evidence of transfer of learning and creativity.

Interviewee 32 (female, high achiever)

Q: Is the most satisfying thing for you in this course is to try to understand the content as thoroughly as possible?

R: When I question the content and i can answer, I feel satisfied.

Q: When you have the opportunity in this class, do you choose course assignments that you can learn from even if they don't guarantee a good grade?

R: When I have time, I will choose them.

Q: Why do you want to do well in this course?)

R: Because it is difficult (Tara, 2010).

Interviewee 29 (male, high achiever)

Q: What type of course tasks do you prefer?

R: Essays because it is difficult and outlines too as they are more effective. I do outlines first then the essay.

Q: Any changes in learning strategies or comments?

R: The student portfolio is very, very helpful. Analyzed friend's essays in class, though sometimes the class becomes very distracted. I find that was one reason that improved my writing skills, essay structure etc (Tai, 2010).

4.2.3.4 Debugging Strategies

A few students reported that they asked questions when in doubt, and reread if they did not understand. They checked their comprehension from multiple sources which are reliable, and were able to judge accurately whether the sources are valid and

reliable. Most importantly, they were willing to change their learning strategies when it did not work and varied them according to different situations. They were willing to take rational calculated risks. A majority of the students have a few debugging strategies such as rereading that was mentioned most of the time and this did not involve complex restructuring of information management.

However, a few students had very poor judgment of self-knowledge. Since they did not know what they know or do not know, they did not think there was a need to debug. They overrated their motivation and metacognition scores and had unrealistic assumptions and expectations of their ability and effort. A few students have limited debugging strategies. They repeat the same strategies even when they have not worked before. They did not think of changing their learning strategies to vary according to the problem. These were the students who did not debug or improve their learning strategies.

4.2.3.5 Evaluative reflection

A few students reported that they reflected on their academic work constantly. They did so before, during, and after class. Some do reflections before they sleep, some in the shower, some while walking, some in the class and much more. Their high frequencies of reflection consisted of summing up what they have learned in their minds and on paper. They constantly asked for feedback from the teacher and peers by asking for review of their work products. Their constant monitoring, checking and evaluating of what they know is important to obtaining an accurate self-knowledge, an important component of cognition. Their regulation of cognition was vigorous and thorough. They evaluated their own performance critically, and set high achievement standards for themselves, and believed that it did meet the criterion set by them. They have self-efficacy and realistic control of learning beliefs. They set higher standards that what they were achieving and these provided the driving force for them to strive for. They were goal-driven rather than driven by goals. A few students have perfectionist traits.

These students were constantly evaluating and searching for ways to improve themselves. They emphasized on learning as an intrinsic goal orientation and said that they needed personal time out to reflect. They did not require in-built class time for reflections as they do it naturally out of habit. Although, they agreed that reflections can be trained, the volition to reflect in an in-depth manner derived from the individual himself. A few high achievers said that they preferred general facilitated reflections in class of about 10-15 minutes per hour of lesson. They were less stressed with general questions of reflections like, ‘ What have you learn today?’ rather than specific questions as they felt pressured to think on the spot.

4.2.3.6 Summary of Metacognitive Regulation of Student Learning

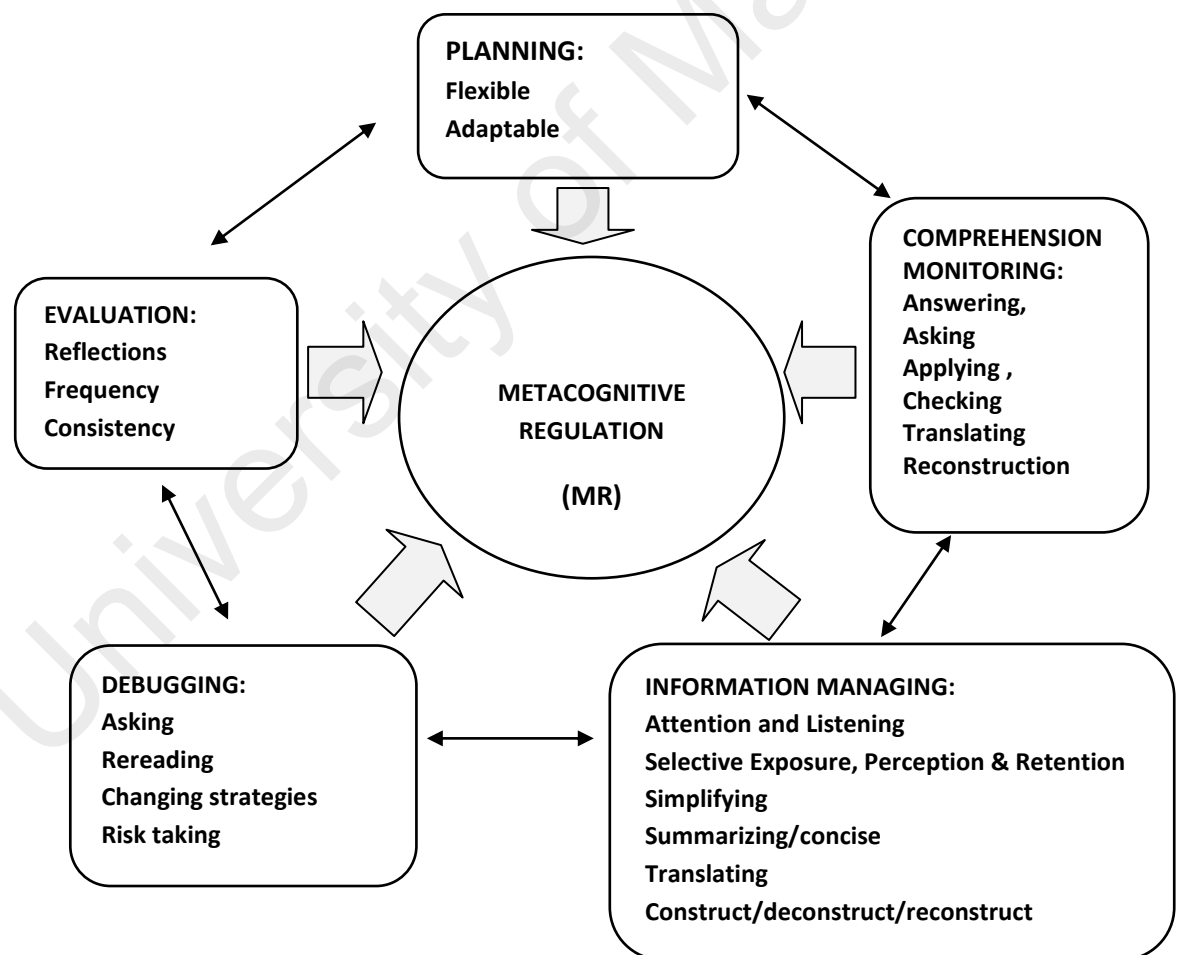


Figure 4.4. Five components of metacognitive regulation (MR).

The five major components of MR learning strategies such as planning, comprehension monitoring, information managing, debugging, and evaluating used by students are summarized in Figure 4.4. Firstly, the more successful planning actions are

flexibility and adaptability to changes. Secondly, the more effective comprehension monitoring actions consists of answering, asking, applying, checking, and translating. Thirdly, the effective information managing actions consists of paying attention, active listening, selective exposure, selective perception, selection retention, simplifying, summarizing, translating, constructing meaning, deconstructing abstract concepts, and reconstructing meaning of concepts. Fourthly, debugging actions of student learning consists of actions such as asking, rereading the text, changing strategies and taking risks in selecting key concepts. Finally, evaluative action such as frequent and consistent reflections of what they learn provided feedback to the students and enriches their metacognitive and cognitive knowledge of the subject. In conclusion, the MR of student learning involves various intended cognitive actions to monitor the learning processes and requires a high and consistent level of metacognitive awareness.

However, there were students who did not monitor their cognition because they have low metacognitive awareness or cannot motivate themselves. Low achievers used some metacognitive regulatory strategies but never evaluated their effectiveness and could not recall which strategies work. A few low achievers reported that they did not have any strategies at all. They had no awareness of their learning strategies, e.g., Tan's case below. In Ling's case, his interview excerpts showed a lack of awareness of what learning strategies were.

Interviewee 39

R: If boring, I will do something else e.g. last night I study for a few hours, so I go out to buy something and then cook something for myself like sandwich. Last week, Wesak holiday, very boring studying all Friday, so I went to the movies which I like very much (Ling, 2010).

Interviewee 9

R: No specific strategies. Spend about half to one hour a day. I read to understand very important facts and try to answer the question, do exercises in class. About 70 %. Browse through the front of the CIE text. I like this text better as it is more concise. I don't like the 'Haralambos' book as it is too thick. Then I choose topics that I don't know to read up. But before exam, I will read all those that I mark with highlighter and underline before. I read for meaning. I don't like to write notes. But I write additional notes on the text book and before exam I just read the highlighted parts only (Tan, 2010).

Ling and Tan did not perform well in their exams. Ling dropped out of college after the second semester before the final examination, and Tan passed marginally in the Final Examination. Ling thought his coping strategies of dealing with boredom were learning strategies. He had difficulty understanding basic concepts and theories. His language proficiency was not the problem but he had difficulty making sense of basic ideas. Tan's grade did not show any improvement throughout the three semesters as he refused to change his strategies although he did become aware of his shortcomings, i.e., refusing to read more and make notes.

In addition, regulation of learning for most students requires motivation. A lack of metamotivators such as low self-efficacy and control of learning beliefs affected student learning. A few student who considered themselves weak academically, did just enough to obtain a grade to get through the course. Not many students were able to consistently regulate their cognition. Many students planned to improve their knowledge of cognition but few were able to carry out the comprehension monitoring and evaluate their learning. It takes will power to actively regulate their cognition.

Many low achievers, when interviewed, were quick to attribute their poor performance to poor memory. It was almost like a self-fulfilling prophecy, "I have poor memory so I will perform badly." Or was this merely an excuse to justify their poor performance to reduce the cognitive dissonance that they experienced so as to reduce stress. A few weak students: interviewees Sam, Tan, Sef and Brandon repeatedly emphasized on their poor memory as a weakness and that there were nothing they can do anything about it Their low self-efficacy beliefs prevented them from improving as they did not strive to do better. They were examples of a learnt helplessness prophecy becoming self-fulfilling. The interviewee, Sef, said many teachers in his earlier school days had told him about his poor memory and he merely affirmed these beliefs. During the interviews, Tan and Brandon reported at least three times on their poor memory. The followings are the interview excerpts of Sam, Tan, Sef, and Brandon respectively:

Interviewee 4 (male)

Q: What do you experience when taking tests?

R: Difficulty in answering some of the questions as I cannot recall even though I remember reading them. I can't visualize them (Sam, 2010).

Interviewee 24 (male)

Q: What type of course tasks that really challenges you to learn?

R: Difficult memorizing, very short term. Hard to remember facts. Theories are hard to remember, methods easier. I was told by a few teachers in my previous school that I have poor memory (Sef, 2010).

Interviewee 9 (male)

Q: What is the most important thing that you learn about yourself today?

R: I mostly read and understand, not much writing and poor memory.

Q: How do you find the level of difficulty of various course materials?

R: moderately as long as you put in effort, case studies-challenging-weak in remembering...need to study more. Theories easiest but method-quite easy. Theories –major ones quite easy. Names hard to remember...some of them.

Q: Do you evaluate what you learn?

R: Better grade if less noise during the trial exam. I change from notes to text. But I think I need both, notes and text. Discussion, change from essays in the first interview to problem-solving. Sometimes making own notes effective. Both teacher and own notes are useful. But I only make notes on something I do not understand. Memory problem because only read once because my reading is slow. Reading notes faster and text is slower. If read fast cannot understand (Tan, 2010).

Interviewee 25

Q: How do you find the level of difficulty of various course tasks?

R: memorizing for the tests. I have problem understanding and have short memory.

Q: How well do you think you will perform in the course?

R: I think I am the weakest in the class. And I need to be told what to do.

Q: How do you study for this course?

R: Takes notes little by little as I cannot remember.

Q: How do you manage new information during the course?

R: Read and understand. But after sometime, I forgot (Brandon, 2010).

Accurate self-knowledge and judgment are crucial to improving academic performance. Low achievers were only too willing to believe in any excuses for their poor performance. They tended to find external causes such as poor class climate, or were born with poor memory. Tan blamed his poor performance on the poor class climate rather than lack of cognitive or behavioral self-regulation. Later, after counseling on his poor gain in learning in the second semester, he still did not change his learning strategies to include writing down notes or practice argumentative essay skills. His grade did not improve in the third final semester.

Many students reported low evaluative skills. They hardly thought about what they learned unless asked in class by the instructor. They accepted the teacher's notes or textbook without asking questions, and they disliked processing the information learned. They do not know what they know and do not know what is important to select. Could this be due to lack of instruction on such metacognitive skills? This suggested the need to train and scaffold thinking about thinking. The PAI interview protocol was probably the first time they have been asked to think about what they know and do not know. A few students said they experienced some changes after the first interview as they embarked on the journey of self-knowledge and began to ask themselves questions.

4.2.4 Summary of Student Metacognitive Learning Processes

An understanding of the three phases of the metacognitive processes of learning: Metacognitive Knowledge (MK), Metamotivators (MM), and Metacognitive Regulation (MR) as in Figure 4.1 shows the complexity of the learning process qualitatively. Each of the three phases is essential for learning to take place effectively and consistently.

MK without the other two phases will mean that the student cognition will remain the same and no learning gain will be achieved without the metamotivators to regulate new cognition or information. Students without motivation to learn and knowledge of how to regulate what they learn would not be able to achieve much learning. Even with motivation to learn but lacking in regulation of cognition strategies, no learning progress can be achieved. A student with knowledge of regulation of cognition but no motivation to regulate will also perform poorly. This explains why some students are unable to achieve learning gains. There are a few possible explanations as to why some students achieve transfer of learning while some do not. There are a few characteristic of types of students: Students who have metacognitive awareness and use them well to achieve learning gains, students who have metacognitive awareness but are not motivated to learn for various reasons; students

who have low metacognitive awareness but have positive will to learn; and students who have low metacognitive awareness and are not motivated to learn. Therefore, the metacognitive processes of student learning are based on two key factors: student metacognition and student motivation.

Figure 4.5 showed how student metacognition and student motivation are interrelated and inter-dependent. The three phases of metacognition correlates with the three phases of cognition which in turn corresponds with a student behavior to take actions to self-regulate his learning. There is a three level depth in the process of learning starting with the innermost level: metacognition of an individual, then the next level composed of cognition, and finally the observable and measurable level consists of the behavior of student learning. This is an in-depth analysis of the three dimension of learning of a student who does deep processing as compared to a surface learner. A majority of the students interviewed did not show deep processing and many use rereading as a strategy which involves mental rehearsal only. Rereading is a popular strategy used by surface learners. Only a few interviewees demonstrated deep learning strategies which involve analysis, synthesis, and evaluation of their strategies. These are high achievers who showed evidence of high level thinking skills in their work products. Many students talked about how they construct notes themselves but few discussed how they deconstruct or reconstruct from the many sources of information that they obtained. This can be seen in Figure 4.5 which explains the need for constant reflection for a higher cognitive awareness in the learning process to take place. It also highlights the importance of the role of metamotivators as a mediator between Metacognitive Knowledge (MK) and Metacognitive Regulation (MR). Past research had not provided a clear role for metamotivators in the learning process.

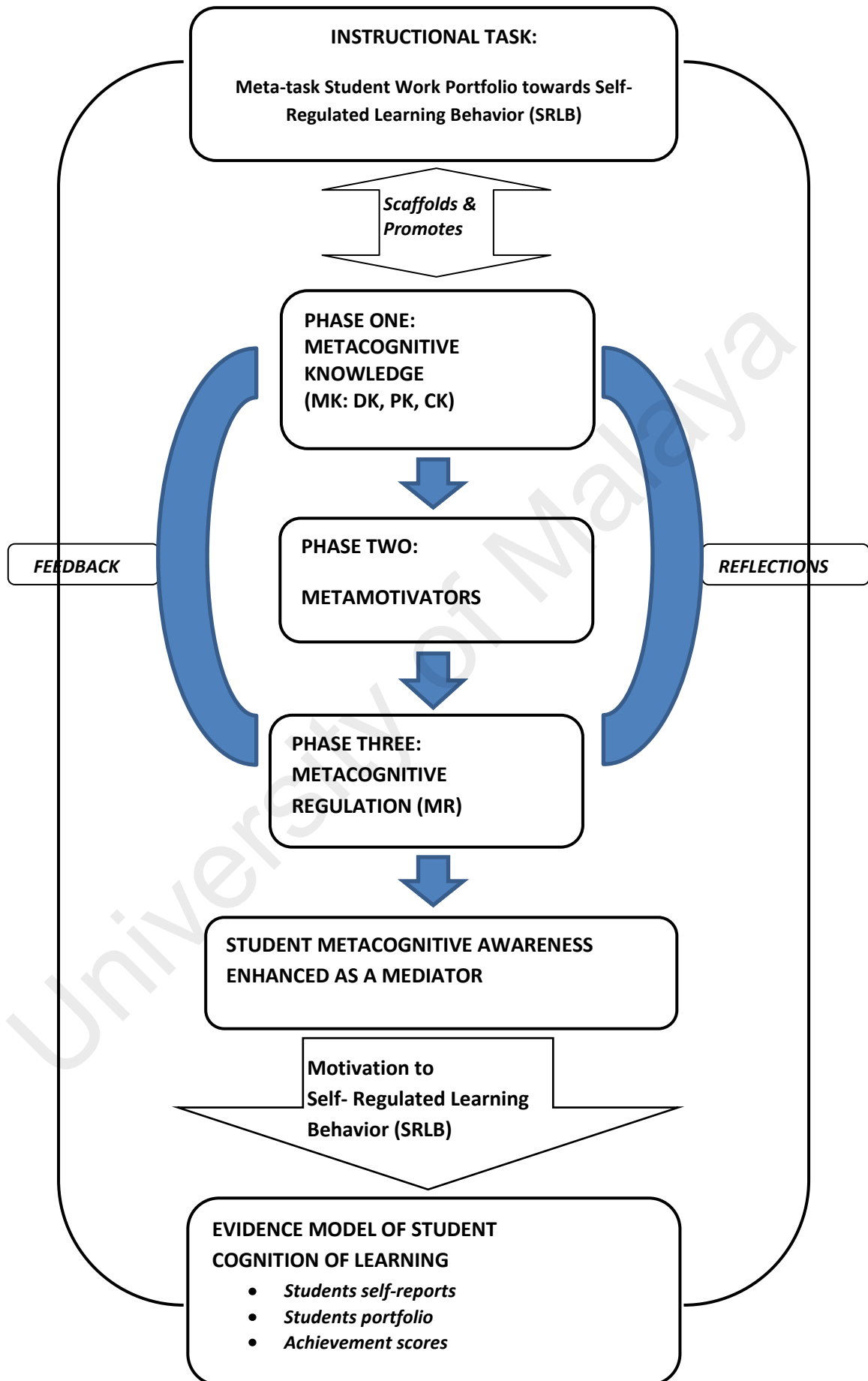


Figure.4.5. Metacognitive Processes of Student Learning.

Table 4.1 shows clearly the three dimensions of the learning process. The initial dimension of the learning process takes place in the metacognitive dimension followed by the cognitive dimension, and finally become observable and measurable in the behavioral dimension. The first two dimensions, metacognition and cognition are unobservable. Students' learning outcomes only become hard tangible evidence in the behavioral actions such as active listening, asking and answering questions, constructing notes, completing assignments for the student portfolio or performance in formative and summative assessments. Table 4.1 shows how the three dimensions are interrelated and interdependent on each dimension of knowing how one knows to knowing and finally taking actions to learn.

Table 4.1

The Three Dimensions of the Learning Process

Metacognitive Dimension	Cognitive Dimension	Behavioral Dimension
Metacognitive Knowledge: Knowing what Knowing how Knowing when and why.	Cognitive Knowledge: Declarative Knowledge Procedural Knowledge Conditional Knowledge	Action: Listening, observe, and read Observe, imitate, modeling Can explain the contextual relationship between concepts
Metamotivators: Knowing own: Self-efficacy beliefs Self-control beliefs	Cognitive Beliefs: Beliefs: 'I can do it.' 'I can motivate myself to Learn when I want to.	Action: Positive self-talk: ability to have a conversation with oneself to self-regulate learning.
Metacognitive Regulation: Reflection about how to: 1. Plan 2. Manage Information 3. Monitor Comprehension 4. Debugged problems 5. Frequently evaluate	Cognitive Regulation: Thinking of: 1. Planning 2. IMS strategies 3. CM strategies 4. Debugging Strategies 5. Evaluating	Action based on Reflection: 1. Executing Plan 2. Constructing concise notes 3. Answering and applying 4. Asking, rereading, research 5. Judging accurately

4.3 Changes in Student Metacognitive Strategies as Student Metacognitive

Awareness Increases

A few students showed that their metacognitive strategies change as their degree of metacognitive awareness changes over time. These were the students who enjoyed the largest gain in learning outcomes, e.g., Tai and Mira who went from low achievers to high achiever over 18 months. During the course they improved their metacognitive awareness and were able to monitor, evaluate and finally motivate themselves to implement the metacognitive learning strategies. The ability to initiate change and maintain them over long period of time is important to see a change in learning performance. Not many students especially the low achievers are able to initiate change in learning habits as seen from their lack of work products that were contributed to their subject portfolio. These students were unable to monitor their learning even when guidelines and framework were provided. They lacked intrinsic and extrinsic motivators. They did not have metamotivators to drive them to perform. Many students complained of difficulty in coping with distractions such as computer games, social networking on the world wide web, social activities, movies, and many more distractions. Even when they were aware of their learning problems, they were unable to motivate themselves to regulate. A few just did not have the procedural knowledge on how to get started. Then there were a few who showed potential initially but were not able to regulate or unwilling to change their strategies themselves and declined from high to average achievers, e.g., Ira, Lynn, and Shan. In Shan's case, she developed learning strategies that were too complicated and required more time and effort to remember than the actual facts themselves. Below are descriptions of students who were able to change their metacognitive strategies as their metacognition increases:

Tai, who showed tremendous gains in learning outcomes, reported how he reflected and change his learning strategies. In the first interview, he said that he had no strategies for SPM but in this course, he tried to read and make notes. During the course

he noticed that his grade has improved since he tried to summarize his notes to not more than ten sentences before the class tests. This indicated the importance of a student's ability to self-observe and increase his awareness of his cognition and strategies. His observation of his success in the beginning provided him the motivation to continue regulating his cognition. His initial metacognitive experience of success was important to drive his effort to improve his grade further. The following is the excerpts from his first interview:

Q: How do you study for this course?

R: I read Haralambos, then Tony Lawson and other text. I make notes. I read about more than ten times. I read slow first, then speed up and then I ask myself questions.

Q: Do you know when to apply different learning strategies effectively?

R: SPM- no strategies but A level, I am trying to summarize notes about not more than ten sentences before tests. I think it works as my test marks has improved from 13 to 18. It was below average in SPM (Tai, 2010).

Before, a student changes his metacognitive regulation, he must first be aware of his shortcomings in learning strategies. Tai was able to monitor and evaluate his weakness in learning and then tried to change his learning strategies. Since he changed his strategies from excessive overload of facts which were sometimes unrelated and started to sum up, he started seeing improvement in his own performance. The following interview excerpt is what Tai (2010) reported:

Q: Do you evaluate what you learn?

R: My weakness is I cannot construct my notes into simple sentences.

Q: What do you learn about your learning strategies in this interview?

R: Yes, by reducing the text and lecture notes and focus on one or two key words. Since I reflected... during the National Service. I love to observe other people. My goal is to build an old folk home and also law career. I used to apply knowledge that I had learnt on things that I am learning. But by doing this, I realized that I am only confusing myself and bringing myself to nowhere. Soon I noticed that, this is because I have not sufficient knowledge and understanding on the subject that I am learning. Yet I am so greedy and trying to join it with else things. Therefore now I decided to temporarily erase things which does not benefit me in my mind, and absorb new things which I should. By doing this, note-taking plays a big role. And by reducing my own notes is definitely one of the best ways to help me in understanding of the subject that I am learning. In his second interview, he reported more self-observation of his learning

strategies and how it helped him become more systematic during the course. He also realized that he preferred studying alone as a strategy to reduce distractions, and

described how he learned to summarize his notes into table or diagram. Below is an extract from the second interview in the second semester.

Q: How do you study for this course?

R: I now use four texts: CIE, Tony Lawson, Haralambos and ACA workbook. I prefer to study individually as there are no distractions and I am more focus. I tried to sum up the 4 texts into one page. Sometimes I summed them into a table or diagram.

Q: Do you know when to apply different learning strategies effectively?

R: I am now more systematic. I try to rest a few days and then reread, I find it more refreshing than I used to do (Tai, 2010).

Next, Tai reported on how constructing and reconstructing his own notes in short summary form helped him remember better. He was aware of how learning strategies such as summarizing and rewriting aid his memory. Tai had moved on from an unaware metacognitive user to being a strategic user of his MK in regulating his cognition. The following is Tai's interview excerpts when he was asked:

Q: How do you manage new information during the course?

R: Summarized in point form, then I go back and rewrite and add to my notes from the text that I read. I find that by replaying in my mind my lessons, it helps to go straight into my brain (Tai, 2010).

Tai had been able to initiate these changes in his learning strategies as he constantly monitor and evaluate his performance. His constant reflection made him consciously manipulate his cognition and he now consciously summarizes what he learns. He puts in a generous amount of time and effort to bring about the change. He was motivated to act based on the incremental successes he observed in his performance and the respect from peers he gets every time he participated in class discussions and presentations. He also found that the instructional tasks given in the form of student work products for their portfolio helped him in regulating his learning. Below is more of what Tai reported on his increasing self-awareness of how he learns.

Q: Do you evaluate what you learn?

R: I need more writing.

Q: How often do you think about your studies?

R: Sometimes. I think daily then I do revision even while eating. All the time I think about different stuff and read and think for about one hour.

Q: How much time do you allocate for thinking about your studies?

R: About 3 days for an essay sometimes.

Q: Do you try to summarize what you learn?

R: Yes, consciously all the topics and I try to remember.

Q: What did you learn about your learning strategies from this session?

R: I know my weaknesses. I use to be a perfectionist. I used to think everything is important but now I choose. From my experience in my semester exam, I ran out of time trying to put in everything.

Q: Do you think having specific reflection time in class would help?

R: Maybe, but some groups will talk

Q: Is ability to regulate your thinking a personal characteristic?

R: Yes

Do you think reflection skills can be train?

R: Yes.

Q: Any changes in learning strategies or comments?

R: The student portfolio is very, very helpful. Analyzed friend's essays in class, though sometime the class become very distracted, I found that was one reason that improved my writing skills, essay structure (Tai,2010).

Another interviewee, Tara who considers herself a perfectionist and drives herself to perform at every class test and was not satisfied until she was sure she had done a good job with the assignment given. But even Tara said she had to improve in some areas too to perform better. She said that, "I need to ask questions and not just answer questions. Need to sleep more."

Another student, Mira was demotivated after the AS finals results were out. She asked to be interviewed using the PAI protocol. She realized that she needed to change her learning strategies after the interview. Her class work was very good but she performed poorly in examination as she ran out of time. She could not accept her poor performance and was very much disappointed. Since she changed her learning strategies, her performance has improved and she was the only three students in her class who obtained an A* in her finals in the November 2010 Cambridge International Examinations. She had the foundation to do well but did not implement the learning strategy for examination conditions and that caused her some disappointment in the earlier AS examination. But, she was able to motivate herself to regulate her learning and managed a tremendous leap in her learning outcome from a D to an A*.

4.3.1 Summary of Changes in Student Metacognitive Strategies

The findings from the interview showed that students need to self-observe and self-indicate to themselves their cognition of learning. The degree of student metacognitive awareness depends on the students' ability to evaluate their cognition and frequently reflect on them. The more aware that they are of their cognition, only can they bring about change in their metacognitive strategies. But, a student's ability to change his metacognitive strategies is a complex process of knowing and changing his epistemological beliefs about how he or she learns and if the change will successfully bring a positive outcome in performance. If there is some incremental positive metacognitive experiences then only the student will continue to be motivated to regulate his cognition further. There are internal and external processes acting on the student's metacognitive awareness during the process of learning that supports and motivates the use of metacognitive learning strategies.

The degree of student metacognitive awareness changes from no use to unaware use to aware use and finally strategic use of metacognitive strategies. They reported internal and external processes acting on the self.

1. The internal processes consist of:

- a. Self-Reflecting, e.g. ,frequent evaluation of strengths, weaknesses or performances;
- b. Self-Monitoring, e.g., self-observation, self-indicating, self-questioning;
- c. Self-Controlling, e.g., overcoming distractions, taking risk to change learning strategies; and
- d. Self-Motivating through positive self-talk of self-control and self-efficacy beliefs.

2. External Processes consist of socialization of the expectations of the family, peers, teachers, class climate or the Planned Action Interview Protocol.

In summary, the sample of students interviewed showed the need for more intrinsic cognitive processes such as reflecting, monitoring, controlling, and motivating to bring about a change to higher metacognitive awareness. A majority of the

interviewees reported no use or unaware use of their metacognition. Very few students reported aware or strategic use of their metacognition. Even fewer related any creative, critical, or transformative change in their metacognitive awareness. Therefore, metacognitive awareness among pre-university students is rather low. With higher metacognitive awareness of learning strategies, many students will begin to enjoy learning as it will help students overcome learning barriers.

Research Question 1(a). What are the metacognitive characteristics of high, average and low achieving Sociology students?

4.4 Metacognitive Characteristics of High, Average, and Low Achievers among Pre-university Sociology Students

The data collected were divided into the three phases of metacognition: metacognitive knowledge(MK), metamotivators (MM) and metacognitive regulation (MR). The data from the in-depth individual interview were analyzed and the metacognitive differences among high, average and low achieving students were inferred.

4.4.1 Metacognitive Knowledge (MK) of High, Average, and Low Achievers

4.4.1.1 Low achievers' metacognitive knowledge

Low achievers reported low MK and showed low declarative, procedural, and conditional knowledge. These students said that they were uncertain about the content of this course. Even then, these low achievers made no attempts to fill this gap of knowledge. As shown below, one of the problems resulting from low achievers' lack of declarative knowledge is their passive approach to learning:

Interviewee 12 (female, low achiever)

R: Not very clear. Topic ok but not sure about the content (Angie, 2010).

Interviewee 25 (low achiever)

R: Not sure. I just started on the methodology (at the end of the first semester only (Brandon, 2010).

Interviewee 40 (low achiever)

R: Not really. Follow the textbook. I don't care about the syllabus. Don't choose knowledge (Lee, 2010).

Low achievers were also found to have low procedural knowledge. They have a limited number of ways for coping with this course, i.e., mainly read, reread, and write some notes. They have poor judgment of learning and consult their peers who are equally weak in the subject, or they refer to those who do not take the subject or have expert knowledge of the subject. Although, low achievers reported some knowledge of how they study, their strategies are not consistent as can be seen from interview excerpts below:

Interviewee 5 (low achiever)

R: read text. Just started to read once and the CIE text I have finished it. I read it two times. I do not make notes (Fay, 2010).

Interviewee 9 (low achiever)

R: No specific strategies. Spend about half to one hour a day depends. Almost everyday. I read to understand-very important and try to answer the question, do

exercises in class. About 70%. Browse through the front of the text (CIE text). I like this text better as it is more concise. I don't like the H...text as it is too thick. Then I choose topics that I don't know to read up. But before exam, I will read all those that I mark with a highlighter and underline before. I read for meaning. I don't like to write notes. But I write additional notes on the text and before exam I just read the highlighted parts only (Tan, 2010).

Interviewee 12 (low achiever)

R: Read notes, reread notes, do not read the text (Angie, 2010).

Interviewee 14 (low achiever)

R: Go through the two chapters from H... Read, write notes on advantages and disadvantages in point form about one to two pages. But I usually don't finished. I don't understand and I don't want to write blindly so I give up (Christie, 2010).

Interviewee 25 (low achiever)

R: Takes notes little by little as I cannot remember (Brandon, 2010).

A few low achievers either have no conditional knowledge or cannot remember the strategies that they used, e.g., Meng. As for Ling, conditional knowledge for him meant changing strategies to relax such as eating or going to the movies. Refer to interview excerpts below.

Interviewee 4

R: Yes, When I have difficulty remembering, I will find different strategy and keep changing my strategy since I started my A levels. I am still not confident.

Q: What did you learn about your learning strategies from this session?

R: I like moving my hands, making notes. My weaknesses are poor memory and time management. I am trying to makes notes to remember better and cut

out some activities for more time. Although I try many strategies since coming here for A levels, is I don't remember which strategy works and which doesn't. (Sam, 2010).

Interviewee 39

R: If boring, I will do something else e.g. last night I study for a few hours, so I go out to buy something and then cook something for myself like sandwich. Last week, Wesak holiday, very boring studying all Friday, so I went to the movies which I like very much (Ling, 2010).

4.4.1.2 Average achievers' metacognitive knowledge

Average achievers reported average declarative and procedural knowledge but their conditional knowledge was low. These students reported a wider range of declarative knowledge from very clear to partial knowledge of the syllabus. The academic achievement among the average students ranged from the lower end to the higher end average students who have the potential to develop their metacognitive and cognitive skills. A few reported a lack of depth in content knowledge, and some seem to have more confidence in their declarative knowledge in the subject as can be seen from excerpts below.

Interviewee 16 (male, average achiever)

R: better now about 60%. I try to understand and then read. If I cannot remember then I revise (David, 2010).

Interviewee 23(male, average achiever)

R: Theories and Methodology...very clear (Kim, 2010).

Interviewee 24(male, average achiever)

R: Theory and method but depth of content not sure (Sef, 2010).

Interviewee 42 (female, average achiever)

R: Investigate the society...8 theories-ok but methods not sure (Li, 2010).

This group reported a wide range of procedural knowledge. They seem to know how they know but are not consistent. The lower end of the average group tend to have less procedural knowledge but the upper end of the average group have a wider range of knowing how to know such as reading, rereading, making notes(especially short notes), and reading for understanding rather than just memorizing for the lower average achiever and low achievers. The upper average group has a higher awareness of knowing how to learn and thus has the capacity to regulate their learning more

effectively to increase their learning outcomes. Compared to the high achievers, their procedural knowledge is less extensive and intensive. Below are some interview extracts of average achievers:

Interviewee 10 (lower average achiever)

R: Flip through the text then make own notes and revise them but they are very long notes (Suk, 2010).

Interviewee 18 (upper average achiever)

R: Set the time at 5-8pm then I sleep and get up at 4-6 or 7 am to read again. I read Haralambos, summarize and write notes in half A4 paper size (Lynn, 2010).

Interviewee 19 (upper average achiever)

R: read generally, basic notes, messy maps, then read articles from news, I also observe and listen (Ira, 2010).

Interviewee 33 (lower average achiever)

Q: Do you know what kind of information is most important to learn?

R: Relating to topic...relevance –understanding (Kiat, 2010).

Interviewee 45 (higher average achiever)

R: I firstly read the lecture notes at home, then come to class and listen, reflect and ask yourself questions, test myself by open books (Tay, 2010).

Interviewee 49 (lower average achiever)

R: I read the Haralambos, a range of texts, then the CIE textbook, then notes. Seldom make notes. Take notes in class. Short notes (Min, 2011).

This group of students reported knowing some conditional knowledge of when and why they learn but these are limited in range. The lower average achievers reported hardly any conditional knowledge, and the higher average achievers reported more elaborate conditional knowledge such as varying their strategies before examinations, e.g., Jo and Seng changed their strategies according to the time gap from the major examination and the degree of urgency as the examination dateline come closer as reported in the interview excerpts:

Interviewee 21

R: I am not very discipline like my friends who can study for three hours, I only study when I got the mood. If I got the mood I can study the whole chapter. I tried before. Sometimes I feel guilty... I use the traffic lights as a guide. I learn them from a talk by my senior who is the best STPM scholar in high school who has writing difficulties... 100 days before exam, I can still relax, yellow light means more stress now that I have one month and red light means I have only one week before exam. Very near the exam, I will study. If the method or strategy is not functioning, then I will change. Yesterday I decided to study this

weekend. I forgot why but I got interested in the research project we are doing this week. If I find something, then I share with others .Sometimes I am motivated by the group, sometimes I motivate myself... I believe learning is for myself. I learn it because I want to know this. If green light, I go slow, if red light, then I study. When walking home I relate to my daily life (Jo, 2010).

Interviewee 27

R: Sometimes, making notes in own words, and concept maps.

Normal days, I go over essays and construct and deconstruct and reconstruct my own notes plus discussion with friends. A few days before exam, I will reread H....And one day before exam I will reread my own notes (Seng, 2010).

However, the lower average achievers have a low awareness of their conditional knowledge. They are not sure what strategies they have and when to use them. These can be seen in Kit and Ting's interview extracts below:

Interviewee 33

Q: Do you use different learning strategies depending on the situation?

R: Not really

Q: Do you know when each strategy you use will be most effective?

R: Not really (Kit, 2010).

Interviewee 38

R: Never (Ting, 2010).

In addition, there are average achievers, e.g. Ming, who knows why she learn and who possesses deep-processing strategies unlike Ching who have surface learning strategies and learn primarily for that single examination. Those average achievers with more elaborate conditional knowledge have higher metacognition awareness and are able to reflect on what, how, when, and why they need to change their learning strategies to improve their learning outcomes.

Interviewee 41(average achiever)

R: Before exam, I make sure cover everything, stick to the points and concepts. After exam, forget everything...(Ching, 2010).

Interviewee 49 (average achiever)

R: I have different strategies for different subjects. For sociology, reading and understanding, applying Korean culture, asks my dad for examples such as during class we learn about British Law such as abortion law...three months still legal. e.g. government housing for those with families (Min, 2011).

Interviewee 50 (high achiever)

R: strategies-basically, read then short notes on what I read, then I write out essay outlines. Imagine miniature outline in the head then read out (Oz, 2011).

Interviewee 51 (high achiever)

R: Yes, in terms of when approaching language based subjects, I need to do a lot of reading and for technical or calculative subjects, I need to do a lot of practice. Other than that, I'm not sure. Making notes-long not concise enough. Trying to simplify and take risks to let go (Reen, 2011).

4.4.1.3. High achievers' metacognitive knowledge

These students reported high declarative and procedural knowledge but average to high conditional knowledge. They were certain of their declarative knowledge and knew the content of this course well. When they were not sure, they will ask or seek information to fill this gap. Refer to interview excerpts below:

Interviewee 7 (high achiever)

R: AS (syllabus) very clear such as socialising, theories, methods, I read Tony Lawson, then read notes 3 to 4 times and go online for case studies (Yuan, 2010).

Interviewee 13 (high achiever)

R: AS (syllabus) no problem (Bill, 2010).

These high achievers reported high procedural knowledge. They could describe how they learn in detail. A few students were creative in their approach in studying for the course. The high achievers were aware of how they learn and were able to give reasons why they prefer certain procedures, e.g., Yee who preferred reading from the text for contextual understanding rather than lecture notes as seen from the interview excerpts below:

Interviewee 6 (High achiever)

R: I read, try to understand, just words that I read and think again. I make notes only on names and case studies as I forget them easily. I prefer reading the text for the contextual understanding rather than notes (Yee, 2010).

Interviewee 7 (High achiever)

R: I listen, read notes, read Tony Lawson, read workbook with colorful pictures and I do references for my notes with interesting facts, very brief notes from different perspectives. I know what is important and I select Q and Answers, write notes, and refer to content page (Yuan, 2010).

Interviewee 13 (High achiever)

R: listen in class, do essays, one essay a week or every two weeks. Points summed into notes i.e. one page in my notebook, prepare 1 page for case study, gender, youth subcultures. Most useful is the acronym SLEPT and PET-very useful for organizing every essay (Bill, 2010).

Interviewee 32 (High achiever)

R: I read briefly, then subtitle, then outline, key words. I make notes on areas I don't understand (Tara, 2010).

High achievers reported low to average conditional knowledge. They knew the content of their cognition and how to assess their cognition to apply them effectively in certain contexts and were aware of the reasons for applying them. Their work products showed relevant and meaningful applications of evidence such as theories, case studies, statistics and general cross-cultural examples to support their arguments.

Among the high achievers, six of them have some interesting ways of learning. Soo and Tara discussed their need to reflect or think constantly about when to apply different strategies, while Tai and Tara spoke about how they actively change their strategies when required. Soo, Bill, Tai, and Tara actively adapt their strategies according to time constraint as shown in their interview excerpts below:

Interviewee 1 (high achiever)

R: After trial, I will change my strategy. After trial, maybe one subject a day and try to reflect on what I learned, everything (Soo, 2010).

Interviewee 13 (high achiever)

R: Do notes, read notes, summarized teacher's notes, check against syllabus, modeling, look at heading and subheading of text. But closer to exam about 1 month, put more effort. Last 2 weeks I work harder (Bill, 2010).

Interviewee 29 (high achiever)

R: SPM- no strategies but A level, I am trying to summarize notes about not more than 10 sentences before tests. I think it works as my test marks has improved from 13 to 18. It was below average in SPM (Tai, 2010).

Interviewee 32 (high achiever)

R: If more time, I read the main text, if less time then notes. I can motivate myself to learn when I need to.

Q: Do you know when each strategy you use will be most effective?

R: Listening in lecture and thinking constantly about what I learn (Tara, 2010).

4.4.2 Metamotivators (MM)

In this study, high achieving students who are good at regulating their cognition are seen planning the tasks for cognition and they possess very positive self-motivational beliefs. Task analysis consists of strategic planning and goal setting such as how much they need to read or write. Whereas self-motivational beliefs such as self-efficacy or self-control, outcome expectations, intrinsic interest or value of tasks and

goals orientation are the underlying metacognitive motivational drive to regulate cognition. Metamotivator could be said to be the mediator between knowledge of cognition and regulation of cognition.

4.4.2.1 High achievers and their metamotivators

Many high achievers reported high self-efficacy but realistic self-control beliefs to achieve their learning goals or targets. They are intrinsically motivated to achieve their goals, and set challenging goals that drive them to excellent performance. These high achievers engaged in flexible goal setting and changes, and adapt as the course progresses whereas low achievers rarely plan any schedule for learning. High achievers dislike fixed plans whereas low achievers do not plan at all. Their self-efficacy beliefs can be shown from the goal set in terms of the grade that they intend to achieve in the course. They have realistic and accurate judgment of the amount of control they currently have over their learning and how much more they have to put in to achieve their goals. Their goals drive them towards high performance. Below are interview excerpts from A* students:

Interviewee 13

Q: Do you have control over how much you learn?

R: depends on mood, I read and write notes

How well do you think you will perform in the course?

R: Bt to A, enough control. (Bill, 2010).

Interviewee 36

Q: Can you finish work on time?

R: If I sit down, I will do (Mala, 2009).

Interviewee 50

Q: Do you have control over how much you learn?

R: yes, when i do sit down. Last minute study-conditioned in the past.

Q: How well do you think you will perform in the course?

R: A* (Oz, 2011).

Interviewee 32

Q: Do you have control over how much you learn?

R: Yes, finish homework, the revise. I spent about 2-3 hours a day studying.

Since myroom-mates ask me a lot of questions about their study and this semester, I get toknow them better, we talk a lot. So I cannot focus, so I find an empty room in thecollege to study after class

Q: What do you experience when taking tests?

R: Some anxiety as I need to succeed. I feel stress as I have high expectations. I need to get at least a 17/20 for each test. (Tara,2010).

Interviewee 37

Q: Do you have control over how much you learn?

R: Never thought about it.

Q: How well do you think you will perform in the course?

R: A plus (Bee, 2010)

Interviewee 48

Q: Do you have control over how much you learn?

R: yes, I can finish what I set out to do.

Q: How well do you think you will perform in the course?

R: at least a B (Mira, 2010).

Interviewee 1

Q: Can you finish work on time?

R: Yes

Q: Can you study when there are other interesting things to do?

R: Yes, if I got interest, I can really, really concentrate.

Q: Do you arrange a place to study at home where you won't get distracted?

R: Yes, I am renting an apartment here, won't get distracted...no TV.

Q: Can you motivate yourself to do schoolwork?

R: Yes

Q: Do you have control over how well you learn?

R: yes, if more time, I read the main text, if less time then notes. I can motivate myself to learn when I need to (Soo, 2010).

Interviewee 52

Q: Do you have control over how much you learn?

R: yes.

Q: How well do you think you will perform in the course?

R: I think I will do fairly well (Lund, 2011).

4.4.2.2 Low achievers and their lack of metamotivators (MM)

Low achievers reported negative or low self-efficacy, and unrealistic self-control beliefs about themselves. They 'hoped' for better grades but did not regulate their learning habits to enable them to achieve their goals as can be seen from their work products in their portfolio. They were unable to motivate themselves into behavioral actions to achieve their goals. Below are interview excerpts from the low achievers:

Interviewee 11 (female)

Q: Do you have control over how much you learn?

R: last time but not now. I am trying as it is time to be serious.

Q: How well do you think you will perform in the course?

R: D for Trial. I hope for a C. (Leng, 2010)

Interviewee 12(female)

Q: Do you have control over how much you learn?

R: Not really

Q: How well do you think you will perform in the course?

R: Trial D, now hope for B. (Angie, 2010).

Interviewee 14 (female)

Q: Do you have control over how much you learn?

R: Yah, but sometime doesn't work.

Q: How well do you think you will perform in the course?

R: C/B. I will try my best. I regret I didn't work hard before. My parents especially my mum but not much. She said if I want to afford better things (Christie, 2010).

Interviewee 17 (male)

Q: Do you have control over how much you learn?

R: No, sometime is no time, sometime no effort...whether I want to or not...I get easily distracted as there are many ideas running through my head.

Q: How well do you think you will perform in the course?

R: above average (Faz, 2010).

Interviewee 25 (male)

Q: Do you have control over how much you learn?

R: No, I don't study.

Q: How well do you think you will perform in the course?

R: I think I am the weakest in the class. And I need to be told what to do (Brandon, 2010).

These students have very varied answers when asked if they have control over how much they learn or how they will perform. Their self-efficacy and self-control beliefs varied from very high to very low. They are still unaware of their potential to learn. They are unsure about their self-efficacy beliefs and have inaccurate self-control beliefs about themselves. They are still in the stage of self-discovery throughout the coursework and changes their perception as they moved from one semester to the next as can be seen from their second interview in the second semester. Those who have achieved some successes in their learning tend to regulate themselves more and are more motivated during the course. However, those who failed to achieve any learning gains developed negative perceptions about themselves. Only a few students who did not perform in the first semester were able to take up the challenge to improve themselves and seek help. There were also students who did well initially but were not consistent in their regulation and faltered by the second semester.

4.4.3 Metacognitive Regulation (MR)

Five main components of regulation of cognition are categorized and analyzed below to give a clearer picture of the differences in how high and low achievers regulated their cognition. They are: planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation. In general, many low achievers have no planning, poor information management strategies, poor comprehension monitoring, few or no debugging strategies, and no evaluation at all. On the other hand, high achievers have flexible plans, good information management strategies, good comprehension monitoring strategies, some debugging strategies, and frequently evaluate their cognition through constant reflections.

4.3.3.1 Low achievers' metacognitive regulation

Firstly, among low achievers there are some who plan and many who do not plan. There are also students who plan but failed to regulate their plans. They gave up easily if they could not perform a task at a first attempt. They did not plan because they have no conceptual knowledge of what strategic or tactical planning involves. They said they did not know how to get started. They lacked content and procedural knowledge as they have never accomplished anything successfully. They have no role model to observe and imitate how to successfully plan. Examples of low achievers interview excerpts on planning:

Interviewee 25

R: No plan (Brandon, 2010).

Interviewee 39

R: No if I plan, I sometime don't do it. I do what I can (Ling, 2010).

Interviewee 44

Do you plan before you start studying?

R: I do timetable but for first two weeks after that I forget about it... no control (Meng, 2010).

Interviewee 2

R: I do, but I don't know if I can overcome my procrastination. I need some stress to get going or maybe a dateline coming.

Q: Do you plan before you start studying?

R: No (Ying, 2010).

Interviewee 20

R: Sometimes I plan (Jenny, 2010).

Interviewee 46

R: No plan. If you plan, then it doesn't work. If want to study...sometimes you can study longer (Joey, 2010).

A few students below reported high level of planning but they did not have any or much work products to show. They were only able to complete a few work products as shown in their collection of student portfolio. Their work products were brief and were of poor quality. They had difficulty regulating their study habits productively.

Interviewee 30

Do you plan before you start studying?

R: Yes, I study which chapter, then set some questions and try to answer them. I use this method since primary school. I set questions and then try to answer them (Vicky, 2010).

Interviewee 34

Do you plan before you start studying?

R: Plan what subjects then what topic. Minimum about 2 hours a day during lunch and at night (Rav, 2010).

Interviewee 35

Do you plan before you start studying?

R: plan a lot. I am an obsessed planner. Make a list every morning and finish what I intend to do everyday (Lew, 2010).

Interviewee 44

Q: Do you plan before you start studying?

R: I do timetable but for first two weeks after that I forget about it... no control (Meng, 2010).

Secondly, low achievers reported a few information management strategies. Even when they have applied some strategies successfully, they could not remember which strategies work before. One student, Sam stated that he applied many strategies before but did not know what works as he could not remember which strategy he applied. He had not kept track or reflected on the strategies. A few students when interviewed said they have no strategies but found they had a few during the interview. They did not know what they know. There was no cognition of information management strategies as they have not thought about it before. They have used strategies without any awareness. Many low achievers have not thought about their

study strategies or were not given opportunities to reflect on them. They have low levels of self-knowledge.

Low achievers were not motivated to learn about what they learn and how they learn. They did not put in effort to highlight important facts. They said that they tried to read from the beginning but had difficulty understanding and gave up easily. They just attended class, believing that their physical attendance in class was enough. Many of them did not take down notes during class too and do not read ahead or after class. They did not process the information learned in class or through their reading sessions. They did not like to take notes nor simplify, summarized and translate into their own words as it takes too much time and effort. They are surface learners who did not construct any notes. Fay, Tan, and Brandon disliked making notes rather than lacked the skills of notes construction. They lacked the will to regulate their cognition thoroughly.

This could be due to difficulties faced by low achievers as they lack proficiency in the English language. Two students said when they studied they think in Chinese when they studied, and try to interpret in Chinese when the medium for instruction and examination was English. They had difficulty in doing well in written English examinations too. They could not process the information learned effectively and efficiently due a lack of motivation aggravated by a lack of language and reasoning skills. They seem motivated at the beginning of the course but as their level of understanding and interpretation of the course materials is hampered by their lack of proficiency in the English language, the spiral of de-motivation set into place.

One girl who was doing very well on assignments and projects did badly in her AS finals examination. She came to be interviewed using the PAI protocol and realized that although she studied hard for the exam she could not remember much for the exam and faced time constraint. Her weakness in her learning strategies was that she took down notes directly in long sentences from the text without processing deeper in her

own words, and thus found it difficult to reproduce in the final examinations. This case showed the importance of information processing strategies in coping with the subject.

Low achievers reported unwillingness or were unable to take risks to select relevant information to construct concise notes. When asked why they refused to summarize and simplify, a few low achievers stated they were afraid that they might choose the wrong ideas so they try to study everything. They were not rational calculated risk takers. They did not know how to select what was important.

Thirdly, low achievers reported few comprehension monitoring strategies. They rarely use the strategy of asking or answering questions. It could be due to prior negative experiences of asking questions. This has reinforced their low self-efficacy beliefs or they just do not have enough knowledge of cognition to know what and how to ask questions. Low achievers' poor judgment of learning or lack of evaluation skills made it difficult for them to use this as a strategy to monitor their comprehension. Low achievers hardly translate or construct notes.

During the interviews, low achievers could not describe in detail how they know that they understand what they read or studied. A few interviewees said they just knew that they understand but could not describe how they know. If they did not understand, they just gave up trying. They did not ask themselves or others questions and they do not try to answer questions in class or after class. They did not create opportunities to find out if they know, but need hand-on tasks such as formative assessment to find out how much they know. They are externally controlled and leave their chances of knowing to others like the teachers to scaffold for them. They are not intrinsically motivated to self-regulate themselves as they find the progress is slow and they are easily demotivated and give up easily, i.e., they lacked patience and perseverance. They have difficulty regulating themselves and are not motivated. They have low self-efficacy and low self-control beliefs. They did not listen actively in class for guidelines and refused to take down any notes and even construct their own notes.

When they managed to write notes, they tend to write lengthy notes. They have a heightened fear of failure and did not want to be embarrassed in giving wrong answers in class. Low achievers did not volunteer to answer questions to check their comprehension, e.g., one interviewee asked the teacher not to ask her question in class for fear of embarrassing herself in front of her peers. Their ego and low self-concept are barriers to positive learning experiences as they did not try out their ideas in class. They faced anxiety in class and exam. Learning was not an enjoyable experience for them and this created the cycle of learned helplessness. They cannot help themselves and refused to seek help for themselves.

Thirdly, low achievers reported low on debugging strategies. They have poor judgment of self-knowledge and since they did not know what they know or did not know, they did not think there is a need to debug. They tended to overrate their motivation and metacognition scores and have unrealistic assumptions and expectations of their ability and effort.

When asked what they would do if they did not understand, they said they would ask questions. But the problem lies in that they asked those who knew even less than them. One girl said she asked her much younger brother, and another two boys asked friends who were doing just as poorly, and one even asked friends who did not take the subject and have no prior knowledge of the subject. They have vague debugging strategies, and used the same strategies that did not work before. They did not think of changing their learning strategies according to the problem.

Many low achievers showed unwillingness to change their learning strategies and are risk-averse. They did not select what is important to learn, overload their memory with irrelevant facts, ended up more confused than ever, and experienced time constraint during examinations. Very few low achievers go through the process of reflecting constantly, monitoring their own progress accurately, or evaluating their work and finally change their strategies. They need to be made aware such as through the

interview protocol and after much persuasion from the instructor. Only then did they consider changing their strategies as they attributed their lack of performance on external factors such as poor memory, language difficulty or unmanageable textbooks. Refer to interview excerpts below on debugging strategies on students' willingness and unwillingness to change strategies. Many of the low achievers reported that they did not like to ask questions either from themselves or others as can be seen from Tan's interview excerpts below:

Interviewee 5 (low achiever)

Q: Do you try to summarize what you learn?

R: yah, in my head. I do not write down (Fay, 2010).

Interviewee 9 (low achiever)

Q: Do you try to summarize what you learn?

R: Yes, ... visualized the points in my mind but I rarely write down anything.

Q: Do you change your learning strategies when you don't understand?

R: No, I read, understand then solve past years. Cannot solve go back to read

Q: Do you ask yourself if what you are reading is related to what you already know?

R: No

Q: Have you ever thought about this type of thinking before?

R: No (Tan, 2010).

Fifthly, low achievers rarely evaluate or have poor evaluative skills. Many low achievers quickly attribute their poor performance to external factors beyond their control such as poor classroom climate or born with poor memory. Fay, Tan and Brandon repeatedly emphasize on their poor memory as a weakness. Their low self-control beliefs prevented them from striving to do better. They accepted the teacher's notes or textbook without asking questions and disliked processing the information learned. They did not know what they know and did not know what is important to select. Even when they reported that they had spent time and effort thinking, the quality of their evaluation is poor or negative about themselves. Refer to interview excerpts below:

Interviewee 4 (low achiever)

Q: How often do you think about your studies?

R: Few hours a day near exam and less before exam (Sam, 2010).

Interviewee 9 (low achiever)

Q: What do you know about your own thinking?

R: No idea

Q: How often do you think about your studies?

R: Not consistent (Tan, 2010).

Interviewee 12 (low achiever)

Q: Do you evaluate what you learn?

R: No (Angie, 2010)

Interviewee 43 (low achiever)

Q: Do you evaluate what you learn?

R: Most of the time...theories weakest...methods okay easier (Ash, 2010).

4.4.3.2 Average achievers' metacognitive regulation

Firstly, average achievers metacognitive regulation consisted of some fixed planning to no planning. Suk, Sef, and Li who did not plan to regulate their learning did not achieve much learning gains. While Seng, Tim, Kiat, and Ken who did some planning managed to regulate their learning and made the most learning gains. They showed improvement in their work and their grade improved from C or D grades to a final B grade. When they were asked, Q: Do you plan before you start studying? They said:

Interviewee 3

R: try to finish one chapter a day just before final exam. Got time if not yet exam period (Ken, 2010).

Interviewee 23

R: Yes. I do but how much depends sometimes in terms of pages until the subtopic ends (Tim, 2010).

Interviewee 45

R: no...but I plan daily what i want to complete (Tay, 2010).

Interviewee 27

R: This semester more on a daily basis about four-five hours per subject. I am quite flexible, sometimes at least one hour (Seng, 2010).

Secondly, average achievers have few information management strategies ranging from clear to unclear learning strategies. The average achievers who achieved the most learning gains have optimal and concise strategies such as active listening in class, understanding key concepts, taking risk to reduce their notes by translating and summarizing them into their own construction of meaning. These are the average

achievers who managed to get the higher end grade: B or B+ such as Shana, Ira, Jo,

Tim, Seng, and Kiat:

Interviewee 8

R: Write it down, put in my own words (Shana, 2010).

Interviewee 19

R: internet, google research and visualized in the head

Q: What is your strength in learning strategies?

R: My brother said I have strong opinions. I pay attention and listen to understand in class. I cope well in the subject as I shared the same ideas as many of the theories especially Marxism. I find my opinions on many things proven (Ira, 2010).

Interviewee 21

R: Focus my attention on important information, then I reflect the whole week and try to relate what I learn daily. I use symbols to remember. I try to translate into Chinese. During lecture, I translate automatically in Mandarin. I need to imagine and visualize in words and numbers. I see in Chinese words. Not in color. I also use the organizational structure of the text to help me. I refer to the text when writing essay. I know if I am reading what I already know. I break down the topic into smaller steps if I am interested in the topic. I focus on overall meaning and sometimes in specifics when I am interested (Jo, 2010).

Interviewee 23

R: listen and try to understand (Sef, 2010).

Interviewee 27

R: Sometimes, making notes in own words, and concept maps (Seng, 2010).

Interviewee 45

R: write in the notes...cut short into key words...learn from Tim (Kiat, 2010).

A few average achievers did not manage to achieve much learning gains as their information management strategies were unclear, unsystematic and overloaded such as Cindy and Shan. Their performances were better in the first semester than the second semester as they used too elaborated learning strategies that have overloaded their memory span. Cindy was unwilling to change her overly detailed approach as she felt less confident if she made too concise notes. Her notes were lengthy and were not suitable for examination condition type of syllabus. Shan's too complicated strategies as reported below were not suitable for examination as there were time constraint and memory factors to consider.

Interviewee 18

R: I visualized in the mind, and think about them. Sometimes as long as half an hour and try to translate the words (Cindy, 2010).

Interviewee 31

R: I slow down, pay attention on important information, focus on meaning and significance of new information. I create my own examples and use mindmaps. I try to translate new information into simpler terms. I scan the content page but I do not ask if what I am reading relate to what I already know. I reflect 4-5 minutes after each lesson.

Q: Are there any changes in your learning strategies since the first interview?

R: a little bit, tend not to concentrate, have to read again waste time. So I experimented. I find then when I read and write together, I can remember better and then open back for review for about two times and just before sleeping. Last time, I read and understand. Now I read and understand and write. I write notes and then shorten them into one word for branching out in my mindmap. I do mindmap for sociology and law. I find reducing my notes have helped me a lot. I remember key words and link into favourite songs and tune and substitute important key concepts into songs. For example for the effects of balance surplus and deindustrialization I chose the Kiatlor's Swift song and change the score words to 'we were both young when there was DI. The tune was fast can catchy to remember' (Shan, 2010).

Whereas Tim said that he preferred to read and reread rather than making notes and just reading from his notes for the final examination as each reading gives him a different perspectives. This is an interesting point as most students just revised from their summarized notes to save time. This raised the question whether reading and making new notes each time is better as one can gain new perspectives but of course this strategy will be very time consuming. He preferred rereading rather than making notes to get a different perspective each time he reads as one tends to miss out something in the first reading. But rereading the text a second time will take more time. In terms of time management, Tim will have to rethink his strategy. This probably caused him his A's in the final examination. He managed to obtain a B in the final examination of the course. Below is his rationale for preferring to reread from the text rather than making notes.

Interviewee 23

Q: Why do you not make notes for Sociology?

R: I prefer reading and rereading as I can get a different view each time. Each time I reread, I can find out parts where I missed before. If I read from notes make the first time it is not the same. For this subject I prefer to read and reread many times until I understand (Tim, 2010).

Thirdly, average achievers shared similar comprehension monitoring strategies as the high achievers such as asking or answering questions, translating and constructing own notes as seen from the interview excerpts below:

Interviewee 3

R: Ask friends and sometimes ask teacher if my friends cannot help me (Ken, 2010).

Interviewee 21

R: Ask for confirmation from friends, teachers, internet. Even when I can do, I still need to ask for confirmation (Jo, 2010).

Interviewee 42

R: I can explain everything and apply sociology to family members... my second brother...teach me to ask tough questions in class (Li, 2010).

Interviewee 15

Q: Do you try to translate new information into your own words?

R: Yes (Flo, 2010).

Interviewee 23

R: If I can speak it in my own words and translate into my own words. Or if I can explain to others in words (Tim, 2010).

Interviewee 8

R: When I reflect, and can put in my own words as I read along (Shana, 2010).

Average achievers usually checked what they are not sure with other sources such as teachers, peers, books, world-wide web, parents, or other sources. Low achievers hardly used this strategy. Even when low achievers do check what they know, they asked sources such as friends who do not take the subject or are very weak in the subject. Below are some interview excerpts from average achievers who seem to prefer this checking strategy. The constant checking is a sign of low self-efficacy or a lack of confidence.

Interviewee 31

R: When I can apply information by writing down so that I can concentrate. I regularly pause to check my comprehension. Yes, I ask myself questions about how well I am doing while learning something new to best theby the bull (Shan, 2010).

Interviewee 27

R: Checking from CIE , Haralambos, call Tim or Qi Tai or internet. Sometimes go back and reread the highlighted section when I make notes earlier. Same method as SPM (Seng, 2010).

Interviewee 21

R: Ask for confirmation from friends, teachers, internet. Even when I can do, I Still need to ask for confirmation (Jo, 2010).

Fourthly, average achievers have moderate debugging strategies. A popular debugging strategy for average achievers was asking questions. Debugging strategies involved a two-way interaction or communication of seeking information from other sources like friends, teacher, dictionary, and internet as illustrated in the interview excerpts below.

Interview 3 (average achiever)

R: Ask friends and sometimes ask teacher if my friends cannot help me (Ken, 2010).

Interviewee 16 (average achiever)

R: Ask friends, check dictionary, go back and change assumptions if cannot solve and find the source of my not being able to solve (David, 2010).

Interviewee 21 (average achiever)

R: Ask for confirmation from friends, teachers, internet. Even when I can do, I Still need to ask for confirmation (Jo, 2010).

Interviewee 42 (average achiever)

R: I can explain everything and apply sociology to family members... my second brother... teach me to ask tough questions in class.

Q: What are your current strategies for the coming examination?

R: Try to do past years, understand notes and tests, explain to myself everyday....10-15 mins after college. Ask friends difficult questions (Li, 2010).

Interviewee 32 (high achiever)

R: Ask friends, lecturers, seek answers in other sources such as textbook, or internet.

Q: Do you have control over how much you learn?

R: Yes, finish homework, the revise. I spent about 2-3 hours a day studying. Since my roommates ask me a lot of questions about their study and this semester, I get to know them better, we talk a lot. So I cannot focus, so I find an empty room in the college to study after class.

Q: What did you learn about your learning strategies from this session?

R: I need to ask questions and not just answer questions. Need to sleep more (Tara, 2010).

Interviewee 36 (high achiever)

Q: Do you use strategies that have worked in the past?

R: Yeah, like doing revision. Looking at questions and doing the questions. If I don't know I look at the marking scheme (Mala, 2010).

Another commonly used debugging strategy reported by many average achievers was rereading. They reported that just by rereading they were able to debug

what they did not understand earlier. They showed persistence in their regulating of their comprehension even if they had to reread multiple times as seen from the interviews below:

Interviewee 8 (average achiever)

Q: Do you change your learning strategies when you don't understand?

R: I read, reread a couple times about 3-4 times. I ask somebody depends on reliable friends and teachers. No, just reread a couple of times to understand (Shana, 2010).

Interviewee 32 (average achiever)

Q: Do you stop and go back over new information that is not clear?

R: reread until I understand (Tara, 2010).

Interviewee 33 (average achiever)

Q: Do you stop and reread when you get confused?

R: Yes, read until I understand, then ask questions...sometimes 5 times or more than 10 times (Kit, 2010).

Furthermore, a few average achievers shared the willingness to take risks to change learning strategies. Some of the changes in learning strategies consist of reading to remember to reading to understand; unwillingness to make notes to willingness to make notes; making long notes to concise notes to reduce memory overload; changing learning environment from home to staying outstation near college, switching to another peer group; and changing text books from larger to thinner ones.

It is also interesting that Tim said he did not like making notes as he preferred reading from the text. Each time he reread the text, he obtained a new insight on meanings he had missed out in the last reading. He preferred rereading from the text rather than from notes. But by not following thorough with his own construction of notes he may have lost the chance to practice his writing skills. His reason for not reading from notes is sound but he could have make notes from each reading and compare them to check for memory and improve his information processing strategies. After he changed his learning strategy in the third semester, his grade improved from a C to a B. Students who refused to change their procedures of knowing either through lack of awareness or unwillingness to change will probably remain in the same level of academic achievement. Refer to Tim's interview excerpts.

Interviewee 23(average achiever)

Q: Why do you not make notes for Sociology?

R: I prefer reading and rereading as I can get a different view each time. Each time I reread, I can find out parts where I missed before. If I read from notes make the first time it is not the same. For this subject I prefer to read and reread many times until I understand (Tim, 2010).

Interviewee 18 (average achiever)

R: When I read, it didn't work and when I make notes also didn't work. Now I Write essays and look at past year questions. Previously before trial I completed 5 essays, now I have done eleven. I can recall and apply better now (Lynn, 2010).

Interviewee 19 (average achiever)

R: I read Haralambos to look for applications as I am rather weak in them. I now read to understand and go on line to check if I find some interesting things. I add notes to teacher's notes rather than make my own. I find my knowledge in methodology is weaker especially in case studies so I am now reading them up (Ira, 2010).

Interviewee 21(average achiever)

R: Yes, I am very excited and thinking lot about sociology. I feel very satisfy when I can write two pages. Although I am not good in the English language. My methodology chapter is better than theories. Before, I would type my notes directly into my computer. But I found I am not strong in holding in what I wrote in memory. Just before the trial exam, I wrote one essay in point form and I found during the exam I can write, infact too much until I took too much time for the first exam paper until I had only 20 minutes left for the second question. I scored 72 for first semester and 76 for the second semester. Before I used to type straight into the computer but during the first semester I know something not quite right. Now I write an essay twice over. Once into the computer then I will rewrite by hand. I find I can remember better and know more. My brother challenged me by saying I should not take this subject. Just before I rewrite by hand, I don't feel the time constraint as I can write more and faster. When I type I don't realize the time constraint as I type fast. I thought this new strategy will work and it works for the trial exam (Jo, 2010).

Interviewee 42 (average achiever)

R: Try to understand this semester as last semester I let it go last semester. I want to get a good result and sociology is good and I want to know more and more (Li, 2010).

Interviewee 31 (average achiever)

Q: Are there any changes in your learning strategies since the first interview?

R: a little bit, tend not to concentrate, have to read again waste time. So I experimented. I find then when I read and write together, I can remember better and then open back for review for about two times and just before sleeping. Last time, I read and understand. Now I read and understand and write. I write notes and then shorten them into one word for branching out in my mindmap. I do mindmap for sociology and law. I find reducing my notes have helped me a lot. I remember key words and link into favourite songs and tune and substitute important key concepts into songs. For example, for the effects of balance surplus and deindustrialization I chose the Kiatlor's Swift song and change the score words to 'we were both young when there was DI.

The tune was fast and catchy to remember' (Shan, 2010).

Fifthly, a few average achievers reported they evaluated what they learn but some did very little evaluation. Refer to interview excerpts below:

Interviewee 24 (average achiever)

Q: Do you evaluate what you learn?

R: Not really (Sef, 2010).

Interviewee 27 (average achiever)

Q: Do you evaluate what you learn?

R: Seldom (Seng, 2010).

Interviewee 31 (average achiever)

Q: Do you evaluate what you learn?

R: Yes, Marxism is my strongest while Postmodernism is my weakest (Shana, 2010).

4.4.3.3 High achievers' metacognitive regulation

Firstly, high achievers preferred a flexible plan and they did manage to accomplish the planned objectives. They allowed themselves some room for changing their study schedule. They disliked fixed study timetable. Their need for freedom to study when and where, and how long was important to a successful session. Many did it out of habitual practices. Somewhere in their younger days, their parents or schooling had reinforced the need to study regularly. They would get it done somehow. This relates strongly to an earlier point on the need to socialize or train such habits until automaticity is acquired. Many high achievers might have been trained in such study habits from a young age. Further and more in-depth study in this area will enlighten us on this.

Many high achievers used examination datelines as an external social control to guide their planning for how fast and how much they have to study. They kept the examination schedule as an end in mind and varied their study schedule accordingly as discussed earlier. Among the high achievers, many had some plans of when and how much time and effort were needed but they preferred a flexible plan. They found that a fixed plan is constraining and gives them more stress. They were satisfied if they were productive in their study sessions. Many students interviewed said they preferred a

more flexible approach to their study habits. A few male high achievers said that they do not have a plan but that they regularly study for about two hours. For male students, it seems cool to say that they do not have a fixed plan and they just study regularly for a short period of time consistently. They differentiated between the meaning of a 'plan' and just studying regularly out of habit. Studying regularly is more of a habit from earlier childhood conditioning rather than part of any metacognition or cognitive exercise. You just do it and there were not any elaborate plan before settling down to study. Or could it be that the plan had become automaticity and they need not think about it anymore. On the other hand, female students tend to have a more elaborate or specific plan. Could this be due to gender socialization?

When questioned if they plan before they start studying, high achievers said the following:

Interviewee 13

R: Never, once a week, I study one-two hours per week to regulate (Bill, 2010).

Interviewee 29

R: Yes, according to topic and subtopic (Tai, 2010).

Interviewee 1

R: yes, many plans, academic get a in all my subject, do well in my piano, degree masters and PhD in Music

Q: Do you plan before you start studying?

R: I set a target such a topic to complete. I definitely finish the topic after three-four hours. I asked myself what I have learned after every topic of revision (Soo, 2010).

Interviewee 32

R: Sometimes, I have a timetable but don't follow exactly. I spent about two-three hours a week per subject (Tara, 2010).

Interviewee 37

R: Yah, I plan in my mind. I arrange some time. Not every day. I finish three tasks a day. One chapter a day for each subject. About two hours per subject so about six hours a day from 5-11pm per day (Bee, 2010).

Secondly, high achievers reported good information management strategies.

High achievers have high self-efficacy beliefs and were willing to take risks to simplify and summarized their notes. Learning involves some risk-taking. High academic achievers were willing to take calculated risks in selective exposure, selective

perception and selective retention in constructing their own notes concisely. High achievers are active learners who are more willing to take rational calculated risks in their learning. They are willing to let go and cut out irrelevant and peripheral facts until their mental schemas become as concise as possible. Through risk taking behavior at trial and error learning experiences, they have more accurate judgment of their learning. They were constantly looking for mental shortcuts. One student even said that he was able to reduce everything for the AS exam into two acronyms: SLEPT (social-cultural, legal, economic, political, and technological factors) and PET (practical, ethical, and theoretical factors) and he managed to score all A's in his final examination. This tells us the need for a mental schema or holistic framework before in-depth facts can be retained for long. High achievers acquire very stable mental models of the lessons and are able to retrieve them easily. These mental models are quite stable over time and help to reduce the stress under examination condition.

Interviewee 7 (female, high achiever)

R: I have changed my strategies. I now make notes about four pages per topic in point form, very colorful from Steve Chapman text.

I study for about two hours a day per subject. I read and memorize the facts. I read for the concept and then reread to remember. I form acronym such as e.g. VIOS or CIRRR those taught in class, none of my own (Yuan, 2010).

Interviewee 13 (male, high achiever)

Q: How do you study for this course?

R: listen in class, do essays, one essay a week or every two weeks. Points summed into notes i.e. one page in my notebook, prepare 1 page for case study, gender, youth subcultures. Most useful is the acronym SLEPT and PET-very useful for organizing every essay.

Q: How do you manage new information during the course?

R: I make my own notes in outline form and to prepare for finals I read and reread. For the coming trial I expect a B but for the finals an A. I study according to section and split them into smaller topics such as definition of family, functions or roles of family and so forth. I think I have enough notes about one page and I apply them. I write it out and I use the acronym SLEPT to help me organize my answers (Bill, 2011).

High achievers were also willing to highlight, visualize and construct their own notes. A few of them tried to hold the points or ideas in their mind and visualize them in their head. They tried their best to simplify into their own words and created their own

examples or songs to help themselves understand, relate and remember. They were willing to do extra mental processing of new information received to allow assimilation and accommodation. A few even tried applying what they learned to everyday events to help them understand and remember for the long term. The very high achievers process the new information many times until it 'makes sense' and 'stick in their memory'.

When that happened, they would have achieved mental equilibration.

Interviewee 6 (female, high achiever)

Q: Do you change your learning strategies when you don't understand?

R: I reread sometimes I look up the meaning but I find it more consuming. I usually do 3 readings until the thing really 'stick' in my head (Yee, 2010).

A few students revised as many as ten times, and some until they understand through reading and rereading. Many high achievers such as Yee stated that, just by reading and rereading a few times, she was able to understand better.

There are two types of high achievers distinguished from the interview data. They are the Concise Type I achiever and the Detailed Type II achiever. The Concise Type I achiever goes for the forest view or helicopter view of the whole topic or sub-topic or syllabus. These are the care-free type and rational calculated risk-taker who enjoys learning as they are not overloaded with too much declarative knowledge. They are independent and they know how to get more data when necessary. They have good procedural and conditional knowledge. The Detailed Type II achiever goes for the trees. Type II achievers have the need to accumulate as much facts as possible and they are not risk-takers at all. They are always worried that they do not have enough declarative knowledge to work with. They come under a lot of stress and do not enjoy learning as much as the Concise Type I achiever. They are willing to commit more time and effort at creating the whole picture from the multiple facts accumulated. They have very neat and detailed notes summary, and tried not to miss out anything.

The Type I high achievers are creative, critical and concise information management strategists. As their approach to information management is concise since they go for the key concepts and ideas, they have more time for reflections and critique.

They tend to produce more creative ideas. The Type II high achievers are more systematic and detailed in their information management. They tend to complain of lack of time to get everything in order and lacked time for further in-depth reflection to produce new and creative ideas. They stick closely to the syllabus taught.

One of the most important attribute of high achievers is their ability to be attentive in class through active listening. This allows them a starting point as active listening provides them the guide to selective exposure, selective perception and selective retention of key information later on in the process. Presence of mind is the key ingredient to regulation of cognition. Being aware and consciously attending to current information is crucial to accurate judgment and decision-making of what is important to select for exposure and retention when they study on their own later on. The following are interview excerpts from high achievers.

Interviewee 6

R: I think about it a lot, during class, I listen and pay attention then I go home and try to understand further (Yee, 2010).

Interviewee 7

R: No, only think, listening and understanding what I study (Yuan, 2010).

Interviewee 36

Q: Do you consciously focus your attention on important information?

R: yah, points for multiple use (Mala, 2010).

Many high achievers processed the information in extensive and intensive ways. They practiced selective exposure, selective perception and selective retention of key concepts and ideas. First, they select what content to expose themselves too. Then they try to visualize it in their minds, and organize them in some written form. They will slow down to highlight keys points. Bee even compared them to her prior knowledge. While another high achiever, Tai tried to challenge what he read and critiqued what he read. A high achiever, Tara categorized and broke down the concepts into parts in her mind, and then wrote them out briefly. She sometimes uses the organizational structure of the text to help her learn. A few high achievers go quite deep in their processing to

the point of looking for mental shortcuts such as organizing new information into mind maps, jokes, or acronyms that help them remember.

Interviewee 32

R: I categorize, breakdown the concepts into parts in my mind, then write them out briefly.

Q: Do you use the organizational structure of the text to help you learn?

R: Yes, sometimes (Tara, 2010).

Interviewee 36

Q: Do you create your own examples to make information more meaningful?

R: yes, I play it my mind, I won't write

Q: Do you draw pictures or diagrams to help you understand while learning?

R: No, I just write out the names (Mala, 2010).

Interviewee 29

R: I absorb, understand, and then counter it and try to critic them (Tai, 2010).

One of the key information management strategies of high achievers is to construct their own notes rather than taking down teacher's or others' notes. They take rationally calculated risk in selecting key concepts or ideas to be included in their notes. They simplify and summarize their notes. They are willing to think about the ideas for long period of time and translate them into their own words. This helps them to remember better. The high achievers would refer to the content page, title, subtitle, teachers, peers, or syllabus for a guide as to what to include in their notes. The high achiever said they listened actively in class, and from there they know what to focus on and select facts or concepts for construction of their notes. Only two high achievers, interviewees Yee and Mala, said they do not like to write down notes but they compensate it with other strategies such as reading and rereading the text so that they can elaborate in detail. Both Yee and Mala enjoy learning and prefer writing essays rather than notes. Below are the interview excerpts of high achievers when question: Do you try to translate new information into your own words?

Interviewee 29

R: Summarized in point form, then I go back and rewrite and add to my notes from the text that I read. I find that by replaying in my mind my lessons, it helps to go straight into my brain (Tai, 2010).

Interviewee 32

Q: Do you try to summarize what you learn?

R: Yes, I try to simplify in my own words constantly. I did that for 'sejarah' (history) but it is more difficult for sociology as 'sejarah' I can see the sequencing or level of the events and do conceptual maps (Tara, 2010).

Interviewee 36

Q: Do you focus on the meaning and significance of new information?

R: sometimes

Q: Do you create your own examples to make information more meaningful?

R: yes, I play it my mind, I won't write

Q: Do you draw pictures or diagrams to help you understand while learning?

R: No, I just write out the names

Q: Do you try to translate new information into your own words?

R: Yah, I don't write. I translate in my mind in my own words.

Q: Do you try to break studying down into smaller steps?

R: at times, if it is too bulky, I make sure I go through all the past year questions. For trial I didn't do family so now I focus it. Now I know when mention of the things.

Q: Do you focus on overall meaning rather than specifics?

R: overall meaning....specific

Q: Do you summarize what you have learned after you have finish?

R: I f I understand, then I can.

Q: Do you ask yourself if you learned as much as you could have once you have finished a task?

R: Yah....not everything but the important one.

My weakness is organization, evaluation, over-loading—half-half now I don't want to overload. Memory not so good but strategy of memorizing just before the exams... Use the charts....for organization (Mala, 2009).

Interviewee 6

Q: How do you study for this course?

R: I read, try to understand, just words that I read and think again. I make notes only on names and case studies as I forget them easily. I prefer reading the text for the contextual understanding rather than notes.

R: I have changed my strategies. I now make notes about 4 pages per topic in point form, very colorful from Steve Chapman text. I study for about 2 hours a day per subject. I read and memorize the facts. I read for the concept and then reread to remember. I form acronym such as e.g. VIOS or CIRRR those taught in class, none of my own (Yee, 2009).

Thirdly, high achievers reported many comprehension monitoring strategies.

They constantly monitor their comprehension of what they learn by checking the facts with the text, online, from their peers and teacher too. They have more positive learning experiences such as getting praise or reward for their correct answers. Therefore, they are motivated to ask and answer questions. Not only do they ask others questions but

they constantly self-question too. High achievers create opportunities to allow learning to take place. They find solving problems as challenging.

High achievers need to ask themselves and others questions immediately and constantly as they read to create opportunities to check their understanding. Constant monitoring was essential to know if they understood what they were studying. They find constructing own notes and solving essays questions as most satisfying, challenging, and requiring high level of metacognition. The ability to produce an output of what they learned is most satisfying as it provides concrete evidence of transfer of learning and creativity.

During interviews high achievers reported high metacognition awareness and were able to describe how they know that they understand. One said when she was no longer confused. Another said when everything falls into place. Another student asks and answers her own question. Another student said when she could explain to others. Another student described when 'it sticks'. Very few students really think about at which point they were enlightened about what they have learned. The MAI interview questions provided this opportunity for them to start thinking along this line.

High achievers did not feel stress from taking class tests as they said it was one way to find out their level of understanding and retention. They like having formative class tests regularly. They showed tremendous persistence in their behavior to improve their performance. They were willing to reread and rewrite until they get it right. This persistence originated from their intrinsic and extrinsic goal orientations, high self-efficacy, and high control of learning beliefs that they can overcome the challenge created by their judgment of the task value.

It was surprising to find that some students merely answer questions, and some students do both, i.e., answer and ask questions. When questioned how they knew that they understand what they read, many students answered that they become aware that they understand at the point of application when they can answer, ask, or explain to

themselves, friends, or teachers. Answering question is one of the most popular strategies of comprehension monitoring used by students from all levels of academic achievement.

Mainly high achievers rather than low achievers asked themselves or others questions. High achievers used both answering and asking questions to monitor their comprehension of what they learn or read. Below are the interviews excerpts.

Interviewee 1 (high achiever)

R: By doing past year questions when I can answer the questions and also ask teacher to mark my papers (Soo, 2010).

Interviewee 22 (high achiever)

R: Ask myself questions and answer myself. Hold the thought in my mind (Kay, 2010).

Only a few high achievers preferred to apply what they know in an imaginatively creative way to real life situations. The low achievers usually found out if they understood what they learned only at the point of solving problems, or even during class tests or major semester examinations. Their comprehension monitoring comes at a later stage in the course which is then not useful for debugging learning gaps before the final examination. Therefore, low achievers are unable to apply what they learn in real situations. Below are interview excerpts from high achievers and how they apply what they know to real life situations.

Interviewee 29 (high achiever)

R: when I connect the ideas to some theories. I ask questions and imagine two people talking e.g. Marx versus Weber. I picture them having a conversation (Tai, 2010).

Interviewee 22 (high achiever)

R: I constantly ask myself how to go about my essays. I don't write down. But I think about the 'social facts' before I sleep, in the shower and free time. I apply what I learn into everyday life for example social order is maintain while driving by following the hand signals, or putting myself into the role of others to understand others. Another example is how social order is maintain in the class, how we all believe in the same values and norms and apply Marxism and social control for how the teacher maintain order (Kay, 2010).

Interviewee 50 (high achiever)

R: sociological imagination, need to have an individual experience to relate to everyday life....learn something in class, based on knowledge on current issues, then I read...Hara and internet, library resources....online journal (Oz, 2011).

Students who translate what they learn or rewrite or reconstruct, or simplify what they read or learn in class, tend to have more effective comprehension monitoring. They also have a more concise mental model of what they have learnt. Low achievers hardly translate or construct notes. High achievers' strategies include translating and constructing own notes for comprehension monitoring as seen from interview excerpts from below:

Interviewee 13 (high achiever)

R: When I can elaborate, recalled and relate to something and I try to write something intelligent (Bill, 2010).

Interviewee 6 (high achiever)

R: When I can explain to myself and others in my own words (Yee, 2010).

Fourthly, high achievers have good debugging strategies such as asking question and rereading, similar to average achievers as shown in the interview excerpts below.

Interviewee 6 (high achiever)

Q: Do you change your learning strategies when you don't understand?

R: I reread sometimes I look up the meaning but I find it more consuming. I usually do three readings until the thing really 'stick' in my head.

Q: What did you learn about your learning strategies from this session?

R: My strength is I have good understanding usually reread four to five times. Usually I get a different meaning when I reread the second time. I prefer reading the main text for the contextual meanings.

Q: What are your strategies for the coming exam?

R: I just read and reread. I like the long detailed description and explanation in the text, Haralambos. I don't like to make notes although I am beginning to (Yee, 2010).

Interviewee 32 (high achiever)

Q: Do you stop and go back over new information that is not clear?

R: reread until I understand (Tara, 2010). Ask friends, lecturers, seek answers in other sources such as textbook, or internet.

Q: What did you learn about your learning strategies from this session?

R: I need to ask questions and not just answer questions. Need to sleep more (Tara, 2010).

Interviewee 36 (high achiever)

Q: Do you use strategies that have worked in the past?

R: Yeah, like doing revision. Looking at questions and doing the questions. If I don't know I look at the marking scheme.

Q: Do you think of several ways to solve a problem and choose the best one?

R: Less than two ways. Just comes naturally. I need to read text book (Mala, 2009).

Furthermore, many high achievers and a few average achievers shared the willingness to take risks to change learning strategies, and are willing to take risk. Some of the changes in learning strategies consists of reading to remember to reading to understand; unwillingness to make notes to willingness to make notes; making long notes to concise notes to reduce memory overload, changing learning environment from home to staying outstation near college, changing peer group/cliques; and changing text from larger to thinner ones. There are more high achievers than low achievers who are willing to change strategies. High achievers constantly reflect, check evaluate, and then change their learning strategies.

Interviewees that showed potential to improve have some strategies but they were not thorough in their strategies. These students are likely to improve if they are willing to change, adopt or adapt new strategies during the course. For example, Mira who wrote notes in sentences directly copied from the textbook and did not translate the notes into her own words. After she changed her learning strategies, her grade improved.

In addition, students who are willing to take risk by choosing what is important and learn to be concise tend to show tremendous improvement as from interviewee Tai who progressed from an E student to an A student in less than one year and he obtained an A* in his A2 final examination. Following are the interview excerpts of students who were willing to take risks to change their learning strategies.

Interview 29 (high achiever)

Q: What did you learn about your learning strategies from this session?

R: I know my weaknesses. I use to be a perfectionist. I used to think everything Is important but now I choose. From my experience in my semester exam, I ran out of time trying to put in everything.

Q: Do you know when to apply different learning strategies effectively?

R: SPM- no strategies but A level, I am trying to summarize notes about not more than ten sentences before tests. I think it works as my test marks has improved from 13 to 18. It was below average in SPM.

Q: Do you know when to apply different learning strategies effectively?

R: I am now more systematic. I try to rest a few days and then reread, I find it

Q: How do you manage new information during the course?

R: Summarized in point form, then I go back and rewrite and add to my notes from the text that I read. I find that by replaying in my mind my lessons, it helps

to go straight into my brain (Tai, 2010).

Interviewee 1 (high achiever)

R: No, not the same...read before the class, listen in class and then review. In SPM I didn't use it. 9A's is good but I expect a little better. I took 12 subjects but I have high expectations from my dad and I know what I did wrong. Form four, form five, whole gang of 10 of us, hang out and all did the same about 9A's. My dad blames me and I talk to my mum and I know I did it myself. From kampong school and then better secondary school, I always did very well, top student in school, they believed that their daughter can do it. The A's I did not get was my science subject as my mum pushed me to take it. Without interest, I cannot excel although I do quite well. I go for competitions like piano...distractions. Do past year questions. Everyday revision by flicking back own notes (self-constructed notes from text, different chapter different reference e.g. mass media I use CIE text as it is more concise and clear. And for Crime and Deviance I use Haralambos as I haven't look at CIE text yet.). I try to remember by writing out on some draft paper in short form and do this many times (Soo, 2010).

Interviewee 7 (high achiever)

R: I have changed my strategies. I now make notes about 4 pages per topic in point form, very colorful from Steve Chapman text. I study for about 2 hours a day per subject. I read and memorize the facts. I read for the concept and then reread to remember. I form acronym such as e.g. VIOS or CIRRR those taught in class, none of my own (Yuan, 2010).

Interviewee 22 (high achiever)

R: Read CIE and Haralambos. In the first semester I did not make notes but second semester I make my own notes about 3 pages per essay. I now have about seven essays. I read and summarize sometime (Kay, 2010).

High achievers asked questions when in doubt. They would reread if they did not understand. They would check their comprehension from reliable multiple sources. They were able to judge accurately whether the sources are valid and reliable. Most importantly, they were willing to change their learning strategies when it did not work, and varied them according to different situations. They were willing to take rational calculated risks.

Some of the changes noted over the period of the study included students who realized that they were just reading to remember, and this does not work at pre-university level. Firstly, a few students realized, through deeper reflections, that they need change from just reading to remember to reading to understand first. Secondly, a few students who dislike making notes, as they were used to being given and taking

down teachers' notes in secondary and primary school, decided to construct their own notes. Thirdly, some students converted from making long notes to concise notes to reduce memory overload, e.g., Mira realized she should have make concise notes instead of copying long sentences directly from the textbook if she wanted to improve her performance. A few students realized that they need to change their home environment, peer group, and even the reference textbooks. Three students decided to move out from the distractions and family problems at home to focus on their exams. A few students changed their cliques when they realized that their peer group was taking them further away from their goals. A few students who realized the heavy volume of the recommended textbook was demotivating them to get started. It was not the content of the textbook but the number of pages was just too scary. So they opted for thinner textbooks that had summarized key parts of the syllabus. High achievers are flexible in their attitude and are willing to adapt their learning strategies when required.

Fourthly, almost all high achievers reported constant and daily evaluation of their coursework. Frequency of evaluation was a salient feature for high achiever as seen below:

Interviewee 29 (high achiever)

Q: How often do you think about your studies?

R: Sometimes. I think daily then I do revision even while eating. All the time I think about different stuff and read and think for about one hour (Tai, 2010).

Interviewee 1 (high achiever)

Q: How often do you think about your studies?

R: Everyday

Q: How much time do you allocate for thinking about your studies?

R: A: everyday, during and after class and before sleep I reflect on what I learn until I am too tired and fall asleep. Sometimes I cannot sleep just thinking about my studies. But not in the shower, it's a place to relax (Soo, 2010).

Interviewee 6 (high achiever)

Q: Do you evaluate what you learn?

R: Yes, apply to daily life too.

Q: How often do you think about your studies?

R: Every class, during and after and I revise constantly.

Q: How much time do you allocate for thinking about your studies?

R: Whenever free and there is good environment. I think it through in the same day, or one or two days before and after sleeping. A good night sleep usually helps (Yee, 2010).

Interviewee 13 (high achiever)

Q: Do you evaluate what you learn?

R: Reflection, evaluate throughout the whole course, even in the shower.

Q: How often do you think about your studies?

R: Sometimes 5 to 10 times on the same topic until I can understand and put back in my memory. Sometimes all this takes one minute only (Bill, 2010).

Interviewee 36 (high achiever)

Q: Do you find yourself using helpful learning strategies automatically?

R: I think so, I simply do...., I take the points that can use for many essays. I write them down as in essays ..family got 15 essays done (Mala, 2009).

Interviewer 32 (high achiever)

Q: Do you evaluate what you learn?

R: Yes, like the section on social constraints or choices, I am rather weak in this area.

Q: How often do you think about your studies?

R: Constantly even during the lessons. My sister teach me to reflect when I Wrote to her last semester about difficulty coping.

Q: How much time do you allocate for thinking about your studies?

R: Constantly thinking.

Do you know when each strategy you use will be most effective?

R: Listening in lecture and thinking constantly about what I learn (Tara, 2010).

Interviewee 37 (high achiever)

Q: How often do you think about your studies?

R: everyday, during revision time.

Q: How much time do you allocate for thinking about your studies?

R: Mon-Friday from 5-11pm (Bee, 2010).

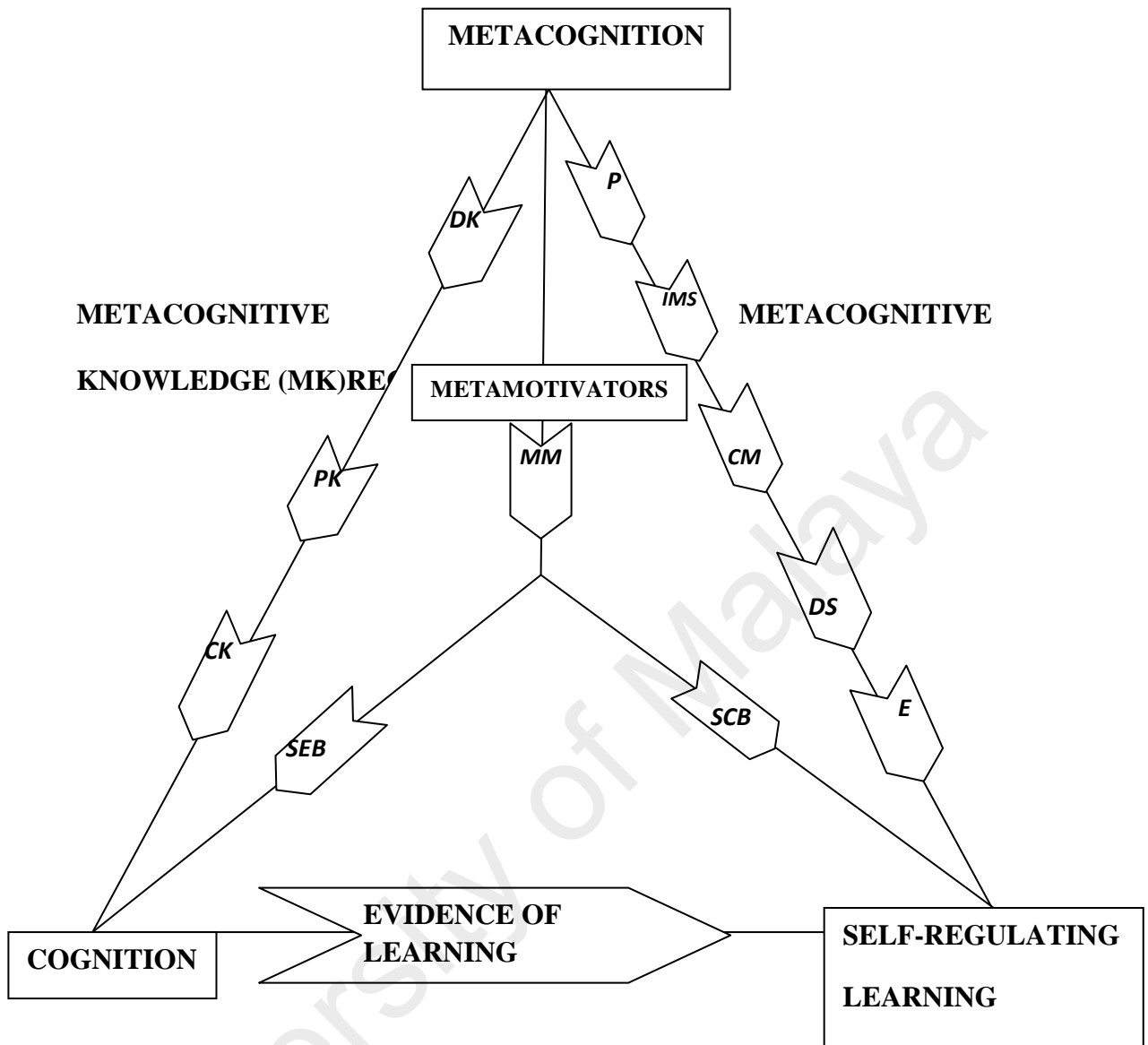
High achievers reflect on their academic work constantly and everywhere. They do so before, during, and after class. Some do reflections before they sleep, some in the shower, some while walking, some in the class and much more. Their high frequency of reflections consists of summing up what they have learned in their minds and on paper. They constantly ask for feedback by asking for review of their work products from the teacher and peers. Their constant monitoring, checking and evaluating of what they know is important for obtaining an accurate self-knowledge which is an important component of cognition. Their regulation of cognition is vigorous and thorough. They are very critical of their own performance and set high standards. They evaluate their work critically and believe it is not up to the standard that they want. They have self-efficacy and control of learning beliefs. They are goal-driven rather than driven by goals. A few have perfectionist traits. They are constantly evaluating and looking for

ways to improve themselves. They emphasized on learning as an intrinsic goal orientation and said that they needed personal time out to reflect. They did not require in-built class time for reflections as they do it naturally out of habit. Although, they agree that reflections can be trained, the volition to reflect in an in-depth manner comes from the individual himself.

4.4.4 The Three Dimensional Learning Processes of Low, Average, and High Achievers

The students reported on their metacognitive awareness of what they learnt (declarative knowledge), how they learn (procedural knowledge), and when and why they learned (conditional knowledge). The lower achievers reported low level on all three categories of knowledge. The high achievers reported high levels of declarative and procedural knowledge, but moderate to high level of conditional knowledge. The high achievers reported moderate to high MR. Figure 4.6 illustrates the three dimensions of learning processes for learning to take place. High achievers have a moderate to high metacognitive awareness, and they use their metacognitive strategies to improve their cognition of what they learnt. They spent more time and effort reflecting on their mental model until the facts, ideas, and concepts are organized into a concise and coherent mental schema which is easy to retrieve when needed.

Many high achievers reported very high frequency of reflections on what they learned in class. They are able to transfer what they learn cognitively onto behavioral form such as written notes, formative tests, group projects, and written essay assignments for their portfolio. They personally construct their own mental model of what they learned through simplifying, translating into own words, summarizing, and organizing the facts, concepts, ideas, and theories learnt into a concise mental schema.



Note: DK-Declarative Knowledge, PK-Procedural Knowledge, CK-Conditional Knowledge
P-Planning, IMS-Information Management Strategies, CM-Comprehension Monitoring, DS-Debugging Strategies, E-Evaluation, SEB-Self-Efficacy Beliefs, SCB-Self-Control Beliefs

Figure 4.6. The three dimensional processes of student learning.

High achievers are able to regulate themselves as they possessed positive metamotivators to regulate their thoughts. They have moderate to high self-efficacy beliefs (SEB) and high self-control beliefs (SCB) that spur their regulation of cognition.

For learning to take place, high and average achievers were able to objectify their thoughts onto written observable and measurable forms as shown in their essays assignments in the student portfolio. Many high and average achievers were able to self-regulate their learning behavior (SRLB) by constantly thinking about how to complete

the 20 essays required for their portfolio. These students use their metacognition strategically by asking, researching, rereading, and other strategies as described earlier. Their metacognition interacted with the demands and challenge of completing the required portfolio as preparation for their final examination. Many high achievers reported that the portfolio provided them a guideline to think about how to prepare for their final examination.

Metacognition acts as a mediator between instructional tasks such as essay assignments and the learning outcome expected for the course. Students who used their metacognition strategically are those who achieve the transfer of learning from instruction to final learning outcomes required for the course. Instructional tasks engaged the student metacognition to help them complete their portfolio successfully in the two semesters. Low achievers did not use their metacognition to help them complete the instructional tasks. The low achievers only managed to complete one or two essays only. They did not find out why they could not get started. They did not seek help and waited to be told what to do. A few average and many high achievers used metacognitive strategies to help them complete their assignments. These students regulated their metacognitive thoughts until their cognition became more observable and measurable in evidential essays in their portfolio. From the evidential portfolio, they were able to judge more accurately their level of understanding of what they learnt and the depth of preparation for the coming examination. These high and average achievers showed evidence of learning by being able to apply the theories, key concepts and ideas they learnt to similar and different contexts.

Table 4.2

Summary of Metacognitive Characteristics of High, Average, and Low Academic Achievers in Sociology, (N=53)

Metacognitive Characteristics	High	Average	Low
<u>Metacognitive Knowledge (MK)</u>			
Declarative Knowledge	High	Moderate	Low
Procedural Knowledge	High	Moderate	Low
Conditional Knowledge	Mod./High	Low	Low
<u>Metacognitive Regulation (MR)</u>			
Planning	Flexible	Moderate	Rarely
Comprehension Monitoring:	High	Moderate	Low
Answers questions	Frequent	Moderate	Low
Asking questions	Frequent	Moderate	Rarely
Application	Frequent	Moderate	None
Information management strategies:	Few	Limited	Very limited
Listening	Active	Moderate	Passive
Constructed own notes	Like	Moderate	Dislike
Selective, simplify, and summarize	High	Moderate	Low
Debugging Strategies	Few	Few	Low
Rereading	Frequent	Moderate	Rarely
Adapt new strategies	High	Moderate	Low
Evaluation	High	Moderate	Low
Frequency of Reflections	Very High	Moderate	Low

(Note: Data categorized from PAI in-depth interview.)

Evidence of learning occurs when a student can demonstrate what he has learnt orally or in written forms. Low achievers were not able to objectify their cognitions due to poor regulation of metacognition which leads to weak knowledge of cognition. This is the learning trap or cycle of learned helplessness for low achievers. Refer to Table 4.2 on the metacognitive characteristics of high, average, and low achievers. It shows the detailed differences in metacognitive knowledge (MK) and metacognitive regulation (MR) among high, moderate, and low achievers. The salient differences among the

three groups were the very high frequency of reflections of high achievers as compared to moderate and low achievers. Another salient difference is the willingness to adapt new strategies such as selecting, simplifying, and summarizing when constructing own notes.

Research Question 1(b). Is there a significant difference in the achievement scores among Sociology students with high, medium, and low metacognition?

4.5 Three Groups of Student Metacognition and Their Achievement Score

Beside finding the different metacognitive characteristics of high, average, and low achievers among pre-university Sociology students, it is beneficial to know if students with varying levels of metacognition performed differently based on their achievement scores in the subject. In this study, students were grouped into high, medium, and low metacognition based on their self-reported scores in the MAI questionnaire. The findings from the quantitative data supported the assumption that students with high metacognition generally performed better than those with low metacognition. The results from a one-way Analysis of Variance (ANOVA) of student achievement scores among the three levels of metacognition provided support for the qualitative data in Research Question (1b) that students with high metacognitive awareness were able to regulate their cognition, and thus perform better in examination.

4.5.1 Is there a significant difference in the achievement score among students with high, medium, and low metacognition?

A one-way Analysis of Variance (ANOVA) between subjects was conducted on 115 students to compare the effect of metacognition on achievement scores among students with low ($N=36$), medium ($N=44$), and high ($N=35$) levels of metacognition. There was a significant effect of metacognition on achievement scores at the $p < .01$ level for the three groups, $F(2, 112) = 8.50, p = 0.001$. Post hoc comparisons using the LSD test indicated that the mean achievement score of students with low metacognition ($M = 3.53, SD = 1.78$) was significantly different from that of medium metacognition

($M = 4.77$, $SD = 1.76$), and high metacognition ($M = 5.06$, $SD = 1.45$). The post hoc test (LSD) confirmed that the differences between group 1 and 2 (effect size, $d = 0.72$), and 1 and 3 (effect sizes, $d = .95$) were unlikely to have arisen from sampling error. However, there was no significant difference between group 2 and group 3 (effect size, $d = 0.18$).

An examination of the skewness and kurtosis of the observable variables of student metacognition and student achievement scores showed values lying between -2 to $+2$. These indicated that the data did not deviate significantly from normality.

4.5.2 Sample Statistics of Central Tendency and Spread of Data

Table 4.3 shows the means, standard deviations, skewness and kurtosis of the observable variables for the four main constructs: Metacognitive Awareness, Motivation, Portfolio, and Score; and two sub-constructs of metacognition: knowledge of cognition and regulation of cognition.

Table 4.3

Mean (M), Standard deviation (SD), Skewness and Kurtosis of the Observable Variables for the Metacognitive Awareness and Motivation Construct (N=115)

Indicator	M	SD	Skewness	Kurtosis
METACOGNITION	257.99	35.32	-.03	-.12
MOTIVATION	176.78	19.31	-.26	-.16
PORTFOLIO	8.12	5.75	1.05	.47
SCORE	4.47	1.79	-.52	-.88

Table 4.4 shows the means and standard deviations of the observable variable metacognition for the three groups of high, average, and low metacognition levels. Group 2, the medium group (moderate metacognition) consisting of 44 students was selected within plus or minus half a standard deviation of the mean of the MAI scores. A total of 36 students with scores less than the cut-off score of half a standard deviation

below the mean of the MAI scores was placed in group 1 (low metacognition).

Students with scores more than the cut-off of half a standard deviation above the mean of the MAI scores consisting of 35 students was placed in group 3 (high metacognition).

Table 4.4

Mean (M) and Standard deviation (SD) of the Observable Variable Metacognition for the High, Average, and Low Groups, (N=115)

Achievement Group	N	M	SD	95% Confidence Interval	
				Lower	Upper
Low	36	3.53	1.78	2.93	4.13
Average	44	4.77	1.76	4.24	5.31
High	35	5.06	1.45	4.56	5.56
Overall	115	4.47	1.79	4.14	4.80

Table 4.5

Analysis of Variance of Sociology Scores Among Students with Low, Average, and High Metacognition

Source	SS	df	MS	F	p
Between	48.06	2	24.03	8.5	.001
Within	316.59	112	2.83		
Total	364.64	114			

The results from the Analysis of Variance (ANOVA) in Table 4.5 among the three groups of students suggested that high levels of metacognition have a significant effect on achievement. Specifically, the results suggested that students with high levels of metacognition performed better in their academic achievement. However, the level of metacognition must be high for the effect to be manifested. Students with medium level of metacognition did not significantly differ from the high metacognition students.

Medium metacognition levels do not appear to significantly affect achievement. This suggested that the group consisted of a wide range of potential achievers to low achievers. This group had undergone the most changes in learning gains for a few students, some changes for a few students and no changes for a few students. Therefore, the relationship between student metacognition and achievement is not easily determined as their metacognition is undergoing changes. Thus, the data showed no significant difference in achievement scores between students who have medium and high metacognition. It was also observed from in-depth PAI interviews that high achievers tend to rate themselves lower on their metacognitive scores, and may have caused the lack of statistical significance in the findings.

Research Question 2. What is the metacognitive profile of high achieving Sociology students?

4.6 A Metacognitive Profile of High Achieving Sociology Students

The eight highest achievers; Tara, Tai, Mira, Bee, Kay, Bill, Oz, and Reen, based on their consistent performance and largest gains in learning outcomes over their three semesters in the course were chosen to develop a metacognitive profile of high achievers. They have excellent knowledge of cognition and consistent regulation of cognition which had enabled them to maintain or improve their performance until the end of the course. Below are some of the descriptive analysis observed from their work products in their student portfolio.

Tara (MAI: 279/ 364, MSLQ: 192/231) is a young lady with high goal orientation and is more intrinsically motivated than extrinsic motivation towards the course. Her work products from a collection of student portfolio and class tests showed ability to remember and understand key facts, concepts, and theories. Her class tests were always the highest in the class and her essays for her portfolio were clearly organized, concise, and showed high level thinking skills. She showed good skills at applying key theories and case studies as evidence to illustrate her points. She also

showed ability to analyze by comparing the points in her organization of argumentative points in her construction of her essay. She showed creativity to synthesize and organize her arguments in a clear, concise and fresh approach. She scored a 95th percentile in her final exam, and received the Top in Malaysia A2 Final Examination Brilliant Award. She maintained her quality of work throughout the course. A good example of her ability to analyze and evaluate can be seen as below:

Moreover, women's depression which is often solely blamed on biological causes such as pre-menstrual symptoms (PMS) and child-birth can be attributed to socio-economic status (SES). In fact, Brown and Harris (1978) reported that women with children in the working class were more prone to depression than those in middle class. This is because working class mothers tend to excessively worry about not being a good mother by leaving home to work. Therefore, social class can also have a subtle effect on depression. (Extracted from Tara's work product, 2010)

Another interviewee, Tai, (MAI: 279/ 364 and MSLQ: 217/231) showed the largest gain in learning outcomes in the three semesters. He himself had said he was the least likely to do well as he performed marginally in his SPM. However, Tai showed passion for the subject. He completed more essays than required. He puts in a lot of effort researching for interesting examples to substantiate his arguments. His application skills are relevant but he has a tendency to write too much. Detailed work is good but verbosity sometimes distracted him from the key arguments. He has a very good content knowledge of the subject but sometimes he overloaded himself with too much fact until they get in the way of clarity of his arguments. His main weakness was inability to be concise but he learnt to do that by the end of the course and performed very well for the final with a 91th percentile. He was able to change his learning strategies as his metacognitive awareness increases during the course. He tends to ask himself questions about his understanding of the course. He said he read for understanding first and this helped him to remember the large amount of facts needed

for the course. His goal-driven attitude helped him to achieve tremendous improvement. He was a below average student and now he is one of the top achievers in the course. He scored an A in AS and A2 Cambridge examinations. This young man achieved one of the largest gains in his learning outcomes because of his positive thinking and volition to learn. He puts in tremendous effort to improve. He overcame his language and writing difficulties with sheer effort driven by a genuine interest in the subject. He enjoys learning in a group and is intrinsically motivated by sociology and extrinsically motivated by his peers and a healthy competition among the classmates. He said that competing with Tim drives him to work harder.

Mira (MAI: 247/365 and MSLQ: 182/231), a foreign student from Indonesia was another student who achieved tremendous gain in her performance. She obtained a D in the AS Final but improved to an A* for her A2 final examination. Her work was always thorough and her take home work products were of high standards. She showed high level thinking skills in her portfolio such as relevant application, ability to analyze, synthesize, and evaluate the claim in essay questions. She could not understand why she performed badly in the AS Final and asked to be interviewed using the PAI protocol. From the interview, she realized that her weakness was mainly in her note-taking strategy. Although she had a good knowledge and understanding of the subject, she ran out of time in the AS final examination. Her metacognitive awareness was raised after the interview and she realized that she was not constructing her notes in her own words but merely taking down notes directly from the main text. She thought this will save her time but it took much more time during the actual examination as she had not developed a concise mental picture of the facts. She changed her note-taking strategies and performed excellently in the A2 final exam to become one of the top students in the course. The PAI protocol helped to improve her metacognitive awareness to debug her learning strategies, and she was able to achieve tremendous gain in performance.

Kay (MAI: 254/365 and MSLQ: 175/231), another proven high achiever who scored A for the finals, is highly driven and has very high expectations of herself. She considered herself a failure if she did not achieve straight A's in all her subjects. Her work products are very detailed. She is one of those high achievers who preferred the detailed approach to her learning strategies. Her strength is her patience and diligence to construct her own notes even from the most challenging text. Her works showed accuracy and detailed factual support for her argumentative points. She is thorough in her work products. She has good memory and preferred lengthy notes. She is a matured young lady who can make independent decision on what is best for her. Her lack of conciseness may have caused her the A* score that she aimed for. She managed to obtain an A grade in the finals.

Bee (MAI: 273/365 and MSLQ: 179/231), another female student who also set high goals from the beginning of the course and aimed to obtain an A in the course, is a quiet student who prefers the individual style of learning. She was not satisfied with herself when she scored a B in the first examination sitting of the course and decided to defer one semester to redo her first semester. She said she did not like reading in her younger days due to bad learning experiences in school as she has dyslexia. She has since overcome her learning disabilities but she still did not like reading and interacting in a large group. She said that she enjoyed writing and practising essay writing and this had helped her to improve her grade to an A by the end of the course. She scored Top in Malaysia for the CIE AS Final Exam Brilliant Award. Her ability to regulate her cognition through regular practice had helped her to improve her grade.

Bill (MAI: 214/365 and MSLQ: 148/231) had a very good knowledge of cognition of the course. He had an in-depth knowledge and understanding of the syllabus. He was very clear and concise in his information management strategies, and he said he used acronyms such as 'SLEPT' or 'PET' to help him through the major examinations successfully. He did not experience much exam anxiety as these strategies

gave him confidence to cope with the course. He was able to analyze and apply his knowledge well. He constantly evaluate his knowledge through frequent reflections even in while taking in shower. He was aware of the strategies that he used. Although he had difficulty in oral communication as he had difficulty speaking clearly, he had excellent argumentative writing skills as can be seen from his work products.

Oz (MAI: 248/365 and MSLQ: 177/231) is one of the few interviewees who showed critical and creative skills in his work products and aimed to obtain an A* in his final examination. He has a strong intrinsic motivation towards the subject and produced excellent work products. He prefers flexible plans based on priority and said that he really enjoy learning Sociology. He enjoys tasks that require research, synthesizing, and mind-challenging. He likes constructing own ideas in argumentative essays and debates. He is able to organize his arguments in a coherent, clear, and, concise manner with strong evidences to support them. He enjoys the whole learning process and could recount how he proceeds from one idea to the next showing strong metacognitive skills. He believed that having sociological imagination in linking up all the concepts and theories as important. He developed very strong mental schema in his learning and loves to share his knowledge in class presentation.

Reen (MAI: 246/365 and MSLQ: 193/231) was awarded top student in Malaysia for the AS Cambridge Final Examination for Nov 2010 with a perfect score of 100. Her key strategy lies in asking herself questions and trying to link the ideas and concepts in a way that she can relate to and understand in her mind and on paper. She used deep learning strategies of trying to simplify and link the concepts after she had read and reread them to understand them. She shows strong extrinsic and intrinsic motivation to do well for the course. She sets high expectations for herself and is not satisfied until she has thoroughly evaluated her work. She constantly evaluated her strengths and weaknesses in the course and is aware of which topic she is strong and weak in. She constantly evaluated her areas of weaknesses in the course. When questioned whether

she evaluated what she learns, she said, “Yes, which I know why I will not do well in mass media as it is shorter but then mass media needs a general knowledge...I don’t know much British examples.”

The data derived from interviews of the high achievers was used to develop the metacognitive profile of a high achiever. Figure 4.7 illustrates the metacognitive learning processes of a high achiever in Sociology that had produced the desired learning outcomes such as an accurate and concise cognitive mental model. These eight students frequently reflect on their learning which involved evaluation of what they know and what they do not know about the course to increase their metacognitive awareness of what they need to do to increase their learning outcomes. This metacognitive awareness together with their positive metamotivation to learn drove them to regulate their cognition such as planning to achieve their goals, constant monitoring of their comprehension through checking, answering, applying, research, asking, and rereading; developing efficient information management strategies to produce a concise retrieval mental schema, willingness to adapt debugging strategies followed by further evaluation of what they have learnt.

4.6.1 Evaluative Reflectivist

The eight high achievers expressed that they frequently reflect on what they read, listen, learn from lectures, and class discussions. They have realistic and accurate judgment of their learning progress. Through constant reflection, Kay, Bill, Tara, Tai, Oz, and Reen accommodated and assimilated new concepts learnt and finally equilibration was achieved after much mental effort to visualize the relationship between theories, concepts, and ideas. Their clear and concise mental model of concepts learned enabled them to retrieve what they learnt at a faster speed within examination time constraint. The interview excerpts below illustrate how Bill, Kay, Tara, and Oz were highly aware of their strengths, weaknesses, likes and dislikes of the content knowledge required for the course. Bill, through reflection, evaluated that he needed to

regulate his learning habits more. Tara was aware of her weak area and Oz knew what he know and did not know and realized he lacked control in regulation just like Bill. Kay was aware that she like reading and was willing to ask questions but she was also aware that she did not practice enough past year questions. Tai was aware that he had difficulty being concise in his construction of his notes and he was willing to change that. Reen was aware of her shortcomings in a certain topic and why she will not fare well in that chapter too. These high achievers had a realistic and accurate judgment of their learning and what they needed to do to improve their learning outcomes.

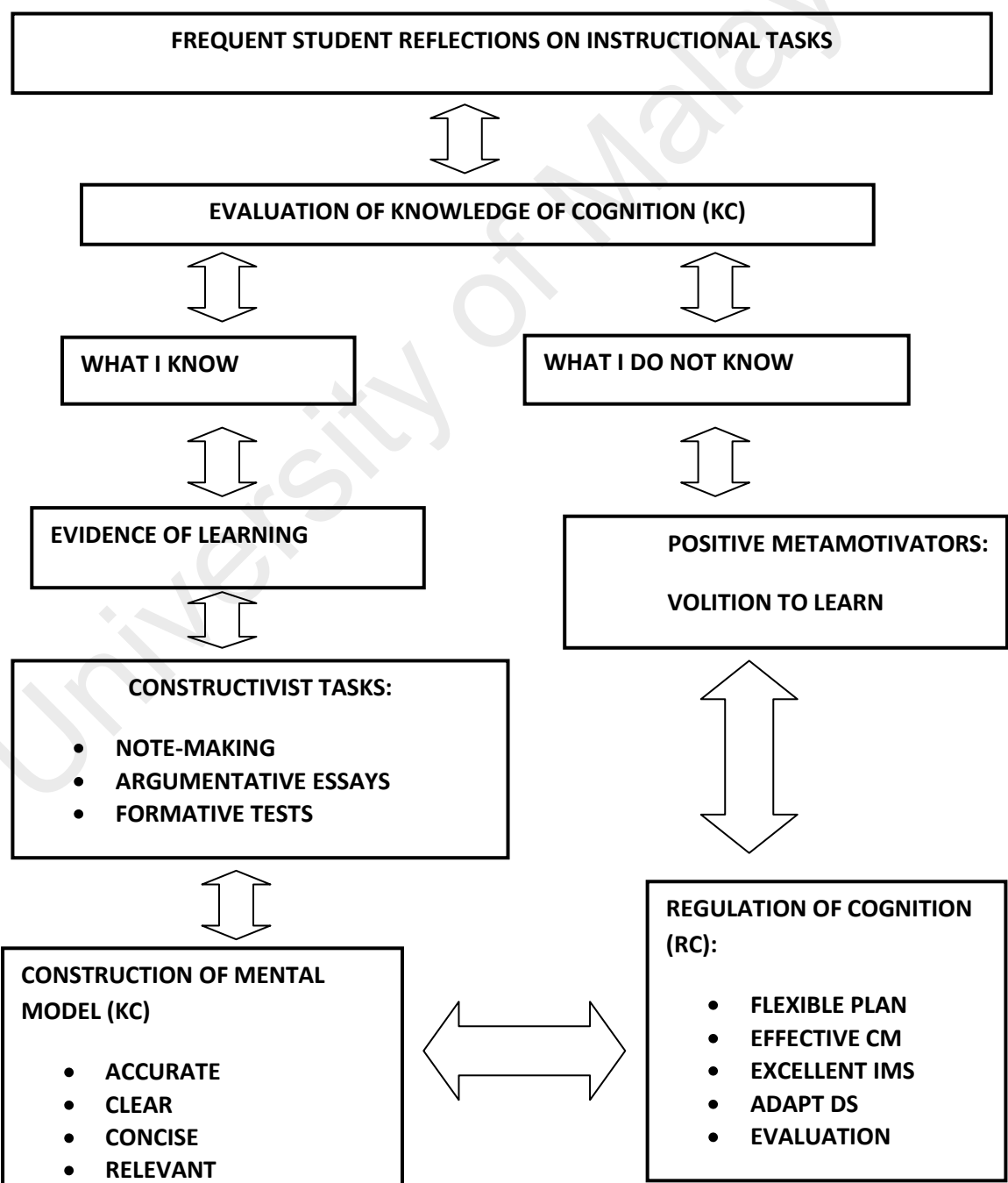


Figure 4.7. Metacognitive profile of a pre-university high achieving Sociology student.

Interviewee 13

Q: Do you evaluate what you learn?

R: Reflection, evaluate throughout the whole course, even in the shower. Sometimes five to ten times on the same topic until I can understand and put back in my memory. Sometimes all this takes one minute only.

Q: How often do you think about your studies?

R: Five to ten times

Q: How much time do you allocate for thinking about your studies?

R: A few minutes and what people ask in class.

Q: Do you try to summarize what you learn?

R: Yes, most important. I think I did the best summary for my AS.

Q: What did you learn about your learning strategies from this session?

R: need to regulate (Bill, 2010).

Interviewee 22

Q: Do you evaluate what you learn?

R: Yes, most difficult- Marxism. Method is okay.

Q: What make you start to reflect more?

R: I constantly ask myself how to go about my essays. I don't write down. But I think about the 'social facts' before I sleep, in the shower and free time. I apply what I learn into everyday life for example social level is maintain while driving by following the hand signals, or putting myself into the role of others to understand others. Another example is how social level is maintain in the class, how we all believe in the same values and norms and apply Marxism and social control for how the teacher maintain level.

Q: What are your current strategies for the coming examination?

R: Try to memorize more notes and time management. I don't do enough past year questions as I am a last minute person. I like to do easier tasks, easily distracted, no regulation such as planning or organizing. But good at reading and willing to ask questions (Kay, 2010).

Interviewee 29

Q: How often do you think about your studies?

R: Sometimes. I think daily then I do revision even while eating...

Q: Do you evaluate what you learn?

R: I need more writing. My weakness is I cannot construct into simple sentences

Q: What do you learn about your learning strategies in this interview?

R: Yes, by reducing the text and lecture notes and focus on one or two key words...and by reducing my own notes is definitely one of the best ways to help me in understanding of the subject that I am learning (Tai, 2010).

Interviewee 37

Q: Do you evaluate what you learn?

R: yah, same for theories and methods, weakness in theories such as phenomenology and ethnomethodology.

Q: How often do you think about your studies?

R: everyday, during revision time.

Q: How much time do you allocate for thinking about your studies?

R: Mon-Friday from 5-11pm (Bee, 2010).

Interviewee 32

Q: Do you evaluate what you learn?

R: Yes, like the section of social constraints or choices, I am rather weak in this area.

Q: How often do you think about your studies?

R: Constantly even during the lessons. My sister teach me to reflect when I wrote to her last semester about difficulty coping.

Q: How much time do you allocate for thinking about your studies?

R: Constantly thinking (Tara, 2010).

Interviewee 50

Q: How often do you think about your studies?

R: all the time, how I going to study... anxiety from not doing enough.

Q: How much time do you allocate for thinking about your studies?

R: don't allocate fixed amount

Q: Do you try to summarize what you learn?

R: yes, talk to myself, orally self-study session, before i sleep, I sometimes summarize, no sleeping patterns,

Q: What did you learn about your learning strategies from this session?

R: I do think that I know myself well, what I can or cannot do but no control.

But I can't make myself improve on weaknesses. Like informal learning and in control of how I learn (Oz, 2011).

Interviewee 51

Q: Do you evaluate what you learn?

R: Yes, which I know why I will not do well in mass media as it is shorter but then mass media needs a general knowledge... I don't know much British examples.

Q: How often do you think about your studies?

R: Not most of the time. Nearing exams I really, really think about my studies.

Q: How much time do you allocate for thinking about your studies?

R: Just a short while between classes. Unless stuck (Reen, 2011).

4.6.2 High Self-knowledge

All eight high achievers performed well in class tests, semester examinations, and their work products in their student portfolio consistently. They could retrieve factual knowledge of the content when asked. Their acquired strong declarative knowledge and procedural knowledge was the first step in any successful regulation of future learning. This strong MK was developed by strong MR of strategies brought about by frequency of reflections of what they know or do not know, how they know, and when and why they know.

4.6.3 Self-motivated

All the high achievers showed volition to regulate their own learning. They were all self-regulated learners. There was hardly need for any external forces to reinforce their motivation to regulate. There was no need to tell them to regulate. They were self-regulators and were intrinsically motivated to learn.

These students reported high goal orientation, strong interest or passion for the subject, strong and positive self-efficacy and accurate self-control beliefs. A few were challenged by the perception of the difficulty of the tasks in the coursework. All the eight high achievers were intrinsically motivated by learning itself and felt satisfied when learning new things or accomplishing a challenge. They were able to pay attention to the instructional tasks as they showed value such learning tasks highly, unlike the low achievers who mostly reported extrinsic motivation to learn only.

Interviewee 29

Q: Why do you want to do well in this course?

R: For myself and then society as my goal is to set up an old folks home.

Q: What do you experience when taking tests?

R: Ok for self-knowledge and progress (Tai, 2010).

Interviewee 32

Q: Why do you want to do well in this course?

R: Because it is difficult.

Q: Do you have control over how much you learn?

If more time, I read the main text, if less time then notes. I can motivate myself to learn when I need to.

Q: Is the most satisfying thing for you in this course is to try to understand the content as thoroughly as possible?

R: When I question the content and i can answer, I feel satisfied.

Q: Do you want to do well in this class because it is important to show your ability to your family?

R: self-satisfaction more than family

Q: Is getting a good grade in this class a main concern for you?

R: Grade and knowledge (Tara, 2010).

Interviewee 50

Q: Why do you want to do well in this course?

R: I really like the course, learning for learning for sociology and economics (Oz, 2011).

Interviewee 48

Q: Do you have control over how much you learn?

R: yes, I can finish what I set out to do (Mira, 2010).

Interviewee 51

Q: How well do you think you will perform in the course?

R: The best of my ability. I can get an A. I want to get an A*(Reen, 2011).

4.6.4 High Self- control

These high achievers preferred flexible plans and willingness to adapt their learning strategies. In addition, they have good comprehension monitoring, information

management strategies, adaptive debugging strategies, and constantly evaluate what they learnt. They are constantly monitoring their cognition through paying attention and listening in class and they have very good information management strategies such as rational risk-taking in selecting main key ideas, concepts and theories in the construction of their own notes. They are able to objectify what they know in written notes and work products such as assignments for their student portfolio. These strategies enabled the high achievers to develop very organized and concise mental schema that they could retrieve when they needed to.

Interviewee 22

Q: Are there any changes in your learning strategies since the first interview?

R: Read CIE and Haralambos. In the first semester I did not make notes but second semester I make my own notes about 3 pages per essay. I now have about 7 essays. I read and summarize sometimes (Kay, 2010).

Interviewee 29

Q: Do you know when to apply different learning strategies effectively?

R: SPM- no strategies but A level , I am trying to summarize notes about not more than 10 sentences before tests. I think it works as my test marks has improved from 13 to 18. It was below average in SPM(Tai, 2010).

Q: Do you evaluate what you learn?

R: My weakness is I cannot construct into simple sentences

Q: What do you learn about your learning strategies in this interview?

R: Yes, by reducing the text and lecture notes and focus on one or 2 key words. Since I reflected during the NS I love to observe other people. My goal is to build an old folk home and also law career. I used to apply knowledge that I had learnt on things that I am learning. But by doing this, I realized that I am only confusing myself and bringing myself to nowhere. Soon I noticed that, this is because I have not sufficient knowledge and understanding on the subject that I am learning. Yet I am so greedy and trying to join it with too many things. Therefore now I decided to temporarily erase things which does not benefit me in my mind, and absorb new things which I should. By doing this, note-taking plays a big role. And by reducing my own notes is definitely one of the best ways to help me in understanding of the subject that I am learning (Tai, 2010).

Interviewee 32

Q: Do you have control over how much you learn?

R: Yes, finish homework, then revise. I spent about 2-3 hours a day studying. Since my roommates ask me a lot of questions about their study and this semester, I get toknow them better, we talk a lot. So I cannot focus, so I find an empty room in the college to study after class (Tara,2010).

Interviewee 50

Q: Why do you want to do well in this course?

R: I really like the course, learning for learning for sociology and economics.

Q: Do you have control over how much you learn?

R: yes, when i do sit down.

Q: How well do you think you will perform in the course?

R: A*

Q: Do you plan before you start studying?

R: Yes, not fixed timetable, priority basis, if I feel I have to finish certain assignments, like essays based on Sociology and Economics (Oz, 2011).

4.6.5 Self-selective Concise Constructivist

These high achievers constantly select, accommodate, assimilate and equilibrate new learning ideas, concepts, and theories into their existing mental model until it was concise enough for them to hold their thoughts subjectively. They reported that they organized what they learnt through categorizing, analyzing and linking the relationships of concepts until they could understand the topic or subtopic.

They are rational calculative risk-taker through selective attention, perception and retention of what they learnt. Bill and Tara were already very selective learners at the beginning of the course but Tai, Mira, Kay, Bee, Reen, and Oz learnt to be more selective in what they need to retain for examination during the course. Bill and Tara had already learnt some learning strategies before they entered the course and this could be seen in their first few work products in the student portfolio. These young constructivists are constantly looking for evidence to objectify what they know. They constantly asked themselves and others questions to look for evidence to know what they know. They become more confident when they can explain to themselves and others as well as construct their own notes and complete instructional tasks such as essays for the student portfolio successfully.

All eight achievers realized they needed to simplify, translate into their own words, and summarize what they know during the course. They developed clear and concise mental model through interpretation, selection, organization and construction of meaning of concepts learnt during their frequent evaluation and reflection of their lessons. This mental model became more concise through constant reflection, selection, evaluation, and relating of learnt concepts. These high achievers learned to construct their own mental model from initially thinking, and holding the ideas in the head and finally writing out concise notes.

Interviewee 13:

Q: Do you know the content of this course?

R: AS (syllabus), no problem.

Q: How do you study for this course?

R: listen in class, do essays, one essay a week or every two weeks. Points summed into notes i.e. one page in my notebook, prepare 1 page for case study, gender, youth subcultures. Most useful is the acronym SLEPT and PET-very useful for organizing every essay.

Q: Do you know when to apply different learning strategies effectively?

R: Do notes, read notes, summarized teacher's notes, check against syllabus, modeling, look at heading and subheading of text.

Q: Do you evaluate what you learn?

R: Reflection, evaluate throughout the whole course, even in the shower. Sometimes five to ten times on the same topic until I can understand and put back in my memory. Sometimes all this takes one minute only (Bill, 2010).

Interviewee 22

Q: What make you start to reflect more?

R: I constantly ask myself how to go about my essays. I don't write down. But I think about the 'social facts' before I sleep, in the shower and free time. I apply what I learn into everyday life for example social order is maintain while driving by following the hand signals, or putting myself into the role of others to understand others. Another example is how social order is maintain in the class, how we all believe in the same values and norms and apply Marxism and social control for how the teacher maintain level(Kay, 2010).

Interviewee 29

Q: How do you know you understand what you read?

R: when I connect the ideas to some theories. I ask questions and imagine two people talking e.g. Marx versus Weber. I picture them having a conversation (Tai, 2010).

Interviewee 32

Q: How do you manage information during the learning process?

R: I categorize, breakdown the concepts into parts in my mind, then write them out briefly.

Q: Do you use the organizational structure of the text to help you learn?

R: Yes, sometimes.

Q: How often do you think about your studies?

R: Constantly even during the lessons. My sister teach me to reflect when I wrote to her last semester about difficulty coping.

Q: Do you try to summarize what you learn?

R: Yes, I try to simplify in my own words constantly. I did that for 'sejarah' but it is more difficult for sociology as sejarah (SPM-level-history) I can see the sequencing or level of the events and do conceptual maps (Tara, 2010).

Interviewee 37

Q: Do you know the content of this course?

R: Yes, theories and methods from Haralambos (Bee, 2010).

Interviewee 51

Q: What type of course tasks that really challenges you to learn?

R: In Sociology, I have difficulties to simplify and link everything that I have learn. Linking the theories together is the most difficult. I am still trying. I have done for all topics except Mass Media. Just notes first second draft (Reen, 2011).

The metacognitive profile of high achieving Sociology students consist of an evaluative reflectivist, high self-knowledge, high self-control, self-motivated, and self-selective concise constructivist. Table 4.6 summarized the processes and characteristics typical of each facet of the metacognitive profile.

Table 4.6

Summary of the Metacognitive Profile of High Achieving Sociology Students

Processes	Characteristics	Profile
1. Evaluative reflection	Accurate and concise mental schema	Evaluative Reflectivist
2. Reading, listening, observing, & practice	Very strong metacognitive knowledge	High Self-knowledge
3. Effective planning, information management comprehension monitoring. debugging strategies, & evaluation	High adaptive metacognitive regulation strategies	High Self-control
4. Positive metamotivators: Self-efficacy beliefs & Self-control beliefs	Intrinsically motivated	Self-motivated
5. Constructivists : making notes, Constructing essays, Summarizing, simplifying, Outlining, mind-mapping, & Concept-mapping	Self-selective rational risk-taker	Self-selective concise constructivist

Research Question 3. What are the factors that motivate Sociology students' use of their metacognition?

4.7 Factors that Motivate Sociology Students' Use of Their Metacognition

4.7.1 Beginnings of Reflections

An understanding of when and what spearheaded student reflections about their academic performance is useful to give some indicators of what motivate metacognition

habits. A majority of students do reflect on their studies but some more than others. The frequency and depth of reflections of high to low achievers vary greatly. High achievers reflect frequently at a high level of awareness. Many high achievers felt thinking about thinking is a personal trait and is something they do habitually.

Firstly, one factor identified in bringing about student metacognition is encouragement and expectations from family members. A few students said they started reflecting on their studies since primary school but many of the interviewees started thinking about thinking at about 17 to 19 years old. Ira said, "Since primary four as my auntie and relatives encourage me to reflect on some ideas I had". While Ling said when his mum picked him up after school, he shared with his mum about what he learnt in school. Ting said his parents motivated him. Family socialization helps to initiate habits of reflection at an earlier stage. About 20 per cent of the 53 students interviewed said that family members encouraged them to start thinking about thinking.

Secondly, students' self-perception of experiencing failure also brought about metacognition. Many interviewees said they started thinking more about their academic performance when they experienced failures. Kay perceived herself as a failure even though she obtained above average results. When questioned when she started thinking more about her studies, she said due to failure for 'O' levels as she obtained only six A's and one B and she had hope for seven A's. Shan responded similarly to the same question. She thought she did very well for the trial but not for the SPM. She said, "It really hit me when I did not do as well. I obtain seven A's but I was disappointed. I need to be more serious, as it is for my future and for my parents." These two female students' performance for their examinations did not meet up with their high self-expectations. They perceived their performance as failures and this initiated the beginning of deeper reflections. Eight students said that they started reflecting more on their achievement when they experienced failure at some point such as SPM or O levels

or at secondary level. A few defined failure as not meeting their expectations of obtaining straight A's.

Thirdly, an optimum level of stress either from parents' expectations or examination dateline can also bring about metacognition. This study found that 12 out of 54 students said that examination dateline was necessary to make them start thinking about their performance. This showed that some stress was needed to get students thinking about thinking.

Fourthly, another interesting factor that initiated reflection is when students experienced a different phase in life such as living outstation away from the family home. Five students said they started more reflections when they entered college life. One student in particular said he realized that there was a difference between college and secondary school life and another said living outstation had him thinking more for himself whereas before his parents did the thinking for him.

In summary, the findings from the interview found that factors that acted as catalyst to initiate metacognition are primary socialization and high expectations of family members, perceived failure in examination performance, changes in living situations, family experiencing problems, and stress as shown in the excerpts below when questioned, "What make you start to reflect more?"

Interviewee 15

R: Since the first semester exam, I didn't do well. I only obtained three D's and one C, and a D for sociology. Now I am getting an A for sociology, two Bs and one C. I have become more focus and change my learning method (Flo, 2010).

Interviewee 18

R: Since last semester before trial...
I didn't get good results in secondary school (Lynn, 2010).

Interviewee 19

R: Since primary four as my auntie and relatives encourage me to reflect on some ideas I had (Ira, 2010).

Interviewee 26

R: secondary...high expectations from family (Asrin, 2010)

Interviewee 40

R: After coming to college. Before mostly parents think for you...when you start to live alone...you think about how to take care of yourself. Staying alone or outstation can help you think more (Lee, 2010).

Interviewee 41

R: After semester one exam... poor results (Ching, 2010).

4.7.2 Extrinsic Student Goal Orientation

This study found many extrinsic student goal orientation factors such as family, peers, teacher, and class room climate. Factors that distracted student from their goal orientation were also noted. The findings showed that family acts as an important extrinsic student goal orientation agent to motivate student metacognition. The interviewees reported that family members still acted as a strong primary socialization agent in forming the students' self-concept, self-efficacy, motivator, language skills, learning strategies, reflections, reading habit, types of books they read, their goals in life, as successful role model or experiences, and gender role.

4.7.2.1 Family as an important extrinsic factor

When questioned who influenced them the most, almost all the 53 interviewees mentioned members of their families motivated, encouraged or put pressure on them to do well academically. This study discovered that families played two main positive functions. Firstly, families acted as a primary socialization agent in inculcating early reflective and learning strategies. Secondly, they acted as a motivator of successful role models, as informal social control through family goal setting and expectations, and setting values and beliefs standards. However, families were also the grounds for learning difficulties such as the origin of language deficiencies, emotional disturbances, and gender role stereotyping.

The findings showed that families played a role as a primary socialization role in nurturing the minds of the young. In this case, families influence the students' metacognition and cognition. The data showed that in a few cases family members played an important role in structuring students learning habits and strategies from

young. Family members who were committed and involved in the students' life such as selecting the type of books for them, encouraging them to ask questions when in doubt, to be critical inculcated a habit of reflection, e.g., Soo's mother trained her with flash cards, music, and learning strategies, Lee's father taught him to take notes and keep it short, Jo and Shan's mothers bought them books on how to study, Tara's sister taught her to reflect, and Li's second brother taught her how to ask tough questions in class. These family members helped to sow the seeds of good metacognitive skills. These six students had a good potential to do well academically as their family members spend quality time with them and helped them cope with their academic performance. The following are excerpts showing families acting as a primary socialization agent on reflective and learning strategies:

Interviewee 1

Q: Do you think that you try hard to avoid performing poorly?

R: Yes, but no strong feelings just try not to fail, from young mum says if you have the will you can do it. My mother trained me with flash cards and music and I can remember every incident since I was a few months old. For my mum, education is the most important, she said she can invest all her money in education. My sister is fifteen and she is very good in art. I do ballet and all kinds of things. My mum says if you have some other non-academic skills like play piano, you can have a better future.

Q: Do you find yourself using helpful learning strategies automatically?

R: not automatically, my mum taught me from books... (Soo, 2010).

Interviewee 21

R: When I was young, my mum bought me a book. Even when I don't understand, if I read two or three times, then will understand. My brother say like you study this, can or not, can or not?' ...the second and third brothers encourage me. .. (Jo, 2010).

Interviewee 31

Q: What have you learn about yourself from this interview?

R: that I have one strategy i.e. read, make notes and then draw mindmap. Beginning read everything in the text, before exam text and then I practice past year questions. My mum even bought me a book on how to study. I know what I am doing and practice a lot of reflections (Shan, 2010).

Interviewee 32

How often do you think about your studies?

R: Constantly even during the lessons. My sister teach me to reflect when I wrote to her last semester about difficulty coping (Tara, 2010).

Interviewee 40:

Q: Do you change your learning strategies when you don't understand?

R: No, read several times, see which point I don't understand, ask someone who can interpret better, mostly sister....degree in law and master in law.

Q: What did you learn about your learning strategies from this session?

R: Only one, anything important I write it down and check from the reference. Hate writing. Only when I feel it is necessary. My father taught me to take notes and keep it short (Lee, 2010).

Interviewee 42

R: I can explain everything and apply sociology to family members... my second brother...teach me to ask tough questions in class (Li, 2010).

The findings showed that many students were obligated to their parents to do well in their studies. Families acted as an informal social control. Members in the family can dispense positive or negative sanctions as a form of behavioral control on the younger members. Family members motivated the students through appeal to affective domain such as emotion, praise, giving attention or material rewards. Students are needs driven for shelter, security, love, self-esteem, and self-actualization. They strived to achieve as they needed to be wanted, love and respected. Families provided the affective component of motivation for actions. Sometimes the affective component of social control can be a more powerful motivator than mere written rules and regulation. A few students said they wanted to do well to make their parents proud, e.g., Yuan said she wanted to do well to impress her mother. A few set goals to please their parents.

Sixteen students said their father influenced them the most. Brandon said since he did not know what he himself want, he followed the goals set by his father for him. Seven students said their mother influenced them the most. A few were influenced by their brothers, sisters, cousins and grandmother. Many students were more influenced by their father than mother as in many families, the father has a higher academic attainment than the mother. In addition, students who reported high metacognition come from families who have high educational attainment with at least a degree.

These students looked for role model in their successful parents. Students who had metacognitive experiences of what success means and how to obtain successes from observing and imitating their successful family members had an advantage in an

increased metacognitive awareness from those students without successful role models.

Learning to observe, listen, and imitate successful role models help in acquiring metacognitive skills for future learning situations. Three students said they started reflecting since they were in primary school. The following are their interview excerpts.

Interviewee 15

Q: What are your family members' highest academic qualifications?

R: Father: PhD, Mother: Diploma.

Q: Who influenced you the most?

R: Father (Flo, 2010).

Interviewee 31

Q: Why do you want to do well in this course?

R: Family

Q: What are your family members' highest academic qualifications?

R: Father: phd, mother: masters in business.

Q: Who influenced you the most?

R: Mother, father and brother and cousins (Shan, 2010).

Interviewee 32

Q: What are your family members' highest academic qualifications?

R: Parents: STPM and sister in Imperial College.

Q: Who influenced you the most?

R: Eldest cousin: who has a PhD. He is also a Chartered Accountant, secondary school teacher, researcher and part time insurance agent (Tara, 2010).

Family members may not be fully aware that what they say, do, or express in facial or body language affect the study habits of the young students besides influencing the students' beliefs in their self-efficacy and self-control. For example, Soo stated that her mother said education is the most important thing in life and she was willing to invest all her money in her children's education. Her mother's words affected her beliefs about the high value of education and train her to evaluate. Soo's mother set high values on the meaning of education whereas Christie's mother attached a more materialistic value to education. Soo managed to improve her academic performance from a grade B to a final grade A whereas Christie did not managed to regulate her work products, and did very poorly for both semesters.

Interviewee 1

Q: Do you think that you try hard to avoid performing poorly?

R: Yes, but no strong feelings just try not to fail, from young mum says if you have the will you can do it. My mother trained me with flash cards and music and I can remember every incident since I was a few months old. For my mum,

education is the most important, she can invest all her money in education. My sister is fifteen and she is very good in art. I do ballet and all kinds of things. My mum says if you have some other non-academic skills like play piano, you can have a better future (Soo, 2010).

Interviewee 14

Q: How well do you think you will perform in the course?

R: C/B. I will try my best. I regret I didn't work hard before. My parents especially my mum but not much. She said if I want to afford better things(Christie, 2010).

A total of 29 out of 53 students (more than 50%) said family members have played a very important role in motivating them. Many interviewees come from middle to upper class family. These families were very child-centered and took a serious interest in their children's education. Not only did they provide emotional support and encouragement, they fully provided financial support in terms of tuition fees and living expenses. A majority of the students in this sample did not worry about financial issues.

There were three cases who came from single parent families or families who separated during their coursework, experienced additional stress emotionally in addition to the academic workload. These students stated that they needed to work harder now to achieve their goals without the support of one parent with financial uncertainties. Their metacognitive experiences of lack of emotional and financial support can be compared to someone pulling their security blanket away from them. Suddenly, they felt the need to grow up fast and make adult's decision and responsibilities for their survival. Sometimes crises in families can act as a motivator to excel but it depends on how the individual perceive the family problem. In this case the two girls took it as a positive challenge to succeed. It could be their middle class socialization of previous successful metacognitive experiences that enable them to overcome such problems. When questioned, why do you want to do well in this course? They said:

Interviewee 7

R: Impress mother (Yuan, 2010).

Interviewee 21

R: Responsibilities to others such as my Family. I accept that I have to do well (Jo, 2010).

Interviewee 12

R: Do not want to disappoint parents (Angie, 2010)

Interview 40

R: Because you want to live up to your expectations and you have sisters and brothers who do well. You don't want to be known as someone's brother or sisters. You want to meet parents' expectations since they spend so much money on me (Lee, 2010).

Refer to Table 4.7 on family members' highest qualifications attained and their influence on students' learning strategies.

Table 4.7

Interviewees' Family Background and Influence on Learning Strategies.

Factors	No. of Interviewees	Percentage of Interviewees (N=53)
Extrinsic	35	66
Family	17	32
Career	14	26
University	4	8
Peers	4	8
Intrinsic	22	42
Self-interest	16	30
Enjoy Learning	4	8
Interest in subject	2	4
Extrinsic and Intrinsic	8	15
Unsure	4	8
Family Background		
Degree or higher	19	36
Influence Learning Strategies	11	21

Note: Data were categorized from PAI in-depth interview protocol.

4.7.2.1.1 Negative effects of family

When family failed to act as a form of social control and gave too much freedom of choice, young students who are not matured enough to make decisions and practice self-control were unable to regulate their learning behavior as in the case of Ying

below. She is a bright young female student who has good language skills but was not able to regulate her learning behavior and was the only one in the cohort to drop out of college after the first semester. Too little social regulation or given the wrong reward too early can become a problem. Ying was not interested in doing this program in the first place but was encouraged by her parents, so she complied with their expectations. Initially as reported below, she developed an interest in law. But her performance in all subjects in the first semester was very poor due to poor regulation of study habits. She began to report low self-efficacy beliefs. After the first six months, Ying reported a lack of interest in theoretical courses in the academic field and she said was only interested in 'animation'. She decided to join a program in animation design six months later in another college. Intrinsic motivation is important to motivate an individual to be committed to a coursework.

Interviewee 2

Q: Do you control what you do?

R: Yes, my parents let me do what I like. So far I did better than my brother in PMR. I scored five A's...so they let me do what I like.

Q: What motivates you?

R: My parents spent so much on my education, I cannot afford to do badly. I wanted to study design but they advise me to come here. Now I am happy to discover that I like law and I might continue with a career in law.

Q: How well can you motivate yourself to do schoolwork?

R: I have to as my parents have invested so much in me. They give a lot of freedom of choice to me (Ying, 2010).

A few students said when the males in the family such as their brothers challenged their abilities, their mother told them not to be so stress out and just do their best. Here we see, the gender role socialization played out in families where the two female students were told that they need not strive as hard. This can be seen from interviews with Jo and Cindy on the next page. They have low self-expectations, low self-efficacy and even low self-control over what subjects they want to take. However, the males in the sample did not face this problem.

Interviewee 28 (Female)

Q: Why do you want to do well in this course?

R: force to do this by my brothers. I find the theory part hard. I am just trying to understand. Although it is a challenge, my mum says just do my best (Cindy, 2010).

Interviewee 21(Female)

Q: What do you learn about yourself from this interview?

R: That I doubt myself and I need to pay more attention and listen. ..Even when I can understand and after confirmation, I still doubt myself because I have three great engineers (brothers) in the house. One of them always called me 'stupid'. I am the only daughter. When I blogged about my shortcomings, my friend told me that I doubt myself too much even when it's not true. My brother say like 'you study this, can or not, can or not?' My eldest brother always discouraging me but the second and third brother encourages me. My mum asked me not to study so much, she cares about my health a lot. I try to de-stress. I learn things not during the process but after the process, when I walked home near here to Carrefour. I don't believe in myself (Jo, 2010).

4.7.2.1.2 Family background contributes to language barrier

The students' lack of proficiency in English contributed to the difficulties students have in the transition from Bahasa Malaysia or Chinese medium of instruction to English medium of instruction. In this college, English is used as the medium of instruction as they are sitting for the Cambridge 'A' level examinations based on the UK curriculum. Many students who did poorly in academic performance suffered due to a lack of language proficiency. They had difficulty understanding lectures and what they read. They experienced difficulties interpreting the meanings of text. They have inaccurate self-appraisals, weak evaluation of tasks, and lacked learning strategies. For example, Vicky and Brandon gave incoherent responses and contradicted themselves throughout the interview as they had difficulty understanding and focusing on the questions asked:

Interviewee 30

Q: What type of course tasks that really challenges you to learn?

R: Subject like thinking skills but not sociology. I also find outlines hard to get the points as I am from Chinese school environment where everyone speaks Chinese.

Q: How often do you think about your studies?

R: Continue my method until I die...because it works. I need to study more. Study strategies no problem but problem with my English. I need to look up dictionary (Vicky, 2010).

Interviewee 25

Q: What did you learn about your learning strategies from this session?

R: Yes, I liked to be push to study by teacher and friends (Brandon, 2010).

4.7.2.1.3 Summary on family as an affective extrinsic student goal orientation.

A total of 17 out of 53 students said family members played a very important role in motivating them. This showed the importance of the role of family in socializing the young in Malaysia. The family is still functional and not a dying institution as suggested by the media based on the increasing delinquencies among the youth today. In this study, the family members acted as a strong primary socialization agent in forming the students' self-concept, self-efficacy, motivator, language skills, learning strategies, reflections skills, reading habit, types of books they read, their goals in life, gender role, and successful role model or experiences of success. Family members motivated and structured the metacognitive learning experiences for high achievers to cope better with life's challenges.

4.7.2.2 Student Goal Orientation: Other Extrinsic motivators.

A total of 35 out of 53 students (66%) stated that they want to do well because of external factors: family, career, the costs incurred, responsibilities, obtaining good results as opportunities to enter a good university, materialistic goals, peers, teachers, and classroom climate. More than 50 % of the sample interviewed said that family members played a very important role in motivating them. However, there were other factors mentioned too as discussed below.

4.7.2.2.1 Peers as an extrinsic motivator

In a few cases, peer influence in learning strategies seems to play a role as an external motivator. In one class, the peers were cooperative but at the same time there was a healthy level of competition that encourages each other to excel. The class climate was conducive and positive most of the time. This helps in creating a positive class environment for learning. However, Brandon was completely dependent on his peers to help him improve. He was one of the weakest in the class and he became more

aware of his inability to cope with the course. He started role modeling his peers and this helped him through tremendous effort on his part and coaching from his peers that he managed to pass the course. He was fortunate to be with very cooperative and helpful classmates.

Interviewee 25

Q: Why do you want to do well in this course?

R: want to fit in, to try something new, my friends motivate me now.

Q: How do you study for this course?

R: I follow Tara's method. .. I tried reading the text for two hours but cannot understand where to start so I called Tara at 10pm. Some topic I spent more time.

Q: Do you change your learning strategies when you don't understand?

R: Ask Tai, Nel who doesn't take sociology. Sometimes Sef and use the dictionary.

Q: Do you change your learning strategies when you don't understand?

R: I change a lot. Last time I don't understand then I try the first method of making notes that Tara taught me. But it didn't work. Then she taught me a second method of making notes on key concepts only that are highlighted in the text. It works better now.

Q: Do you evaluate what you learn?

R: Yes, I compare with Tara and Tai (Brandon, 2010).

Interviewee 45

Q: What are your family members' highest academic qualifications?

R: dad; form five, mother: ...

Q: Who influenced you the most?

R: everyone, friends... Tim... mixed every day and dinner (Tay, 2010).

Interviewee 48

Q: Do you change your learning strategies when you don't understand?

R: Read again if don't understand and ask Oz... (Mira, 2010).

Interviewee 52

Who influenced you the most?

R: my classmates (Lund, 2010).

4.7.2.2.2 Teacher as an extrinsic motivator

One student said that her former teacher in grade six had a big influence on her.

Interviewee 43

Q: Who influenced you the most?

R: teacher –grade six... and parents

Q: When did you start to think more about your studies?

R: since grade six.

Q: What make you start to reflect more?

R: a teacher... I wasn't studying at the time so she talk to me... she motivated me like a second mother... she was teaching environment... I wasn't doing well... could have done better just not that bad (Ash, 2010).

4.7.2.2.3 Textbook as an extrinsic factor

The data showed the textbooks did not motivate but rather can be a de-motivator. Many students at first complained about the main text which they feel were too huge. A first look at the thick textbook of about 1000 pages gives them stress. But once they started reading it, a few high academic achievers seems to like the book. When it was suggested that the text be withdrawn, they objected to its removal from the booklist. Weak students had difficulty with the language and difficulty understanding and interpreting the content accurately. They complained that there were just too much facts to absorb. In addition, the academically weak students had difficulty in selective perception and selective retention of key concepts and facts. They were not able to judge what is relevant to a topic or assignment and took everything down in their notes. This resulted in lengthy notes which were just as cumbersome as the main text. They tend to take long notes using the same sentence construction as the text. They were not able and not willing to spend the extra time processing to simplify and reduce the notes as in Mira's interview excerpt below:

Interviewee 48

Q: How do you study for this course?

R: I highlight the important part of the text. Then take down notes... very long notes and I revise from my notes.

Q: Do you try to summarize what you learn?

R: Summarize using the same text from the book. (text book language structure). I read everything and write down everything in my notes. I don't simplify into my own words as they take too long to write (Mira, 2010).

Mira is a bright student and did well on written assignments but fared badly in examinations as her note-taking was long. She had not learned mental shortcuts and therefore could not cope with the time constraint in exams. She was very disappointed with her CIE Final AS results as she expected a better grade. She volunteered to be interviewed to find out where she went wrong with her learning strategies as she felt she was using the right strategy so far. Using the PAI interview protocol, her main weakness identified was not simplifying and summarizing the theories, concepts, and

facts into her own constructed sentences. During the final examination, she ran out of time although she felt that she knew the answer.

A few students said that they were not willing to take the risks of excluding anything in case the facts were important later for examination. They were risk-adverse in their selective perception. This has led to information overload. The weaker students were able to cope better with a text that had already simplified and summarized the key facts and they had only to understand and remember. The low achievers found difficulty to cope with the textbook.

Low achievers did not know how to interpret and select what is important as they did not learn the skills in the earlier years of education. They lacked good judgment of learning in their selective exposure, selective perception and selective retention of what is important. They put in lots of effort but had limited results in academic achievement. They did not learn smart strategies unlike those with high metacognition.

4.7.2.2.4 Classroom climate as an extrinsic factor

Classroom climate can act as an extrinsic motivator or demotivator to regulate student metacognition. In one class of twenty-nine students, the classroom climate was positively cooperative and students were willing to learn. The climate was conducive to teaching and learning. The class performed very well with a one hundred percent passing rate and thirty-five percent of the class obtained A's in their final CIE AS results. The class started out as an average class with students ranging from very weak to a few high achievers. But throughout the two semesters, the students encouraged each other and produced high quality student portfolio. A positive classroom climate can be an important extrinsic student goal orientation agent in the eyes of informal social control from their peers. They reported that they enjoyed their peer evaluation of their work products in the class. They were able to experience through observation, imitation, and discussion of group and individual student presentation of their portfolio.

They were willing to evaluate and judge each other's presentation. Through numerous peer evaluations of each other's work products, their self-judgment improved as they were able to benchmark themselves to their peers in the class. Many students reported that they enjoyed the peer evaluation sessions although it can be stressful for their work to be judge publicly. They learned to be constructive in their comments and learned to accept criticisms. They were experiencing the learning process in an engaging manner.

However, in another small class of thirteen students, class climate played a demotivating role for members in the class. The class climate consisted of students with low energy level and aspirations. They were not driven to high performance and had low aspirations. Could this setting of low goals be due to the knowledge that their parents were not going to send them abroad for higher education and they had to be contented with the prospects of a local community college that they could afford. This was the same class that was driven last semester but after their AS results where many performed badly on their other subjects. Although this class had a 100% pass rate and a few A's for Sociology, they just did not have the will power to try harder after that. They were negatively affected by their failure in the other subjects and continue to slide in their class performance and showed a lack of interest to even try to better their grade. In the CIE final examination, they managed to maintain their grades for Sociology but not for the other subjects. One of the class representatives made this observation one day when interviewed:

Interviewee 9

Q: Do you think reflection skills can be train?

R: Yes, the younger the better. I think the class is feeling demotivated for all the subjects and not only those taking sociology but I don't really know the reason why. Although I think many are going to B..... for law and the requirements are rather low. Only two pass and I am going to lakeside and the requirement is only CDD too. So maybe we have low targets so don't feel the need to work that hard (Tan, 2010).

4.7.3 Intrinsic Goal Orientation

The high achievers reported a more positive attitude towards the course. They found it challenging rather than difficult. For examples, Tara and Mala said they

wanted to do well in this subject as they considered it a challenge. Their thirst for knowledge can be seen by their expression that the more they learn, the more they want to know and how they were not satisfied yet. They persisted through tasks and were able to control and endured mental stress. They expected better work performance from themselves and strived to produce quality work. The following interview excerpts showed the persistence and mental endurance of the high achievers when questioned, “Why do you want to do well in this course?:

Interviewee 1

R: interests, self-motivation, the need to understand any product, to predict not so much to control (Soo, 2010).

Interviewee 22

R: myself ...satisfaction (Kay, 2010).

Interviewee 29

R: For myself and then society as my goal is to set up an old folks home (Tai, 2010).

Interviewee 32

R: self-satisfaction more than family

Q: How well do you think you will perform in the course?

R: An A but I am not confident as I am afraid to write essays. I am always not happy with my work so I keep doing them and have not hand them up. I am not satisfied as after I write them, I think I can do better and write in another way (Tara, 2010).

Interviewee 36

R: The more I study the more I want to learn more than others, the more I hear from you about how to relate to normal events, the more interested. More...a challenge (Mala, 2009).

Low achievers lacked persistence and mental endurance. They reported a lack of control of what they really want to do and their motivation is affected even though they showed an initial interest in the course. Even when they are intrinsically motivated by the subject, their interests and motivation are negatively moderated by their inability to achieve their ambition such as becoming a pilot, e.g., Meng. Many low achievers talked about the lack of will power to persist in their comprehension monitoring as shown below:

Interviewee 14

R: Go through the two chapters from Haralambos. Read, write notes on advantages and disadvantages in point form about one to two pages. But I usually don't finish. I don't understand and I don't want to write blindly so I give up (Christie, 2010).

Interviewee 17

Q: Do you change your learning strategies when you don't understand?

R: No, give up (Faz, 2010).

Interviewee 30

Q: Do you have control over how much you learn?

R: No, control. Everyday must study. One hour a day. Sometimes two hours. Sometimes if I want to study economics, I study economics. I don't like TV, I like listening to music... whole day.

Q: Do you know when to apply different learning strategies effectively?

R: Distractions at home from four elder sisters and one younger sister ... (Vicky, 2010).

Interviewee 44

Q: Why do you want to do well in this course?

R: Find sociology very interesting because it studies about societies. No particular ambition. Although wanted to be a pilot but dad disagreed (Meng, 2010).

4.7.3.1 Analysis of intrinsic goal achievement

About 22 out of 53 students (about 42 %) stated their intrinsic goals such as interests in learning, challenge, volition to learn, self-knowledge, positive attitude towards learning motivate them to try to do well in their study. Out of the 22 students who said they were interested in learning itself composed of academically average to high achievers. Eight were low achievers, six medium achievers and eight high achievers. Students who were intrinsically motivated by the process of learning or both intrinsically and extrinsically motivated were high academic achievers compared to those students who were only extrinsically motivated. There was slightly more than 50% of the sample who were more extrinsically motivated than intrinsically motivated. The findings found a lower percentage of students who were internally goal orientated (IGO=42%) than externally goal orientated (EGO=66%) in their motivation to do well in the course.

4.7.3.2 Control of Learning Beliefs

There were 17 out of 53 (31%) students who reported high control of learning beliefs. Almost the same percentage of students reported having high, average, and low degree of control of learning beliefs as shown in Table 4.8.

Table 4.8

Control of Learning Beliefs

No of Students	Percentage of Students	Strength of CLB
17	32	HIGH
18	34	AVERAGE
18	34	LOW
TOTAL=53	100	

Table 4.9

Control of Learning Beliefs (CLB) Among Male and Female Students.

Sex	Degree of CLB	Interviewees	Percentage of Interviewees
Male	High	13, 27, 45, 50, 52	25
Male	Average	3, 4, 9, 16, 23, 24, 29, 40	40
Male	Low	17, 19, 25, 33, 38, 39, 44	35
Female	High	1, 6, 15, 26, 34, 35, 41, 47, 48, 49, 51, 53	36
Female	Average	2, 18, 21, 22, 28, 31, 32, 36, 43, 46	30
Female	Low	5, 7, 8, 10, 11, 12, 14, 20, 30, 37, 42	33

Note: Percentage of males and females is based on the number of male or females interviewees divided by the total number of males=20 and females=33 in the total sample of (N=53) to get a more accurate percentage of a sample stratified by sex.

Table 4.9 shows that a higher percentage of females (36%) who reported high control of learning beliefs compared to males (25%). There were 10 per cent less females than males who reported an average control of learning beliefs. However, the

percentages of male and female students who reported lower control of learning beliefs were about the same, i.e., 35% and 33% respectively.

More female students expressed a higher control of learning beliefs than male students. About 36 percent of female students (12 out of 33 females) said they have a strong control over how much they want to learn compared to only 25 per cent of the male students (5 out of 20 males) believed that they have a strong control over how much they wanted to learn. The male students believed that they have low to average control of learning.

Surprisingly, high achievers such as Yuan, Kay, and Tara reported that they had average to low control of learning beliefs although they thought they would perform well in the course. A few high achievers reported a lower control of learning beliefs than what they are capable of achieving, whereas six low achievers reported a high to average control of learning beliefs compared to the high achievers. Thus, 9 out of 53 interviewees did not have an accurate or realistic belief of their control of learning. These were the gaps between self-appraisals and students actual performance in the course. Low achievers such as Rav and Ajah over-estimated their control and exaggerated their self-assessment of their control and gave contradictory statements. They did not put in more effort to close the gap between their current performance and their expected goals. On the other hand, high and average achievers under-estimated their control of learning although they still have a positive belief that they will do well in the course. They were more critical of their own ability and effort and therefore put in more effort to achieve or maintain their grade.

4.7.3.3 Lack of control of learning: Distractions

Many students expressed difficulty controlling how much time and effort they wanted to spend on their studies due to distractions from computer games, TV, friends, family members, and social activities. Brandon and Vicky were two of the weakest students in terms of academic performance and both experienced a lot of distractions

and lack control to regulate their learning behavior. Even high achievers such as Tara experienced some level of difficulty adjusting to college life and interference from roommates. In her first interview, she was very confident of her control of learning beliefs about herself and said that she preferred individualistic and independent learning traits. She disliked group work initially as she felt group members were pulling her backwards and slowing her down in her work. She admitted that she is a perfectionist when it came to her studies. She has very high expectations of herself and set high standards. But as she adjusted to college life and make friends, she found making friends requires time and commitment to share and cooperate and her stress increased. She was well-liked by her peers for her helpfulness and eventually seems to get along fine in group work. She learned to manage and accommodate the distractions and adjusted her learning environment by finding a quiet room in college to study alone after college hours. Her positive attitude to change enabled her to adapt easily. By the second semester, she was more outgoing and became more confident of her work.

Ying, Ken, and Kit experienced some degree of addiction to internet games and could not control their habits. This lack of self-control affected their performance in the subject as they could not spend as much time on their studies. All three students had good potential in terms of language and thinking skills as shown in their work and class participation, but they did not reach their fullest potential academically due to the lack of control. Internet games and social networking on the world-wide-web such as facebook, twitter, and blog seems to be the new distractions for students. Below are the interview excerpts on distractions for a few students.

Interview 2

Q: How well can you study when there are other interesting things to do?

R: It depends. If it is internet games, it is rather difficult as I like them very much. I can play for six hours a day even during my SPM final exams. But, I still obtain seven A's.

Q: How well can you concentrate on your sociology work?

R: Okay only.

Q: Do you have control over how much you learn?

R: No, I don't think so, too much fact (Ying, 2010).

Interviewee 3

Q: Do you have control over how much you learn?

R: Yah, if I read more but I get lazy due to distractions from my computer. Very hard to reduce or stop as I am on the net and facebook for four to five hours a day. I am addicted. But maybe 1 to 2 weeks before the finals I will be able to stop this (Ken, 2010).

Interviewee 33

Q: Can you finish work on time?

R: Not really, live very far away and reach home late after seven hours of classes and a few hours of traveling to college... feel tired.

Q: Can you study when there are other interesting things to do?

R: No, easily distracted

Q: Do you arrange a place to study at home where you won't get distracted?

R: TV, Computer, PST(computer games), I can't stop myself..

If I want to study, I go out of the room...my house there is an area in the living room but even then I find it difficult to focus for long even after 10mins, I am distracted. I find it hard to concentrate for long. Force to I can focus. One younger sister also distract when she asks me questions.

Q: Can you motivate yourself to do schoolwork?

R: no (Kit, 2010).

Interviewee 32

Q: What type of course tasks that really challenges you to learn?

R: Reading H..., hard to focus, too much distraction from my roommates. I feel very stress nowadays (Tara, 2010).

Interviewee 36

Q: Do you think that you try hard to avoid performing poorly?

R: at times, due to distractions...going out, watching movies, going out late (Mala, 2009).

Interviewee 25

Q: Do you evaluate what you learn?

R: I ask why like this when I do badly in the tests. I realize I need to work more and read more. Something occur so I read more economic and law and sometimes I got money problem I need to go ATM daily as I don't like to carry too much money...alot of distractions (Brandon, 2010).

Interviewee 30

Q: Do you have control over how much you learn?

R: No, control. Everyday must study. One hour a day. Sometimes two. Sometimes if I want to study economics, I study economics. I don't like TV, I like listening to music...whole day.

Q: Do you know when to apply different learning strategies effectively?

R: Distractions at home from four elder sisters and one younger sister so I ask my parents' permission to move out and nearer to the college. Save time from jam and gossips (Vicky, 2010).

4.7.3.4 Self-Efficacy Beliefs

The findings on students' self-efficacy beliefs shown in Table 4.10

Table 4.10

Self-Efficacy Beliefs

No of Students	Percentage of Students	Strength of SEB
31	58.5	HIGH
17	32.1	AVERAGE
5	9.4	LOW
Total: 53	100	

There were 31 out of 53 (58.5%) students who have high self-efficacy beliefs of performing well in the course. About 17 (32.1%) students have an average level of self-efficacy beliefs and only 5 (9.4%) students have low self-efficacy beliefs from the total sample of 53. There were five low achievers who reported very high self-efficacy beliefs and there were also two very high achievers who gave themselves average level of self-efficacy scores as they set high standards and expectations for themselves.

The few low achievers have an inaccurate perception of their ability and performance and felt that they would achieve excellent results even though their grades have never surpassed even an E grade in class tests or assignments. For example, Tan, Vicky, Rav, Ling, and Ajah were very low achievers, but they expected an A grade in the finals. These low achievers set very unrealistic goals for themselves given their current performance and they do not state how they are going to achieve them clearly. In contrast, there are very high achievers who gave themselves average level of self-efficacy, e.g., Tara and Mala. These high achievers set high expectations and standards for themselves and tend to strive to achieve the high goals they have set for themselves. They are more critical of their own performance and judge themselves harshly.

4.7.3.5 Students' self-efficacy beliefs, memory retention, and attention span

Soo said she has almost perfect memory and has very strong beliefs about her ability to cope with the course and she managed to show improvement over the semester from a grade B to grade A in the finals. Faz has strong self-efficacy beliefs as he was told when young that he has photographic memory. Ying, Fay, David, and Sef attributed their poor performance to poor memory or poor attention span. Sef strongly

believed that his poor performance was due to poor memory, since he was told by a few teachers in his previous schooling. It became a self-fulfilling prophecy when he felt he was not going to do well because of his poor memory.

Interviewee 1

Q: Are you good at remembering information?

R: Yes, kann-lah

Q: Do you think you have a large store of factual knowledge of this subject?

R: Yes, visual, can remember passages even the page number..concept mapping rather than mindmapping...more systematic (Soo, 2010).

Interviewee 2

R: My attention span is really short (Ying, 2010).

Interviewee 5

Q: What type of course tasks that really challenges you to learn?

R: memorize facts, just too much from Haralambos and I don't know how to apply (Fay, 2010).

Interviewee 16

How do you find the level of difficulty of various course material?

R: lectures are easy to understand but I cannot hold the ideas long in memory. The textbook is too big and my reading is slow (David, 2010).

Interviewee 17

Q: How do you study for this course?

R: I don't memorize. I create a whole picture in my mind...some says I have photographic memory...since form 3. I also ask questions in class, reflect on the bus home, then write out later on paper and make notes. I read about 3 texts.

Q: What do you learn about yourself during this interview?

R: I don't put in enough effort like planning and give up easily. I don't have any particular strategies. I like to read and have good memory (Faz, 2010).

Interview 24

Q: What type of course tasks that really challenges you to learn?

R: Difficult memorizing, very short term. Hard to remember facts. Theories harder to remember, methods easier. I was told by a few teachers in my previous school that I have poor memory.

Q: How well do you think you will perform in the course?

R: D now but hope to get an A

Q: What did you learn about your learning strategies from this session?

R: Procrastinate but I have to start soon. Weakness is poor memory, maybe lack of practice (Sef, 2010).

Students perception of their self-efficacy are rather subjective and dependent on their perception of past performance experiences and current performance of themselves and their peers in the class too. Student's judgment of learning can help or hinder their

progress as their effort and commitment are based on their self-efficacy beliefs about themselves. An accurate judgment of learning will provide a better guideline or feedback to the student on the required effort and commitment needed for the task of learning. The important question is how do instructional practices help to close this gap between students' self-efficacy beliefs and their actual performance. These findings tell us that there is a need for more formative assessment and constant feedback to close this gap and enhance student progress in academic performance. The interview excerpts and Table 4.11 showed that self-efficacy beliefs vary widely among high, average, and low achievers.

Interviewee 31 (average achiever)

Q: How well do you think you will perform in the course?

R: C, as I haven't familiarized myself with the course yet (Shan, 2010).

Interviewee 32 (high achiever)

Q: How well do you think you will perform in the course?

R: Average (Tara, 2010).

Interviewee 38 (average achiever)

Q: How well do you think you will perform in the course?

R: C (Ting, 2010)

Interviewee 34 (low achiever)

Q: How well do you think you will perform in the course?

R: Very interested. I will do well maybe an A. I want to become a writer (Lew, 2010).

Interviewee 39 (low achiever)

Q: How well do you think you will perform in the course?

R: A (Ling, 2009).

Interviewee 47 (low achiever)

Q: How well do you think you will perform in the course?

R: Trial a C but Final AS an A (Ajah, 2010).

Table 4.11

Level of Self-Efficacy Beliefs (SEB) Among High, Average, and Low Academic Achievers (N=53)

Academic Achievement Level	Level of SEB	No. of Interviewees	Percentage of Interviewees
High	High	14	26
High	Moderate	6	11
High	Low	0	0
Average	High	9	17
Average	Moderate	6	11
Average	Low	1	2
Low	High	8	15
Low	Moderate	5	9
Low	Low	4	8

4.7.3.6 Control of Learning Beliefs (CLB) versus Self-Efficacy Beliefs (SEB)

The pre-university students reported higher levels of self-efficacy beliefs (58.5%) compared to their control of learning beliefs (32%). One of the plausible explanations could be the SES background of these students that are composed of mostly middle to upper class families who can afford to provide strong emotional, financial support with rich resources leading to higher SEB. The data also indicated that students believed that they have a lower control of their learning. This may also indicate a need to train metacognitive regulating strategies.

4.7.3.7 Task Value

Some of the salient findings from the interview showed that 38% of the 53 interviewees said writing essays was the most challenging task. Another eight per cent found discussion enjoyable and preferred such as activity in class. The students who reported positive task values such as challenging and enjoyable spent more time on tasks and many did perform better in their exams. The most difficult tasks reported were reading the textbooks (30%), writing essays (19%), memorizing facts (19%), writing own notes (13%), making outlines or mapping (8%), group presentation (10%), research (4%), assessment of questions (2%), and reflections(2%). The students who

reported that they found the tasks difficult did not perform as well as those who reported a positive value towards the learning tasks. The findings found that if a student values the tasks positively, he is more motivated towards completing the tasks and achieving his goal orientation of a better grade. High achievers described activities in a positive way such as challenging or interesting or stimulating whereas low achievers described activities in a negative way such as difficult or hard as seen from the interview excerpts below.

Interviewee 2 (low achiever)

Q: What type of task do you enjoy doing for this subject?

R: None, all just work...very difficult sometimes (Ying, 2010).

Interviewee 1 (high achiever)

Q: What type of task do you enjoy doing for this subject?

R: all also interesting

Q: Which type of tasks makes you think more?

R: Essay...relate to title

Q: Which type of task do you ask yourself more questions?

R: Essays (Soo, 2010).

Interviewee 31 (average achiever)

Q: What type of course material do you prefer?

R: Essays...more stimulating.

Q: What type of course material arouses your curiosity?

R:Discussions

Q: What is the most satisfying thing for you in this course?

R: To like what I am doing so I don't feel it's a chore.

Q: Do you choose course assignments that you can learn even if they don't guarantee a good grade?

R: It is worth it in the end (Shan, 2010).

Interviewee 11 (average achiever)

Q: What type of course tasks that really challenges you to learn?

R: Patience to read, feel bored. Text book - the words are too small and too much H....

Q:How do you find the level of difficulty of various course tasks?

R: Essay-okay. Reading's very difficult (Leng, 2010).

Interviewee 45 (high achiever)

Q: What type of course tasks that really challenges you to learn?

R: Essay it pretty much combine all the strategies we learn (Tay, 2010).

The findings showed that students faced difficulty with tasks that are related to activities that require good language skills such as reading and writing. The high achievers found essays to be most challenging but the low achievers found essays most

difficult. Many of the low achievers who find essay writing to be difficult have a low proficiency of the English language. They did not enjoy the tasks as they had not experience a sense of competency level as compared to the high achievers who are motivated at accomplishing the task of essay writing, and they are motivated at something they are competent due to their language advantage. Many low achievers attributed their poor academic performance to tasks that require memory work. They had not learned any strategy to help them remember large amount of facts throughout their schooling, and continue to experience learned helplessness at tasks that require memorizing facts and concepts. Below are excerpts of interviewees who experienced learning difficulties because of lack of proficiency in the English language.

Interviewee 28

Q: What type of course tasks do you prefer?

R: outline as they are more precise, short and easy to understand.

Q: How do you find the level of difficulty of various course tasks?

R: hard to understand as my English language is weak. I study in a Chinese primary school. Words are hard to interpret. I think in Chinese and try to translate to Chinese e.g. socialization I translate to 'se jiao'. I am better in Chinese than English (Cindy, 2010).

Interviewee 42

Q: What type of course tasks that really challenges you to learn?

R: Essay and reading because of language problem.

Q: How do you find the level of difficulty of various course tasks?

R: Essay and reading hardest, making notes-average...try to be short and can explain it. Nothing's easy. Project presentation-ok (Li, 2010).

Interviewee 44

Q: What type of course tasks that really challenges you to learn?

R: Writing essays because English not so good.

Q: How do you find the level of difficulty of various course tasks?

R: Essays-quite difficult unless I have someone essay to base on, everything is okay, quite good in understanding. Reading can understand (Meng, 2010).

Another interesting finding relating to low achievers such as Rav, Lew, and Ajah who reported that they found all class tasks as not difficult although they had not been able to regulate their work products as shown in their portfolio. They were unable to evaluate their performance due to their inaccurate judgment of learning. Ying, who was the only one who dropped out from the course, found all tasks and subjects not

challenging. This could indicate a lack of interest as she was forced to take the course by her parents. Autonomy to make choices of the subjects taken and career choices are the foundation to motivational drive. At the end of the second semester, she dropped out to do an animation course in another college as this was her passion and hobby.

Surprisingly, the four students consisting of Tan, David, Faz, and Kit found class discussion as enjoyable but they did not like to write notes and go the extra mile to excel in the course. They preferred activities where they did not have to exert extra effort and they were easily distracted.

Interviewee 9

Q: What type of task for this subject do you enjoy doing?

R: Class discussions.

Q: Which type of tasks makes you think more?

R: Discussions ...Prefer talking rather than writing as it is faster

Q: Which type of task do you ask yourself more questions?

R: Essays...challenging...slow and difficult too.

Q: What type of tasks makes your reflect more and for how long?

R: Essay so far about two. One sent to portfolio and 1 not yet finished editing...I'm an idealist. Take about five hours for each essay (Tan, 2010).

About 43% of the interviewees think that having reflection tasks in class such as recall, rehearse, or summed up the topic completed are useful but 13% think such activities may not be that useful as some students may not cooperate, are distracted to talk and a few students think reflection is best down alone in a quiet place. About 60% feels that reflection skill is a personal individual trait whereby it is habitual for some and not for others. For example, Yee said reflection should be done on own time.

Although slightly more than 50% said that reflection skills and habits can be trained, it will take a long time and need to be trained from young. About 25% said reflective skills may not be trainable. There were five students consisting of Yuan, Sef, Lew, Ting, and Ling who made contradictory statements like reflection tasks in class are useful but, that such skills cannot be trained. These could be caused by interviewer effect as they wanted to give answers that they interpreted will please the researcher.

Five of the seven students felt strongly that reflection task as an in-class activity will not be useful as it is a personal characteristic of an individual. These were all high

achievers. The two low achievers who said reflection tasks in class will not work for them were weak academically and still need a lot of assistance to think about the task.

Below are interview excerpts on students' views, varying from positive to negative opinions on reflection as a task in class.

Interviewee 13

Q: Do you think having specific reflection time in class would help?

R: It depends, as it is very subjective. I think memorizing the facts a few days before exam will help plus a good night sleep before exam (Bill, 2010).

Interviewee 3

Q: Do you think having specific reflection time in class would help?

R: Don't think so, other students will do something else.

Q: Is ability to regulate your thinking a personal characteristic?

R: Yah

Q: Do you think reflection skills can be train?

R: Yah (Ken, 2010).

Interviewee 4

Q: Do you think having specific reflection time in class would help?

R: It does, easier to understand. I need to understand before I can remember. My poor memory is probably due to lack of sleep as I now sleep six-seven hours and I usually need eight hours a day.

Q: Is ability to regulate your thinking a personal characteristic?

R: more personal. When I go back, I take a bath and sit down to think.

Q: Do you think reflection skills can be train?

R: Yes, it can be train. Probably need to reflect for 10-20 minutes in each hour of class. This is enough time. I usually write down and open a book to remember a certain name (Sam, 2010).

Interviewee 15

Q: Do you think having specific reflection time in class would help?

R: Definitely, yes for new topic (Flo, 2010).

Interviewee 19

Q: Do you think having specific reflection time in class would help?

R: Not possible as depends on groups or individuals. I think individual reflection is better. Both needed for a more balanced view (Ira, 2010).

Interviewee 20

Q: Do you think having specific reflection time in class would help?

R: Yah, 5 minutes for one chapter to see if I take in and remember or need to concentrate more (Jenny, 2010).

Interviewee 34

Q: Do you think having specific reflection time in class would help?

R: Yah, it would help if not you will lose everything and the final conclusion of the lessons (Rav, 2010).

Interviewee 35

Q: Do you think having specific reflection time in class would help?

R: Definitely as it is a chance to explain if they learn anything or all will be forgotten when they leave the classroom (Lew, 2010).

Interviewee 44

Q: Do you think having specific reflection time in class would help?

R: helps as it pulls back the memory.

Q: Is ability to regulate your thinking a personal characteristic?

R: yah...for me also

Q: Do you think reflection skills can be train?

R: can (Meng, 2010).

Another interesting finding showed that students preferred class tests as a task but not in major examination. They felt that tests made them regulate their study habits and gave them feedback on their current performance whereas exam created anxiety.

Interviewee 13

Q: What type of course tasks that really challenges you to learn?

R: Exam- study (Bill, 2010).

Interviewee 18

Q: What type of course tasks do you prefer?

R: Tests as it is a good way to force me to study. Essay... (Lynn, 2010).

Interviewee 20

Q: How do you find the level of difficulty of various course tasks?

R: group presentation as I have to put in effort on research and learn more. Both also others such as essays, outlines and tests also okay (Jenny, 2010).

Interviewee 22

Q: What type of course tasks do you prefer?

R: Class test..easier, group work okay because it's easier and essay most difficult...very time consuming (Kay, 2010).

Interviewee 30

Q: What type of course tasks that really challenges you to learn?

R: Like tests as it test how much I know. I also like group presentations because its short and I feel I can focus and learned a lot. When I present and my friends present, at least I know something (Vicky, 2010).

Interviewee 5

Q: What type of course tasks that really challenges you to learn?

R: memorize facts, just too much from H...textbook and I don't know how to apply.

Q: How do you find the level of difficulty of various course tasks?

R: can't remember (Fay, 2010).

Interviewee 32

Q: How well do you think you will perform in the course?

R: An A but I am not confident as I am afraid to write essays. I am always not happy with my work so I keep doing them and have not hand them up. I am not satisfied as after I write them, I think I can do better and write in another way (Tara, 2010).

Refer to some interview excerpts above and Table 4.12 for the value attached to each task by the students. Table 4.12 showed that 60% of the 53 students perceived reflections as a personal trait with 51% of the students who thinks that reflection skills can be trained, 25 % said may be trainable, and 13% said not trainable. While 43% thought that reflection training can be useful to them. The unstructured in-depth interview provided students an opportunity to describe how they felt about the learning tasks. The data collected may not be an exhaustive list of students' perception of instructional tasks but it provided some insights into how students value tasks.

Table 4.12

Student Attribution of Values to Type of Tasks

Task Value	Types of Task	Interviewees	Percentage of Interviewees (N=53)		
Challenging	Essays	1,6,7,10,15,17,19,21,26,31, 32	38		
		33,34,35, 43, 44, 45, 46, 50, 52			
		Answering			
		Questions		4, 8, 50	6
		Mapping		16, 37	4
		Presentation		21	2
		Discussion		31, 50, 52	6
Enjoyable	Discussion	9,16,17,33	8		
		Class tests	20, 30	4	
		Essays	23, 29	4	
		Presentation	25,30	4	
		Reflection	20	2	
Difficult	Reading	7, 11,12,14,16, 18,20, 27, 28,30, 31,38,41,42, 44,46	30		
		Essays	7, 9, 22, 27, 28, 30,44, 43,46, 48	19	
		Construct notes	6, 9, 10, 12,13, 24, 51	13	
		Research	19, 30	4	
		Outlines	8, 30, 37, 47,	8	
		Assessing	48	2	
		Presentation	17, 18, 20, 32, 40	10	
		Reflection	48	2	
		Memorising	4, 5, 9, 13, 16, 24, 25, 39, 45	19	
		Effective	Q and A	33	2
Not difficult	All tasks	34,35, 47	6		
Not challenging	All tasks	2	2		
Useful	Reflections	9,15,20,21,22,24,26,27,28,29,31,34, 35,37,38,39,40,42,44,45,46,47,48	43		
Not trainable	Reflections	11,12,13,19,25,31,43	13		
Personal trait	Reflections	1,3,4,6,9,11,12,14,,15,19,20,21, 22,24,25,29,31,34,35,37,38, 39,43, 44,45,46,48, 49,50, 51, 52, 53	60		
Trainable	Reflections	1,3,4,9,11,12,14,15,18,20,22,25, 26, 27,28,29,34,35,37,40,42,45,46,47, 51,52,53	51		
May not be Trainable	Reflections	6, 7, 11,9, 21, 24, 31, 35,38,39, 43, 49,50	25		

Note: Data categorized from PAI in-depth interview, N=53

In conclusion, the findings showed that how students value tasks depends on their perception of whether they could complete the task successfully. High achievers who can cope with the tasks given have a positive attitude, whereas low achievers found the tasks too difficult to complete have a negative attitude. Therefore, the findings

showed that students will value a task highly if they know they have a good chance of completing it and they value a task negatively if they think they have no chance of completing it successfully. This means that students' self-efficacy beliefs influence their valuation of a task. Their self-efficacy beliefs are in turn influenced by past successful or unsuccessful metacognitive experiences. It is a vicious cycle of learned helplessness. The low achievers negative evaluation of a task demotivate them from trying out, and even when they do get started on the task, their inability to accomplish the task further strengthen their beliefs that the task is of no value to them. The low achievers' low perception of the task value do not help them to regulate their study habits as evidenced in the low number of essay assignments completed for their portfolio.

4.7.3.8 Test Anxiety

The findings from this study showed that test anxiety can work both ways as a motivator or a hindrance. Some level of anxiety was necessary for students to get started on their preparation but too much or too little anxiety can become a barrier to progress in academic performance. A few interviewees experienced low anxiety and they took little proactive actions to improve their student learning. There were many students who reported high levels of anxiety and did not enjoy learning or taking tests.

Examples of interview excerpts below:

Interviewee 2

R: I feel anxiety, very nervous and I cannot elaborate (Ying, 2010).

Interviewee 4

R: Difficulty in answering some of the questions as I cannot recall even though I remember reading them. I can't visualize them (Sam, 2010).

Interviewee 12

R: Dizzy, sweat, prefer assignment do better (Angie, 2010).

Interviewee 21

R: Fear, remorse, need insurance, tempted to cheat, not thorough! (Jo, 2010).

Interviewee 38

R: panic when I cannot understand the questions and don't know how to answer (Ting, 2010).

Interviewee 48

R: worry and stress. I can't recall during the exam (Mira, 2010).

This finding suggests that how students' response to test shows their affective component of motivation. Too high level and too low level of anxiety does not support a positive learning experience and therefore may not drive student learning. Some level of anxiety is needed to spur the learning process and a positive attitude to taking tests helps to set the conditions for learning to take place as best said by Flo:

Interviewee 15

Q: Such as fear of failure or need to succeed?

R: Both, some stress is involved but I get used to it (Flo, 2010).

A few high achievers experienced average level of anxiety and said it was necessary for them to get started on their preparation for examinations. There were five female interviewees who reported low level of anxiety and they were also low academic achievers. This suggested that some level of test anxiety was necessary for self-starters to motivate themselves to prepare for the coming exams. But the low achievers, either due to poor judgment of learning or over-confidence, did not commit as much time and effort to improve their performance as seen in Tan's comments below:

Interviewee 9

R: Normal-relax before test, don't force myself to remember, don't read textbook last minute and just read newspaper. Rest means sleeping (Tan, 2010).

The response from a few interviewees showed that they differentiated between taking tests and major examinations. Lynn, Kay, and Tim said that they did not feel much anxiety taking tests but they felt some anxiety during major examinations as the coverage was more general, and the results from the final examinations were important for their university application and career choices.

Interviewee 18

R: No for tests as I come prepared for that section but not for exam as it is too general (Lynn, 2010).

Interviewee 22

R: No, test anxiety because test not exam (Kay, 2010).

Interviewee 23

R: test is okay as it test my knowledge but exams, I am anxious and think I probably will get a B since I am not prepared (Tim, 2010).

The findings also showed that 25 % of the interviewees like taking test as they said it was a good way to gain feedback on how they were coping with the course. Eight male students and five female students reported a positive response to tests. Males tend to take tests as a positive challenge rather than a negative event. In addition, the five male students who reported a neutral feeling towards test were high achievers who felt their preparation for the exams was enough. A few female students also reported that if they were prepared, they would not be so stressed by examinations.

Below are interview excerpts and Table 4.13 summarizing students' response to sitting for test.

Interviewee 13

R: Okay, back of hand with the facts. Only worry about interpretation (Bill, 2010).

Interviewee 16

R: Not bad, don't mind. Tests make me study almost every time. I am motivated when I cannot keep up with the others. I don't want to waste time here (David, 2010).

Interviewee 19

R: Sometimes, I learn sometime about what I don't know. I feel anxious, not content with my performance and I need more vigorous internalization (Ira, 2010).

Interviewee 27

R: Normal. I like the practice by hand. It is satisfying to see my own words. I go home and retyped and check the facts again(Seng, 2010).

Interviewee 29

R: Ok for self-knowledge and progress (Tai, 2010)

Interviewee 32

R: Some anxiety as I need to succeed. I feel stress as I have high expectations. I need to get at least a 17/20 for each test (Tara, 2010).

Interviewee 37

R: Using tests to write. I enjoy writing (Bee, 2010).

Furthermore, data summarized in table 4.13 found that 40% of students experienced high anxiety level, 32% experienced average level, 21% experienced low level, and 7% did not report on their anxiety level during examinations. More female

(15) students reported a higher level of test anxiety than males (6). Seven male students reported taking tests as normal compared to thirteen female students.

Table 4.13

Test Anxiety Among Male and Female students.

Gender	Number of Students			Anxiety Level		
	High	Average	Low	Positive	Normal	Negative
Male	6	8	5	8	7	4
Females	15	9	6	5	13	12
Total No	21	17	11	13	20	16
Total (Percentage)	40%	32%	21%	25%	37%	30%

Note: Percentage was calculated based on number of interviewees who reported on their test anxiety divided by 53, total number of interviewees. More female students experienced higher test anxiety than males. Four students did not report on their test anxiety level.

The interviewees reported that they needed some level of anxiety like assignment dateline or an approaching major examination, before they can get started to regulate their learning behavior. But, many also reported that too much stress such as fear of failing the final examination can de-motivate them to take actions to regulate their learning behavior. They are numbed from taking actions.

Figure 4.8 shows the students' responses to examination anxiety. At very low levels and very high levels of anxiety, they are unable to take actions but at moderate levels of anxiety, they feel that they can cope better and achieve their highest performance. They felt moderate anxiety during tests but high levels of stress for major examination. They did not mind sitting for formative class tests but they suffered from a higher level of stress when preparing for summative final examinations.

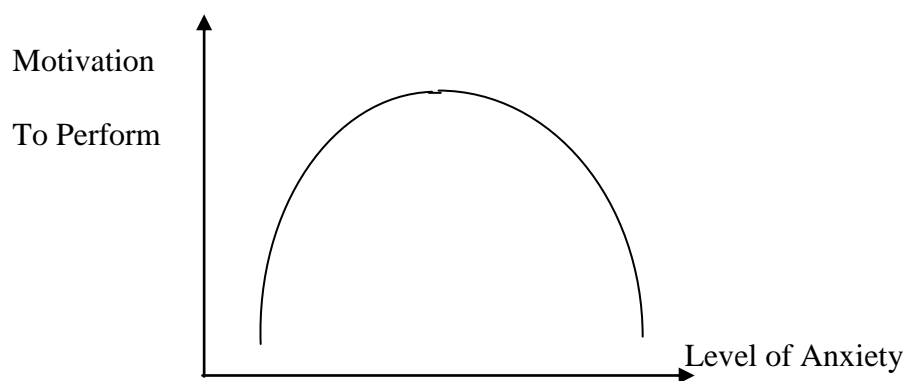


Figure 4.8. Relationship between anxiety and motivation to perform.

Table 4.14

Summary of Motivation Characteristics of High, Average, and Low Achievers

Motivation Characteristics		Academic Achievers		
		High	Average	Low
Goal Orientation:	IGO	High	Moderate	Low
	EGO	High	Moderate	High
Control of Learning Beliefs (CLB) Female>males		Low-Mod.	Moderate	Low
Self-Efficacy Beliefs (SEB)		Moderate	Moderate	High
Task Value		Challenging	Moderate	Difficult
Perseverance		High	Moderate	Low
Test Anxiety		Low	Moderate	High
Attribution of failure at performance: Lacking in		Effort	Effort/ability	Ability

Table 4.14 summarizes the findings from the interview data on the motivational characteristics of high, average, and low achievers in the subject. The high achievers reported high internal and external goal orientations, and average achievers reported moderate internal and external goal orientations. But the low achievers reported high extrinsic goal orientation but low internal goal orientations. They did not enjoy learning for learning itself or for self, or for the subject.

All three groups did not report high control of learning beliefs and self-efficacy beliefs. The female students reported more control of learning beliefs than the males. The high achievers perceived the learning tasks as positive and challenging, the average achievers found learning tasks as moderate, and the low achievers did not value the tasks as they found them difficult. The high achievers have high perseverance to complete the tasks given but the low achievers gave up easily. High achievers felt lower level of test anxiety than the low achievers. Figure 4.8 showed that extremely low or high levels of anxiety did not motivate learning.

Figure 4.9 illustrated clearly the eight factors reported by interviewees that motivate them to self-regulate their learning. All the variables such as internal goal orientations, control of learning beliefs, self-efficacy beliefs, task value, and test anxiety arise from within the individual's cognition of his self-concept except for external goal orientations. This external goal orientation arises outside of the individual but also contributed to the individual's perception of his self-concept. However, the student's ability to persevere in completion of a task successfully developed from internal and external factors that motivate an individual learner. A learner's ability to motivate himself to act comes from how he values the task as challenging or difficult and also how he perceives his self-efficacy by attributing his success or failure to complete the task on controllable factors such as more on effort, and not on uncontrollable factor such as ability like poor memory. The high achiever reported a high level of motivation based on positive self-efficacy beliefs and positive value of the tasks.

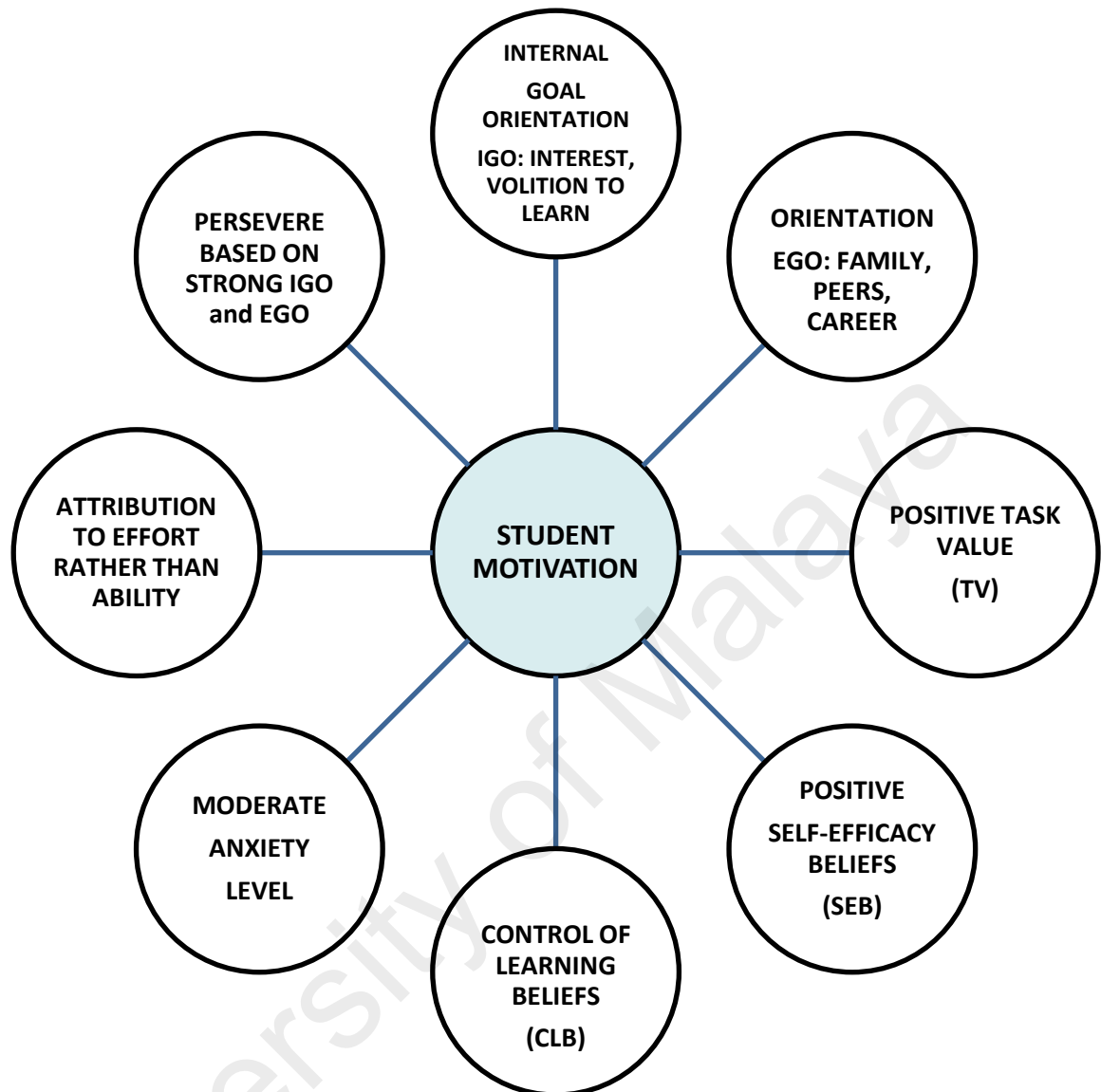


Figure 4.9. Factors that contribute to student motivation.

Research Question 4. What are the characteristics of instructional task in Sociology that can enhance student metacognition?

4.8 Instructional Tasks

4.8.1 Characteristics of Task That Enhances Student Metacognition.

The characteristics of instructional task that have access to student metacognition depend on the value students place on such tasks. Students' evaluation of tasks as challenging, interesting, or difficult motivated or demotivated them. High achiever' positive evaluation of essay writing, reading, reflection tasks, and class

discussions motivate them to think in-depth. Low achievers' negative evaluation of reading, writing, and answering questions put them off such tasks. They do not think further about their lessons as their negative beliefs of the task as not do-able demotivate them. There is a need to understand how to overcome low achievers' mental barriers to help them access their metacognition and develop them. There is a need for pedagogical skills of the instructor to bring about positive metamotivators in such students to activate their metacognition for development.

Many interviewees found writing essays for their subject portfolio as most challenging especially the high achievers. They said that the planning process of writing essays make them think more deeply. Many students reported that having a personal subject portfolio was a good way to help them regulate their study habits throughout the year. They did not felt stress as it was up to them when they could submit their essays. They were told that they needed to complete about 20 essays to be prepared for their first AS final Cambridge International exam at the end of the second semesters. Below are the students' comments on student portfolio as an instructional task to help them improve their metacognition, including regulation of their work products:

Interviewee 29

Q: Any changes in learning strategies or comments?

R: The student portfolio is very, very helpful. Analyzed friend's essays in class, though sometime the class become very distracted, I find that was one reason that improved my writing skills, essay structure etc (Tai, 2010).

Interviewee 50

Q: What do you think of student subject portfolio as a way to regulate learning?

R: Good way, you know you are monitoring and have the flexibility to do when you want. Currently, three essays for family, four essays for religion (Oz, 2011).

Interviewee 51

Q: What do you think of student subject portfolio as a way to regulate learning?

R: I think it is good. Especially eight good essays...discussing in class, about more than ten. Structured outlines and group discussions. Both group and individual (Reen, 2011).

They also reported that they enjoyed class discussion on debatable issues in Sociology. They enjoyed their peers' comments and this keeps them engaged in the learning process. About 50% of the students interviewed said reflection in class was

useful in helping them organized their thoughts in a more coherent manner and that effective reflection skills could be train in class. A few said a reflection time of about 15 to 20 minutes was useful to sum up the lesson for the day or weekly summation at the end of the week.

Reading and writing were considered two of the most difficult tasks followed by answering questions in class. Low achievers seem to avoid these forms of instructional tasks, and therefore instructional tasks may need to cater to these groups by having group work to scaffold them in the initial stages before individual assignments are given. The low achievers have low self-efficacy beliefs and need to build their self-esteem on do-able tasks before they could and would attend to tasks that require high level thinking skills. The instructional tasks need to be achievable to increase student meta-motivational beliefs. When they could do a single piece of task, the low achievers were observed and reported more interest and motivation to continue regulating their learning behavior. To encourage the reading habit, perhaps each class need to start off with a stimulus reading material as an instructional task.

One useful instructional task that can access student metacognition, as can be seen from the interview excerpts below, is that instructors need to ask students questions about their progress and let them reflect on their own progress. During and after the interviews using the Planned Action Interview protocol (PAI) and the Planned Action Scale (PAS) questionnaire adopted from MSLQ and MAI instruments, students reported more awareness about their own performance and initiated some changes in their learning strategies. For many students, it was the first time they were asked to reflect upon how they were performing and they felt good that their views mattered. It was a good opportunity for any instructor to transfer the responsibilities of learning to the learner. In addition, the students felt more in control of their own learning progress. A question from the PAS protocol such as, ‘how do you know that you understand what you read?’ or ‘At what point did you realize that you understand what you learn?’

helped to initiate the student to reflect on their own cognition. In addition, questions like, ‘What are your current strategies for the coming examination?’ or ‘What is the most important thing about learning for you to overcome in the coming examination?’ or ‘Are there any changes in your learning strategies since the first interview?’ tends to initiate student into a high metacognitive awareness of their cognition. Thus, the PAS protocol could be a useful instrument to access student metacognition. However, the PAS protocol by itself is not enough to access student metacognition accurately as seen from the interview data. High achievers underrate themselves and low achievers overrate themselves. Furthermore, female students’ self-reported higher control of learning beliefs than males. Students’ poor judgment of learning gave inaccurate reports about their knowledge of cognition and regulation of cognition. Therefore, there is a need to triangulate the self-reported PAI protocol interview with evidence from the students work portfolio.

An increase of student metacognition can be seen from students’ self-reports from a PAI’s question, “Do you know when to apply different learning strategies effectively?”

Interviewee 22

R: like to do easier tasks, easily distracted, no regulation such as planning or organizing. But, I am good at reading and willing to ask questions.

Read CIE and Haralambos. In the first semester I did not make notes but second semester I make my own notes about three pages per essay. I now have about seven essays. I read and summarize sometimes (Kay, 2010).

Interviewee 27

R: I am thinking more this semester. Weakness is in evaluation. I learn from peer evaluation and will try to come up with better intermediate conclusion as I am weak in writing them. I look at other students essays to learn how to analyze and write better IC. I think most important is teacher’s guidelines on how to learn. Yes, last few minutes. It helps. The first interview also helps me to be more aware as I do not reflect as frequently before (Seng, 2010).

Interviewee 7

R: Start on the subject, I looked back and think about what I forget and don’t understand, then I looked up other references. My weakest part in AS was Postmodernism too (Yuan, 2010).

Interviewee 29

R: SPM- no strategies but A level, I am trying to summarize notes about not more than ten sentences before tests. I think it works as my test marks has improved from 13 to 18. It was below average in SPM.

Q: Do you try to summarize what you learn?

R: Yes, consciously all the topics and I try to remember (Tai, 2010).

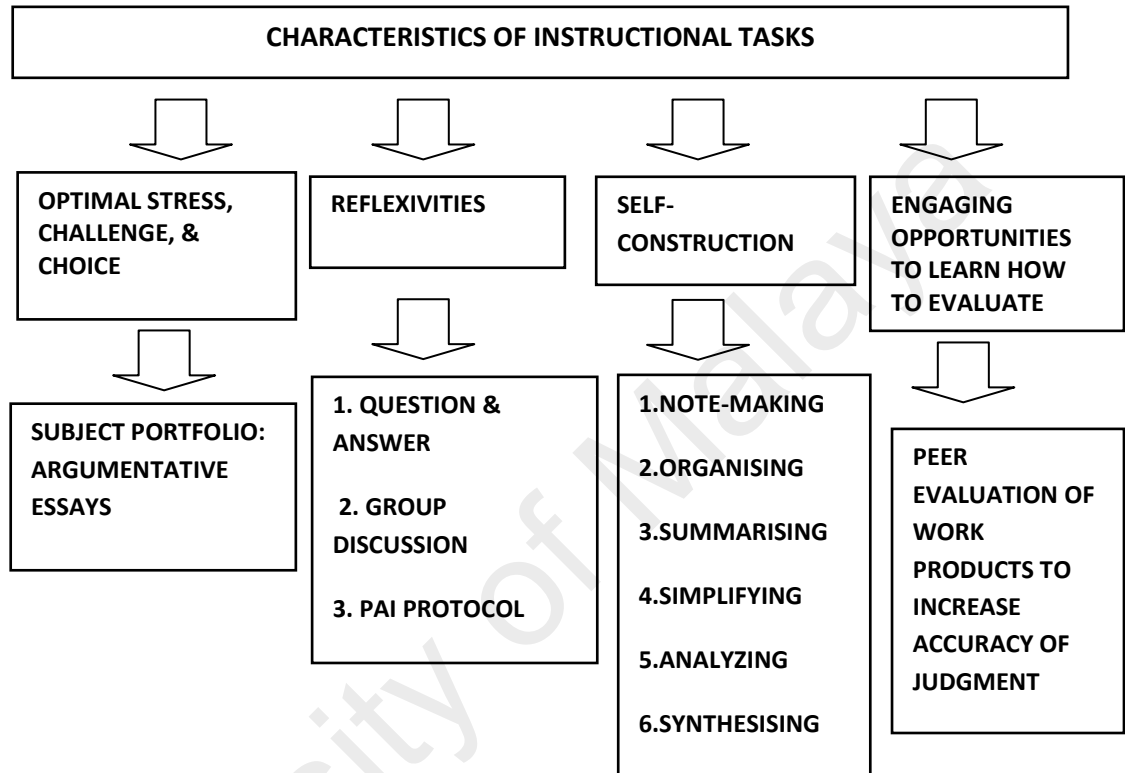


Figure 4.10. Varieties of metacognitive instructional tasks.

In conclusion, characteristics of instructional task that have access to student metacognition so as to develop their metacognition require student to think about the process of learning. Figure 4.10 shows the various instructional tasks used to increase student metacognition and how they become aware of their own learning process by completing challenging tasks that require them to think about how they think. They have to learn the procedural knowledge of writing argumentative essays, construction of meaningful but concise notes, and increasing their accuracy of evaluation of their own work and other students' work products through practice in peer evaluation of their work products. In order to have access to their metacognition and further develop them, students need to start thinking about their thinking. Instructional tasks need to include

questions of what is learned, how they learned, when, and why they learned a certain topic. There is a need for more problem-based learning where students are required to ask questions and plan how they are going to learn a topic. High achievers can be given individual and challenging tasks while low achievers may need group work and tasks that ranged from easy to moderate difficulty to build their self-efficacy beliefs. Student subject portfolio can be one form of instructional tasks that can assess student metacognition as the students' work products are evidential of their metacognition or lacked of metacognition. The ability to complete the essay assignments in their individual subject portfolio have helped them to increase their metacognition as not only the instructor but the learner can see their own output as evidence of their cognition. The students' constant upgrading of their portfolio have enhanced their metacognition as they have to think about how to complete and improve on their work products constantly throughout the whole process of learning in the course and not only during examination. Many students interviewed reported that the subject portfolio help to regulate their study habits.

4.8.2 Metacognition as a Mediator between Instructional Task and Learning

Figure 4.11 shows the complex stages of the instruction and learning process. Once an instructional task is assigned, the students think or reflect on how to complete the task. They reflect in search for underlying patterns from existing MK: declarative, procedural, and conditional knowledge to guide them to complete the instructional tasks successfully. Next, they need meta- motivator also known as intrinsic motivators or positive self-efficacy beliefs and self-control beliefs to drive them to regulate their cognition.

High achievers reported strong interest and satisfaction in learning for learning itself. If they have high metamotivators, the subsequent stage of MR takes place. This is followed by increased cognition or awareness of what they know, how they know, when and why they know.

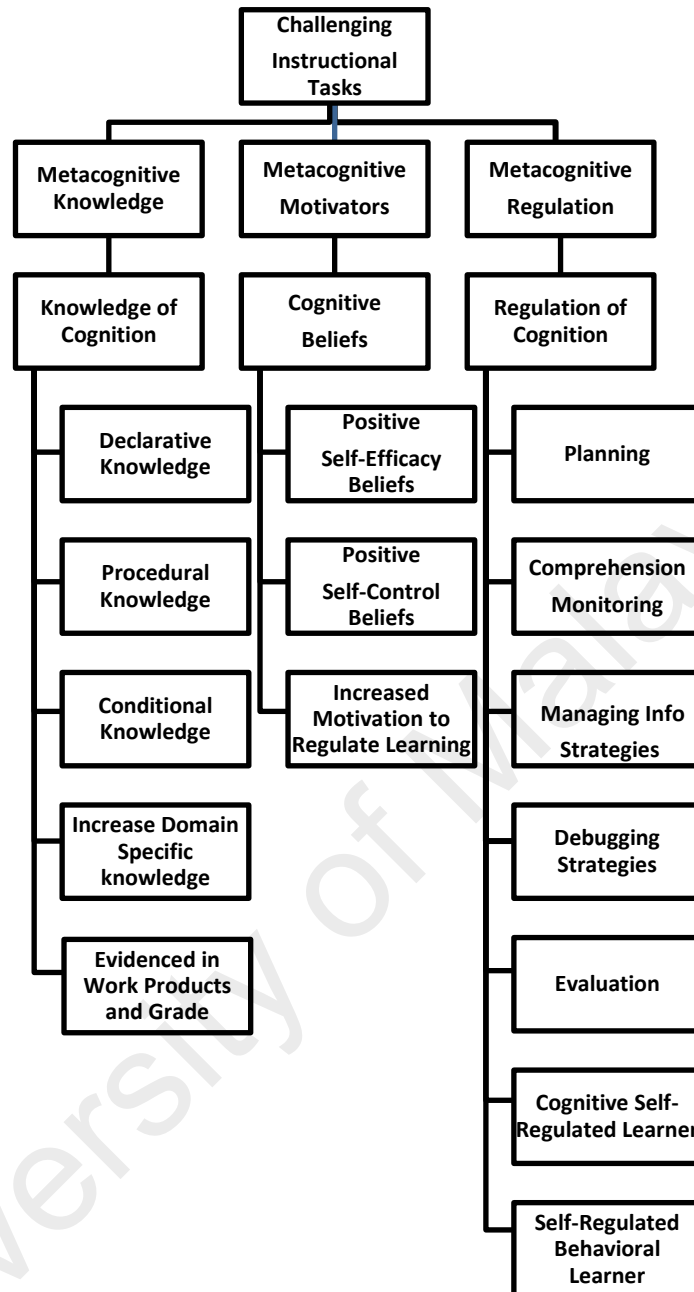


Figure 4.11. Metacognition as a Mediator between Instructional Task and Learning Outcomes.

Figure 4.11 shows the relationship between instructional tasks, metacognitive processes and cognitive processes clearly before they transform into behavioral evidence of student learning. It shows how challenging instructional tasks engage the three dimensions: metacognitive, cognitive, and behavioral dimensions. The flow chart of the key concepts studied in relation to student metacognition in Figure 4.11 clearly illustrate the dynamic relations between instructional tasks, student metacognition,

student cognition, student underlying behavioral patterns of learning. It clearly showed the mediating role of metamotivators between MK and MR to enhance student metacognition before a better control and regulation of cognition or student learning can take place. The final evidence of learning is observable when cognition is transformed into behavioral or actions of learning.

Before students can self-regulate their learning behavior, extrinsic motivators are needed to reinforce their drive through reward and punishment to motivate them to action. Reward can be in the form of getting into a university of their choice, or career, or scholarship or respect from peers, and punishment can be in the form of fear of failure or shame.

Consequently, in the next stage, students are driven to work on their assigned task in completing their portfolio. The final outcomes are the learning gains that are observed in students who managed to negotiate through this complicated process of successful transfer of learning. All high achievers navigate through these stages daily through constant reflection of their learning process before, during, and after as reported in the interviews, and evidenced in their work products in their portfolio showing high self-regulated learning taking place. Successful transfer of learning requires strong metacognitive knowledge, positive metamotivators, high metacognitive regulation, extrinsic motivators, constant reflection to create a clear, rational, concise, and in-depth conceptual mental models that linked all the concepts for easier recall, and adaptability to change.

Research Question 5. What is the relative contribution of metacognition, motivation, and instructional task toward student achievement in Sociology?

4.9 The Relative Contribution of Instructional Tasks, Student Metacognition, and Student Motivation to Student Achievement in Sociology

The role of student metacognition as a mediator can be seen in how high achievers in Sociology frequently reflect on what they learn. The level of reflection

consists of the higher order of thinking skills such as evaluation of what they know and what they do not know and MR strategies on how to close the gap between the two situations of knowing and not knowing what they learn. The salient metacognitive characteristics of high achiever of evaluative reflection is clearly reported in the in-depth interviews as compared to the low and average achievers' lacked of frequency of reflection on what they learn.

Firstly, reflection is the action verb of the concept of metacognition. Secondly, the type of reflection which is mainly evaluative plays an important part in the process of MR. Evaluative reflection is one of the key MR strategies. Thirdly, the higher the level of student metacognitive awareness as analyzed in research 1(b) in Section 4.3 correlate with higher Sociology student achievement scores.

The importance of the role of metacognition in student learning in Sociology is shown in the quantitative analysis of the closed-ended questionnaire PAS. A significant correlation, $r=.79$, $p<.001$, $N=115$ between the two main components of metacognitive knowledge and metacognitive regulation was found. This showed that there is a shared variance of 62% in the MK and MR scores. In addition, a significant correlation, $r= .48$, $p<.001$, $N=115$ between student motivation and student metacognition was also found. This indicated a shared variance of 23%, i.e., student metacognition explains 23% variance in the scores of student motivation.

Firstly, in order to understand the relative contribution of instructional tasks, student metacognition, and student motivation to student achievement in Sociology a simultaneous multiple regression analysis was conducted to test the effect of three independent variables, student portfolio, student metacognition, and student motivation on the dependent variable, student achievement scores. The association between the dependent and independent variables is moderately strong (Multiple $R= 0.51$) as shown in Table 4.15. Student portfolio, student metacognition, and student motivation

significantly predicted student achievement scores, $F(3, 111) = 12.78, p < .001$. All three variables together were positively and significantly related to achievement scores.

Table 4.15

Summary of Simultaneous Multiple Regression Analysis for Variables

Predicting Student Achievement (N=115)

Model 1			
Variable	B	SE B	β
Portfolio	.12	.03	.39
Metacognition	.01	.01	.19
Motivation	.01	.01	.11
R		.51	
R ²		.26	
F for change in R ²		12.78*	

NOTE. R² = .26, * $p < .001$.

Table 4.16

Simultaneous Multiple Regression Analysis of Variance of Sociology Student Scores

Model 3	SS	df	MS	F	p
Regression	93.63	3	31.21	12.78	.001
Residual	271.02	111	2.44		
Total	364.64	114			

a. Predictors: (Constant), Portfolio, Metacognition, Motivation.

b. Dependent Variable: Score.

Table 4.15 and Table 4.16 summarized the findings of the simultaneous multiple regression analysis of the data. Portfolio, metacognition, and motivation accounted for 26% explained variation in the achievement score. In this model, the standardized regression coefficient for Portfolio was .39 (95% CI = .07-.17); for Student Metacognition was .19 (95% CI = .001-.02), and for Student Motivation it was .11 (95% CI = -.01-.03).

Secondly, a hierarchical multiple regression analysis was conducted to test which of the three independent variables: student portfolio, student metacognition, and

student motivation is the best predictor of student achievement scores. The association between the dependent and independent variables is moderately strong ($R= 0.44$) for Model 1 and ($R=.50$) for Model 2, and ($R=.51$) for Model 3. Model 3 showed that the effect of student motivation was negligible as there was only a slight change in R squared ($R^2= .01$). This indicated that Model 2 was a better model to explain the variance in student achievement score as shown in Table 4.17.

Table 4.17

Summary of Hierarchical Regression Analysis for Variables Predicting Student Achievement (N=115)

Variable	Model 1			Model 2			Model 3		
	B	SE B	β	B	SE B	β	B	SE B	β
Portfolio	.14	.03	.45	.12	.03	.40	.12	.03	.39
Metacognition				.01	.004	.25	.010	.005	.193
Motivation							.010	.009	.106
R^2		.19			.25			.26	
F for change in R^2		26.39*			18.52**			12.78***	

Note: $R^2= .19$ for Model 1; $\Delta R^2= .06$ for Model 2; $\Delta R^2=.01$ for Model 3.
 * $p<.001$. ** $p<.0.004$. *** $p<.27$

Student portfolio and student metacognition accounted for 25% explained variation in the achievement score for Model 2. Student portfolio accounted for 19% ($R^2= .19$), while student metacognition accounted for 6% ($R^2=.06$) explained variation in the achievement score. In Model 2, the regression coefficient for Portfolio was .40 (95% CI = .07-.17) and; for Student Metacognition was .25 (95% CI= .004-.021). Since the confidence level did not encompass a negative value, it can be concluded that the population regression coefficients for Model 2 were positive (Portfolios $-t= 4.75, p= 0.001$ and Student Metacognition $-t= 2.97, p =.004$).

The standardized regression coefficients in Model 3 showed that student portfolio ($\beta=.39$) is a better predictor than student metacognition ($\beta=.19$) and student motivation ($\beta=.10$). Student metacognition also contributed significantly as a predictor to student achievement scores. Student motivation is not a significant predictor of student achievement scores.

In Model 2, student portfolio and student metacognition significantly predicted students achievement scores, $F(2, 112) = 18.52, p < .001$. Student portfolio explained a significant proportion of variance in achievement scores, $r=.44, R^2 = .19$, and student portfolio and student metacognition explained a significant proportion of variance in achievement scores, $r=.50, R^2 = .25$. Table 4.18 shows the results of the analysis of variance of sociology scores among students for Model 2.

Table 4.18

Hierarchical Multiple Regression Analysis of Variance of Sociology Scores among Students for Model 2

Model 2	SS	df	MS	F	p
Regression	90.64	2	45.32	18.52	.001
Residual	274.01111		2.45		
Total	364.64	114			

a. Predictors: (Constant), Portfolio, Metacognition.

b. Dependent Variable: Score.

The results showed that student portfolio is a better predictor of student achievement than student metacognition and student motivation. Although the findings showed that a majority of interviewees have low metacognitive awareness, it does not mean that metacognition is a weaker predictor. If the students were trained to improve their metacognitive awareness, then the results may have been different. Metacognition

helped student to reflect on the instructional tasks required for successful completion of their student portfolio and to achieve gains in achievement score.

In addition, the result shows the importance of instructional tasks such as student portfolio on achievement score. The positively significant but low contribution of metacognition showed that students at pre-university have not fully become aware of the strategic use of metacognition in student learning. The significant but low contribution of motivation could be due to the overlapping contribution of metacognition, and showed that transforming student metacognition into behavioral motivational drive is not an easy task. Much of intrinsic motivation is already reported in metacognitive awareness and this could be inferred that intrinsic motivation contributed more directly to tasks completion and eventual learning outcomes than extrinsic motivation. Therefore, learning is only successful for students who had managed to transform their metacognition into cognition and finally planned behavioral action to success.

Figure 4.12 showed how metacognition (MC), cognition(C), and motivation (M) work together to bring about the volition to complete instructional tasks such as argumentative essays for student portfolio. A successful planned action to learn requires many factors to work together. The shaded intersection area between MC and M shows student metacognition overlaps with student motivation. This overlapping part consists of intrinsic motivation of metamotivators (IGO). The part of motivation that does not overlap with metacognition consists of extrinsic motivators (EGO).

The intersection area between cognition and metacognition consists of knowledge of cognition (KC) and shows how intrinsic and extrinsic motivation works together to bring about volition to learn, and the part of metacognition not overlapping with cognition consists of regulation of cognition (RC). The non-overlapping portion of cognition consists of other domain general knowledge.

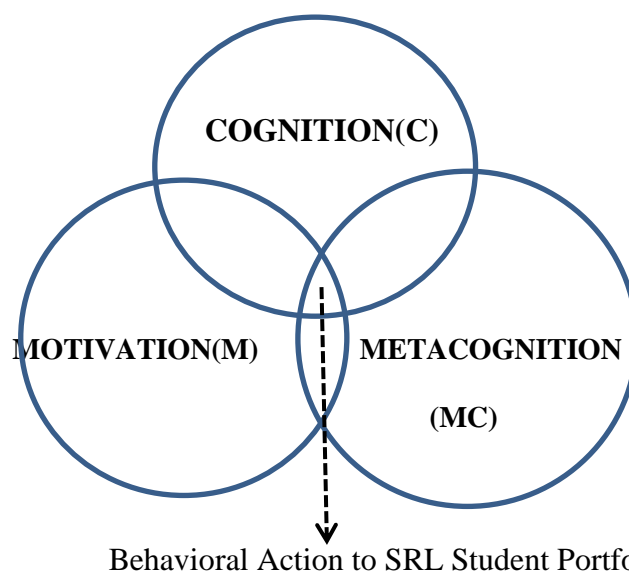


Figure 4.12. Contributing factors for student achievement scores among student portfolio, student metacognition, and student motivation.

The intersection area between cognition and motivation consists of cognitive beliefs about self-efficacy and self-control. These beliefs are the intrinsic metamotivators to drive cognitive regulation before behavioral action follows.

The central common intersection area of metacognition, cognition, and motivation shows the need for an individual to become aware of his or her intrinsic and extrinsic goals before he or she is motivated to carry out unobservable regulation of cognition, and finally observable self-regulating learning behavior in the form of evidential tasks in student portfolio. Learning was observed at two stages: students' ability to regulate his cognition to enhance his knowledge of cognition and secondly, the output of learning outcomes in the form of students' work products and improved academic score. Metacognitive planned action of learning allows learning to occur at the cognitive level before the observable, measurable and evidential behavioral stage of learning.

4.10 Summary of Findings

Successful learning occurs for some students, but not for all even when they had received the same stimulus such as same instructor, same reading materials or texts, same conditions in a class or college and even same cultural context. Three phases of student metacognitive learning processes were clearly described metacognitive knowledge(MK) phase, meta-motivators(MM) phase& metacognitive regulation (MR) phase. Three dimensions of the complex learning processes were clearly illustrated and explain. They are the metacognitive dimension, cognitive dimension, and behavioural dimension. In addition, the study documented many interesting, practical, and useful metacognitive regulating strategies used by students documented. In addition, the metacognitive characteristics of high, average and low achievers were categorized for profiling of students in the classroom. The qualitative analysis of data also described how student metacognitive strategies changes through self-reflecting, self-monitoring, self-control, self-motivating processes. A profile of high achieving Sociology student consisting of individual characteristics such as evaluative reflectivist, high self-knowledge, high self-control, self-motivator, and self-selective concise constructivist. This profile is later used in chapter five to develop metacognitive instructional tasks that will modelled high achievers metacognitive processes in instructional design.

Eight factors that motivate Sociology students' use of their metacognition and four key characteristics of instructional task composed of optimally challenging, reflectivist, self-constructivist, & evaluative tasks were categorized. These factors helped in designing metacognitive instructional tasks in chapter 5.

In the quantitative analysis, a comparison of achievements scores of students with high, medium, and low metacognition was found to be significantly different. This finding supports the study that metacognitive level of a student can be a relevant predictor of student achievement in Sociology. In addition, the hierarchical regression analysis of data among students with three different levels of metacognition,

instructional tasks in the form of portfolio, and self-reported levels of motivations found a significant effect on student achievement scores in Sociology. The positive contribution of metacognition relative to instructional tasks showed the importance of the role of metacognition as a mediator between instruction and student cognition of learning.

Who are the students that are able to learn and experience a transformative learning experience? What kind of learning occurs? When and why does learning occur?

4.10.1 Successful Learning Achievement

4.10.1.1 Who achieved successful learning?

Successful learning occurs for students who have high metacognitive awareness and are intrinsically motivated to learn for learning. They are satisfied just learning something new and constantly challenged themselves to solve more difficult problems. These students have achieved successful transformation at the end of the course as they are highly motivated with good MK and MR of cognitive learning strategies.

4.10.1.2 How did they achieve successful learning?

How do they gain this concise mental model? This happens when they have gained a concise mental schema of whatever they intended to learn from frequent reflection of what they learn. Reflexivity is how they have managed to attain a clear and concise mental model. They have learnt the underlying patterns of each concept taught in the course.

4.10.1.3 When did students achieve successful learning?

Successful learning took place when these achieving students became experts at information processing and documentation until they developed a concise mental model of the subject matter. They practiced accurate judgment of learning at selecting what is important to learn, and they organized the information until it falls into an easily retained mental model that is easy to recall. They have assimilated and accommodated

the new information into a concise mental model that is easy for retention and recall later.

4.10.1.4 What kind of successful learning took places?

The kinds of successful learning that took place occur for similar kind of problems known as near transfer of learning or for different contexts known as far transfer of learning. For example, Sociology students who are able to transfer the knowledge of one theory by applying it to different contexts are showing evidence of far transfer or an ability to apply theory to real life problems in society.

4.10.1.5 Why did successful learning take place?

Successful learning took place because of many factors. Students with higher needs for achievement were more motivated to learn. They have positive self-efficacy and accurate self-control beliefs about their actions. These beliefs provided strong intrinsic metamotivators to learn new things.

When their metacognitive awareness is raised, learning can take place more successfully as seen in the high achievers. They are aware of what they know and what they do not know. They are aware of what learning strategies and when to apply them.

4.10.1.6 Who failed to achieve and why?

Students who have low metacognitive awareness and low motivation failed to learn. These students are not intrinsically motivated although they may be extrinsically motivated. They do not value the task of learning and have negative attitude and beliefs towards actions of learning. These students are unable to achieve successful transformation at the end of the course as they are not motivated with their weak MK and limited MR of cognitive learning strategies.

They did not spend time and effort evaluating what they learn through frequent reflection. Thus, they lacked comprehension monitoring, information management, and debugging strategies to develop clear and concise mental model of the subject. Without a clear and concise mental model, they are unable to retrieve information for learning to

occur effectively. They are unable to apply what they know successfully to similar and different contexts. These students failed to achieve much learning as they lacked motivation and metacognitive awareness of what they know, how they know, when, and why they know.

University of Malaya

CHAPTER 5

DISCUSSION, CONCLUSION, AND IMPLICATIONS

5.1 Introduction

The findings showed three key factors: metacognition, optimally challenging tasks, and meta-motivation contribute to student achievement. The level of metacognition, evidential work products in student portfolio, and self-reported meta-motivational level in intrinsically motivated students were independent variables that influence student achievement in Sociology. The qualitative and quantitative findings supported the inference that metacognition is the missing link between instructional tasks completion and student learning, and meta-motivation is the missing link between metacognitive knowledge and metacognitive regulation.

There are two key components of metacognition: metacognitive knowledge and metacognitive regulation. Metacognitive knowledge consists of knowing what, how and when to apply knowledge. These are important learning outcomes. Metacognitive regulation refers to reflective actions on planning, comprehension monitoring, information managing, debugging, and evaluating. The research question one, one (a) and two contributed richly to the detailed description and explanation of metacognitive processes and strategies that students engage in to achieve learning gains. These are summarized in Table 5.2, Table 5.3, Table 5.4 and Table 5.5.

This study in research question one (b) found a positively significant correlation between total score on the MAI and achievement grade in the course. There was a significant effect of metacognition on achievement scores at the $p < .01$ level for the three groups, $F(2, 112) = 8.50, p < .01$). The results suggested that students with high levels of metacognition performed better in their academic achievement, especially for students with low metacognition their achievement scores were significantly different from that of medium and high metacognition. This study found student metacognition accounted for 6 % of explained variance in the achievement score and found

significant correlation of $r=.24$, $p<.01$, $N=115$ between the total score of the MAI and their final course grade. This finding is consistent with findings by Young & Fry (2008) study that found a significant correlation of $r = .19$, $p<.05$, $N=178$ between the total score of the MAI and their end of course grade. These results showed that metacognitive awareness are related to academic achievement, and provides further support for the validity of the MAI instrument to be used as a quick initial predictor of achievement scores.

The findings of the study also concurred with some of the five variables identified by Conti and Fellenz's (1991) study. They developed the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) dealing with real life adult learning. The SKILLS inventory is based on five aspects of the learning process: metacognition, metamotivation, memory, resource management, and critical thinking. Many of the assumptions of real-life adult learning by Conti and Fellenz are similar to the sociological problems dealt in this course as mentioned in the literature review. Thus, the five aspects of SKILLS are relevant to support the findings of this study. Critical thinking is involved in evaluation and debugging strategies while resource management and memory are involved in information management strategies in the MAI. Thus, the five aspects of SKILLS can be further reduced to two key factors, namely metacognition and metamotivation as shown in the findings in this study.

In this study, metacognition and meta-motivation are important factors for successful completion of optimally challenging tasks. The final learning outcome is improved learning achievement as evidenced in the grade obtained in successful performance. However, there must be some prior level of cognition before systematic regulation of cognition is necessary. All students come to class with some prior cognition. It is during the schooling process of learning how to acquire, evaluate, validate, accommodate, and assimilate knowledge that regulation of cognition becomes extremely important for students to improve their academic achievement or

achievement in any other areas. Without the strategies of regulating cognition, knowledge of cognition will just remain the same. Student metacognition monitor and control student cognition. Recent research has shown that higher levels of metacognition allow high level of self-monitoring and self-evaluation that enhance student cognition (Pellegrino, 2006). It is not enough for student cognition of what, how, and when something happens but knowing what you know, how you know, and when you know to apply knowledge is raising the individuals' self-awareness of his capabilities and limitations as a conscious human being. Metacognition is the 'thermostat' of cognition.

5.2 Discussion

5.2.1 Metacognition as a Mediator

The findings support the proposition that metacognition plays a role between instruction and learning. The findings are consistent with the literature such as Young and Fry (2008) which have also found positively significant correlation between total score on the MAI and achievement grade in the courses. Efklides (2006) have also argued the importance of including metacognitive experiences in the three phases of task processing such as forethought, on-task processes, and reaction and reflection found in Ainley, Hidi, and Berndorff (2002) findings. He argued that metacognitive experience is the missing link in the self-regulated learning process. The findings in this study also confirmed the importance of metacognitive knowledge or experiences are needed learning to take place. Efklides (2006) believed that including measurement of metacognitive experiences with other affective experiences can help increase the reliability and validity of online measures and understanding of the self-regulation process. Metacognition consists of knowledge of cognition through documentation of experiences that can be called forth to assist in regulation of cognition for similar tasks to dissimilar tasks. Metacognition has been shown to be more important for new and challenging tasks. The pre-university Sociology students reported difficulty in doing

argumentative essays as they were new to such tasks that required language, writing, thinking, research, and examination skills. After gaining procedural knowledge in the first few months of the course, students were more settled in and did not complain as much of the difficulty and could do the tasks with ease. These students were just beginning to develop their metacognitive awareness. Many reported that after experiencing failures to meet their academic expectations of SPM level, they began reflecting on their learning. If metacognitive training is provided at an earlier stage, many students would be better able to regulate their cognition and thereby enriched their educational journey in many ways such as acquiring learning strategies to achieve higher academic achievement with less stress.

Efklides (2006) defined metacognitive experiences as online feelings, judgments or estimates, and thought that people are aware of during task processing. He argued that affective experiences such as feeling of difficulty or satisfaction and thoughts on strategies provided the interface between person and task. These subjective responses are sometimes evident in self-talk when solving a problem. It influences a student's self-concept and motivation and thus will influence future decisions for similar task engagement (Efklides & Tsiora, 2002). Efklides concluded that metacognitive experiences are critical for self-regulated learning. Efklides' findings and evaluation on metacognitive experiences which he termed as subjective responses are similar to the findings in this study on the importance of positive meta-motivators or subjective beliefs such as 'I can do it' of students helped to motivate further self-regulated learning and completion of their tasks assigned for their portfolio. The affective domain which influences motivation to regulate learning although unobservable was self-reported by students in the in-depth interviews. These positive meta-motivators need to be supported and encouraged in students for further motivated behavior to self-regulate their learning.

5.2.1.1 Levels of metacognitive knowledge

The data from the in-depth interviews showed that student knowledge of cognition plays a role between a student's cognition and instructional tasks. The level of student's knowledge of cognition such as their declarative, procedural and conditional knowledge can describe their potential for achievement in the course. Vice-versa, a student's level of achievement tells us something about their level knowledge of cognition. Student knowledge of cognition becomes observable and measurable in their performance in the summative final examinations. But, instructional tasks such as completion of work products successfully for student portfolio are formative assessments for students and teachers to increase awareness of their metacognition of their learning progress such as how much they have learn, how much they can remember, and when and why they can apply what they learn.

The data showed that student metacognition consisted of metacognitive knowledge such as knowing what they learn, knowing how they learn, and knowing when and why they learn which play a role in student learning process. Without metacognitive knowledge, the student will not be aware of their cognition as well as how, when, and why they learn. With metacognition, students are now able to demonstrate in behavioral actions as evidences of their cognition. For example in this study, students who were able to complete the instructional tasks of writing argumentative essays or solving sociological problems in their portfolio are tangible evidence of good knowledge of the subject and accurate knowledge of their cognition. They performed relatively better in their final examinations compared to those with low knowledge of their cognition or low metacognition. Thus, instructional tasks that are challenging engaged the student metacognition as well as cognition. Instructional tasks had enable students to achieve a larger gain in learning outcomes as seen in their final examination results.

Table 5.1

Levels of Metacognition and Bloom Revised Taxonomy of Knowledge

LEVELS	METACOGNITION	BLOOM'S REVISED TAXONOMY
ONE	UNAWARE USE	REMEMBER BUT UNAWARE
TWO	AWARE USE	REMEMBER AND UNDERSTAND
THREE	STRATEGIC USE	APPLY
FOUR	CRITICAL USE	EVALUATE
FIVE	CREATIVE USE	CREATE

Note: 1. **Unaware use** refers to decision-making without thinking about it.
 2. **Aware use** refers to consciously thinking of when he or she is doing it
 3. **Strategic use** refers to organized thinking by way of particular conscious strategies that enhance its efficacy.
 4. **Critical use** refers to evaluation before, after and during the process pondering on how to proceed and how to improve.
 5. **Creative Use** refers to a new order of consciousness as reframing his thinking and developing a new way of making meaning to the highest point of transformative reflections.

Swartz and Perkins (1989) categorized metacognition into four levels: tacit use, aware use, strategic use, and reflective use. Similarly, Grossman (2009) categorized metacognition into another four levels: content-based reflection, metacognitive reflection, self-authorship reflection, and transformative reflection. There were some overlapping categories between the two studies. A more concise five levels of metacognition adapted from the revised Bloom Taxonomy by Anderson and Krathwohl (2001) and Mayer (2002) as in Table 5.1 can be used for assessing students' metacognition. Based on the literature review and findings in this study, the suggested five levels of metacognition provide a quick and functional checklist for assessment of student metacognition that is aligned with assessment of student content knowledge. This parallel assessment of the two types of knowledge i.e. metacognitive knowledge and content knowledge will help teachers to understand what students know about how they learn and what they learn.

5.2. 1.2 Metacognitive knowledge

Metacognitive knowledge, experiences, skills, or strategies are important for successful planned self-regulated learning action to take place. This study discovered the metacognitive processes of how students know what, how, when, and why they know as shown in Table 5.2 below. Past research have categorized metacognitive knowledge into declarative knowledge, procedural knowledge, and conditional knowledge and did not emphasize on the processes needed to acquire metacognitive knowledge. This study has enriched the knowledge of metacognitive processes of knowing what students know, how they know, and when and why they know. This study described in detail the many procedural strategies for students to know what they know such as reading, listening, applying, explaining to themselves and others, experiences, researching, understanding, observing, executing, practicing, by doing, observing the teacher, exposing, expressing in social situations, putting on paper, reflecting in everyday activities, answering questions in class discussions, passing class tests, scoring high, forming mental maps or mapping out their ideas, quizzing or testing oneself, remembering, and relating to daily social life. However, the findings showed that pre-university Sociology students have limited procedural knowledge mainly reading and listening. The study also showed that students need to carry out some behavioral action to acquire knowledge in a raw or initial form. When questioned on how they knew how to learn, a few students replied from common sense, from knowing within oneself, from the norms in society since primary school. A few students gave more vivid descriptions of how they know what they know because they had metacognitive experiences from informal and formal socialization. One student said her mother told her but many said they were not formally told that to acquire knowledge, they had to do all of the above actions. Some just knew. This study suggested the need for teachers to teach how to learn. Teachers can help students to know what they know by designing instructional tasks that promotes metacognition of learning. There must be

ample opportunities such as formative assessment or just reading assignments for the learners to know more and also how much he knows about the subject.

Table 5.2

The Metacognitive Processes in Acquiring Metacognitive Knowledge (MK)

Types of Metacognitive Knowledge	Metacognitive Processes
1. Declarative Knowledge	Recalling, Telling, Explaining, Applying
2. Procedural Knowledge	Reading, Observing, Listening, Doing
3. Conditional Knowledge	Reflecting, Evaluating, Relating

5.2. 1.3 Metacognitive regulating strategies

This study found that metacognitive regulating strategies such as planning, comprehension monitoring, information processing strategies, debugging strategies, and evaluation are important to student achieving academic success. The findings from the qualitative and quantitative data supported the need for metacognitive regulation for actual task completion such as student portfolio of tasks. The number of pieces of work completed by students showed the evidence of metacognitive regulation that was manifested into behavioral work outputs. The metacognitive knowledge, skills, and experiences of students helped them to know how and when to monitor their cognition to be successful in task completion such as completion of assignments. The successful completion of the 20 essays assigned for the student portfolio is the manifested behavioral action of learning that requires knowledge, skills and strategies to regulate their cognition in a productive way.

Table 5.3

The Metacognitive Processes in Acquiring Metacognitive Regulation Strategies(MR)

Metacognitive Regulating Strategies	Metacognitive Regulating Processes
1. Planning	Adjusting, Adapting,
2. Comprehension Monitoring:	Answering, Asking ,Applying , Checking, Translating, Reconstruction
3. Information Management:	Attention, Listening , Selective Exposure, Selective Perception, Selective Retention, Simplifying, Summarizing, Translating Construction, Deconstruction, Reconstruction
4. Debugging	Asking, Rereading, Changing strategies, Risk taking
5. Evaluation	Reflecting, looking back

Garner (2009) discussed five groups of key executive processes that form part of self-regulated learning such as planning, organization, impulse control, motivation, and empathy. She classified planning and organization as important executive functions and goal-directed cognitive processes that allow for the control and coordination of cognition and behavior. The capacity to plan between current or planned behaviors and future outcomes are essential to student success. Many high achievers reported flexible planning and ability to adapt to each situation as helpful to get them started. In addition, Garner classified organization as the second key component of executive functions both at the micro level and the macro level. At the micro level, cognitive organization is essential to avoid distraction and the ability to control attention and the contents of working memory (Spinella, 2005 as cited in Garner, 2009). At the macro level, organizational skills allow individuals to prioritize, manage time effectively, and keep track of tasks and belongings. Both levels promote student success. Impulse control which is the third key component of executive processes that allows for action control is

through the inhibition of inappropriate responses. High achievers exhibit high impulse control unlike students with low metacognitive awareness and difficulty getting started because of reported distractions. Student motivation and ability to empathize allow them to show pro-social behavioral norms of offering and seeking help as part of students' success at developing successful self-regulated learning.

5.2.1.1 Information Management Strategies and Working Memory Capacity

Neisser (1982) emphasized the need to study how memory is related to the learning process. He stressed the need to understand how people use their own past experiences to cope with the present and future events under natural conditions. A study of the process of learning without understanding how memory capacity can influence learning is incomplete.

Piaget (1926), cognitive constructivist theorist, discussed how the conservation rule learning develops in student and with repeated experience leads to rule induction, i.e., the number remains invariant despite changes in appearance. The motivation for forming conservation rules is due to economy of processing. When a child knows that a property or rule is conserved, it eliminates the need for constant qualifications and comparisons. The rule-learning approach explains some of the data. Since developmental learning is seen as a gradual process of the slow accumulation of conservation rules, there are no sharp stage boundaries as described by Piaget (Leahey & Harris, 2001). Piaget's (1926) cognitive constructivist theory, Anderson's (1994) schema theory and Rumelhart's (1980) mental model theory discussed in detailed how students assimilate and accommodate new data until a clear, concise, and stable mental model or schema develops. As there is limited capacity and rapid decay of information in the working memory, there is a need for the process of chunking. George Miller (1956) showed that the memory span was seven plus or minus two. Any number or facts that are more than seven digits long need encoding into long-term memory. The bits of information may be much larger through the processes of chunking. Chunking is the

process of combining pieces of information together in a form which takes up less space in working memory by using mnemonics (cited in Leahey & Harris, 2001). High achiever learns chunking at some point of their cognitive development.

This was also discussed in Neisser's (1967), *Cognitive Psychology* as cited in Ashcraft (2006). Neisser claimed that cognition "refers to all the processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used...[including] such terms as sensation, perception, imagery, retention, recall, problem-solving, and thinking".

The way high achieving students' response to learning new and huge amount of information is reductionist that is similar to how a researcher operationalizes or break down general constructs into indicators to measure the social constructs. This explained how high achievers are able to perform well as they have procedural information management system that works. This can be seen in Watson's third and fourth basic principles of behaviorism which is simplifying and reducing abstract concepts for measurement respectively. Researchers are conscious human beings just like students and both make sense of the world by simplifying, classifying and reducing abstracts concepts into something that the mind is capable to hold or store for later retrieval. This finding is supported by the Cognitive Load Theory (Sweller, van Merriënboer, & Paas, 1998) that posits a limit to the working memory capacity. Thus, students who are able to do chunking of large bits of information and reduce the load on the working memory have more capacity for processing and other executive functions. This finding suggested that curriculum design should incorporate research skills at a young age where students can model their mind on the ontology and epistemology of knowing what they know, i.e., metacognitive skills.

Recent research studies by Cowan (2005) hypothesized that the central limit in the working memory system is a capacity that is limited by the individual's focus of attention. Attention is needed in performing many instructional tasks. A greater

understanding of student's attention span can greatly help to improve learning gains. Cowan had argued that the central limitation of the working memory system is the limited capacity of an individual's focus of attention. Working memory is needed for mental tasks such as language comprehension, problem solving, and planning. In Sociology, working memory is important in retaining ideas from an early sentence to be used for constructing an argument in an essay. She also stated that many studies have found that working memory capacity varies among people, predicts individual differences in intellectual ability, and changes across life span. In the traditional classroom teachers emphasize on students' paying attention as the key factor contributing to learning and not just memory. Focus on memory capacity without attention span would have excluded an important part of the learning process. Gagne's (1985) nine events of instruction also begin with gaining students' attention. The importance of focus of attention has been researched rigorously by Cowan (1985). According to Cowan, working memory capacity is important because cognitive tasks can only be completed when students have sufficient ability to hold and process information. She found that the central memory store is limited to three to five meaningful items in young adults. She also discussed why this limitation is important, how it can be observed, how it differs among individuals, and why it may exist. However, he was aware that the ability to repeat information depended on the task demands. This is supported by Brown's (1987) view that metacognition is task dependent. This also concurs with the findings in this study on the importance of metacognition and tasks such as student portfolio. In addition, Brown argued that it is possible that expert learners or achievers execute comprehension monitoring, retention and evaluation procedures until these processes become automatized. They may or may not be conscious of their use of metacognitive strategies as with practice, they have become automatic metacognitive strategists.

One of the key characteristics of high achievers with high metacognition is that they show good regulation of cognition. They planned for success, have flexible plans that they adjust or adapt according to the needs of the subject content and the time constraint. They are constantly evaluating what they know and understand. They are constantly reflecting on what and how much they knew and understood their lessons, and they did so everywhere. They have become habitual reflector. This need for reflection is supported by Bem's Self-perception theory (1972) which states that we know ourselves by observing ourselves. The process of attribution, i.e., how we explain other's behavior by attributing to them mental states such as beliefs and desires is the same in self-attribution where we attribute our mental states from observing our beliefs and desires (Leahey & Harris, 2001). Nelson and Narens' (1990) model of the object-level and meta-level of cognitive processes showed the importance of the processes of monitoring and controlling the dynamic flow of information from object-level to meta-level, and vice-versa. Nelson and Naren's model supports the finding of this study that effective regulation of the flow of information is important to achieving learning gains.

Another important distinguishing feature of high achiever's regulation of cognition is they have good information strategies. They listened actively in class and this provides them the guidelines on what and how to simplify, summarize and translate key ideas into their own words. They produce very concise notes through selective perception of what is important. Their selection is based on paying attention and listening actively in class for guidance from the teacher on what to select. They made good decisions on selective exposure to the right learning materials, selective perception and selective retention. They are calculative rational risk-takers. They constantly reflect and weigh the cost and benefits of each task such as construction of notes. They perceived reflection as a subjective individual personal preference and they need personal time out to reflect.

Many high achievers are good observers and active listeners. They are open-minded and willing to imitate how experts in the subject cope with the course. Crossland (2010) said recent studies in brain neuroscience had shown that imitation is a very powerful pre-conscious learning strategy that teachers can deliberately use to model particular new ways of working. He found that students learn more effectively when the modeling is by peers. Thus meta-task in classrooms consisting of peer evaluation of group projects can be effective in promoting learning by observation and imitation.

High achievers who have high metacognitive skills also have good comprehension monitoring. They constantly check and monitor their understanding on what is important by answering own and others questions, asking themselves and others questions. They are patient and persistence in their willingness to read and reread until they understand. Many of them are willing to practice their thinking and writing skills by completing as many of the student portfolio assignments. They are self-regulatory learners and are able to complete 20 or more essays from the list suggested. They create opportunities to apply their knowledge and this had helped them to monitor their depth and width of understanding. They are not stressed by formative topical tests as they see them as a way to discover their level of understanding and increase their metacognitive awareness.

High achievers have effective and multiple debugging strategies. They are constantly looking for ways to make their learning easier and more effective. They show willingness to ask and answer questions, and to reread if they do not understand. They are aware when they are not clear of something and are willing to ask and check from reliable and valid sources. They have good judgment of learning and are able to select the right sources for validating information. They are open-minded and willing to try new strategies and change when necessary. These students have the flexibility to adapt and change strategies

The findings in this study that high achievers frequently evaluate what they learn showed the importance of critical thinking to successful process of learning. Many research, e.g., Brookfield (1987) , and Conti and Fellenz (1991) believed that critical thinking is an important aspect of learning. How can critical thinking be taught? Brookfield presented a simple model of the underlying patterns of critical thinking. His model of critical thinking consists of identifying and challenging assumptions, challenging the importance of context, imagining and exploring alternatives, and reflective skepticism. These are four strategies to help instructors design tasks to scaffold critical thinking. Conti and Fellenz stated that Brookfield's model moves critical thinking from an intellectual activity to a more holistic endeavor. Sociology students in this study have to go through all the four components of critical thinking to solve sociological problems. They need a higher metacognitive awareness to be able to know what stage or strategies of cognition needed to learn or solve a problem.

In addition, Conti and Fellenz (1991) argued that the current interest and research in the role of critical thinking for learning introduced a sociological dimension to it. Jarvis's (1987) model of learning integrated the personal and social aspects of learning through a reflection on experience. He concluded that learning results from the meaning attributed to an experience based on the individual's personal stock of knowledge and the interaction with the social-cultural-temporal factors. There is a need to understand the relationship between critical thinking, metacognition, and learning outcomes. The high achievers in this study were constantly reflecting on their past learning experiences to help them evaluate what they know or do not know. They reflected through questioning themselves that their work were not perfect or up to standard due to their slightly lower self-efficacy in relation to their high self-expectations and goal orientation whereas weak students have weak self-efficacy beliefs and poor judgment or evaluation of their ability and expected better grades than their work shown.

5.2.2 Metamotivation

This study found the importance of positive meta-motivators as the drive behind metacognitive regulation. Positive self-control beliefs and self-talk are examples of meta-motivators that are also known as intrinsic motivators. Table 5.4 summarizes the metacognitive processes that enable students to metamotivate regulation of their metacognition. Garner's (2009) study also found that intrinsic motivation appeared to be the key academic motivation drive closest to the executive function of general motivation drive to perform any task. Metacognitive regulation such as planning, organizing, and goal setting will not be possible without including intrinsic motivational drive to execute functions to perform.

Table 5.4

The Metacognitive Processes in Acquiring Metamotivators (MM)

Metamotivators	Metacognitive Processes
1. Self-Control Beliefs:	Evaluating or Judging accurately Setting realistic self-control beliefs Attributing success of performance to effort
2. Self-Efficacy Beliefs:	Positive self-talk Setting challenging expectations/standards/goals

Motivation of a behavioral change in learning can be considered as the second level of motivation that reinforced the positive meta-motivators. A change in learning behavior rests upon the ability for student to first regulate their cognition known as metacognitive motivation. Abraham Maslow (cited in Goble, 1970) coined the word meta-motivation as referring to drives to achieve high needs of an individual. He used the phrase meta-motivation to explain that high achievers go beyond the basic needs and they set high expectations for self-actualization. Metamotivation is driven by B-needs (Being Needs) and not D-needs (Deficiency Needs). Conti and Fellenz (1988)

went further to state that the word meta-motivation was used to emphasize the learner's control of motivational strategies and personal learning. In contrast, Tough (1971) had earlier concluded that pleasure, increased self-esteem, pleasing of others, and achieving relevant goals were useful in clarifying meta-motivational strategies. Keller's (1987) ARCS model consisting of four categories: Attention, Relevance, Confidence, and Satisfaction offered a set of categories for the analysis of metacognitive strategies. Deci and Ryan (2000) in their Self-determination theory postulate three innate psychological needs: competence, autonomy, and relatedness. There are some similarities to Tough, Keller, and Deci and Ryan's categorization of intrinsic motivation. Although, all these categories provide the intrinsic motives for the drive to learn, they are still too general to provide a procedural knowledge of how to bring about a higher level of meta-motivation to a planned action of learning. The findings of this study provided an alternative and an in-depth understanding of the metacognitive process among low, average, and high achievers in addition to the metacognitive profile of high achievers. An understanding of how student, especially expert students know what they learn, will provide some ideas about practical meta-cognitive strategies used. This will enable more effective instructional design and bring about transfer of learning.

While Zimmerman (2000) stated that the first stage of self-regulated learning process that he called forethought consisted of two processes: task analysis and self-motivational beliefs before the next stage of performance takes place. In this case study, high achieving students who are good at regulating their cognition are seen planning the tasks for cognition and they possess very positive self-motivational beliefs. Task analysis consists of goal setting such as how much they need to read or write and strategic planning too. Whereas, self-motivational beliefs such as self-efficacy or self-control, outcome expectations, intrinsic interest or value of tasks and goals orientation are the underlying motivational drive to regulate cognition. Metacognitive motivator could be said to be the mediator between knowledge of cognition and regulation of

cognition. Students who are motivated to monitor their metacognition can alert them to over-regulation, under-regulation, or learned helplessness (Zeidner, Boekaerts, & Pintrich, 2000). Many high achievers reported high self-efficacy and self-control beliefs to achieve their learning goals or targets, and are intrinsically motivated to achieve their goals and they set challenging goals which drive them to excellent performance. These high achievers engaged in flexible goals setting and changes and adapt as the course progresses whereas low achievers rarely plan any schedule for learning and attribute their failure to helplessness as they have poor memory. High achievers dislike fixed plans unlike low achievers who do not plan at all.

The relationship between instruction and motivation is a complex one. Even when teachers teach well, students may be motivated or amotivated. Deci and Ryan (1985) developed the term 'amotivated' to mean the least self-determined behavior as opposed to intrinsically motivated behavior. In terms of motivation, high achievers are more intrinsically motivated. This finding is supported by Deci and Ryan's (2002) Self-determination theory (SDT). SDT identifies three innate intrinsic needs that if satisfied, allow optimal function, growth, psychological well-being. SDT is based on the belief that human beings need to grow by showing effort, agency and commitment in their lives. These needs are seen as universal necessities that are innate and not learned and they transcend time, gender, and culture (Chirkov, Ryan, Kim & Kaplan, 2003). The Cognitive Evaluation Theory (Deci & Ryan, 1985) which is a sub-theory of SDT specifies factors explaining intrinsic motivation and how social and environmental factors such as class climate or college climate can help or hinder intrinsic motivation. According to Deci and Ryan (1985), intrinsic motivation is the natural, inherent drive to seek out challenges and new possibilities but may be promoted or hindered by social and environmental factors.

Garner (2009) in her study of 108 college students found a degree of commonality of conceptualizing the relations between executive functions and self-

regulated learning. She stated that intrinsic motivation appears to be the facet of academic motivation that is closest to the executive function of general motivational drive. This is consistent with the findings in this study where many of the high achievers self-reported high level of intrinsic motivation to learn. They enjoyed learning for itself and find solving problems to be challenging. One student stated that she is motivated to start reflecting when her interest is ignited. Low achievers are weak regulators and do not take the trouble to put on paper or write notes to reduce them. They cannot remember which strategies work even when they do apply many learning strategies. Low achievers have low motivation and have difficulty regulating their learning. They need hand-on tasks to scaffold them to learn how to regulate for some period of time. The findings in this study on the importance of intrinsic motivators or meta-motivators concurred with Garner's findings that motivation is the driver in the construct of planned action of learning behavior.

Vrugt and Oort (2008) found positive relationship between metacognition and mastery goal performance but a weak relationship between metacognition and performance. Metacognition is evoked during mastery goal performance and is important for immediate learning situations, but the relationship is indirect and cannot be predicted over a long term performance. During mastery goal performance, metacognition is needed and this helps to engage and motivate students in high order thinking skills. An understanding of the processes of student metacognition in learning will help to encourage high order thinking skills among students who are potential leaders of the future.

They also found that female students showed more metacognitive regulation strategies and are better at regulation of cognition than male students. This is similar to the findings in this study. They also discussed the positive relationship found between intelligence and metacognitive strategies. They also found that effort makes a lot of

difference in performance. High achievers are willing to expend more time and effort processing information learnt until they understand and are able to remember them too.

5.2.3 Extrinsic Motivation

The findings also showed that extrinsic motivational factors reinforced meta-motivators. Family members, peers, teachers, and classroom climate provided the informal social control to regulate learning action through internalization of the values of learning. Deci and Ryan (1985) called this type of extrinsic motivation as introjected regulation of behavior in their Organismic Integration Theory (OIT) which is a sub-theory of SDT. OIT describes four types of extrinsic motivation: external regulation, introjected regulation, regulation through identification, and integrated regulation.

Although, Garner (2009) found that executive functions overlaps with self-regulated subscales, they are not the same as metacognitive regulation in a learning environment. Executive functions were found to correlate with self-regulated learning constructs, but not all aspects of self-regulated learning are related to executive functions. In addition, she found that self-regulated learning processes implicate but are not fully driven by executive functions. She concluded that motivation appears to be an important variable for the effective application of executive functions and self-regulated learning. Her findings concurred that learning is a complex process that is influenced by many internal and external variables to the individual learner. Executive functions may be too general to predict student achievements compared to metacognition in predicting whether a learner will self-regulate his learning. She indicated that metacognition plays an important part in a student's planned action of learning.

5.3 Conclusion

The findings of this study found that metacognition acts as a mediator between instruction and student cognition of learning among pre-university Sociology students in the Malaysian context. This conclusion is consistent with past studies. Young and Fry (2008), Efklides (2006), Ainley, Hidi, and Berndorff (2002) also provide

convergent validity that metacognition can be a potential indicator of achievement score of students. In addition, this study found that positive meta-motivators consisting of positive self-control beliefs and self-efficacy beliefs motivate students metacognitive regulation. Meta-motivators is also known as intrinsic motivation is past studies on motivation that measures beliefs system. Garner's (2009) also found intrinsic motivation as the key academic motivation drive closest to the executive function of general motivation drive to perform any task. This study also documented the cyclical three phases of metacognitive processes consisting of metacognitive knowledge(MK), meta-motivators (MM), and metacognitive regulation (MR). All three phases are closely correlated and works together to enhance use of metacognition knowledge and metacognitive regulating strategies that mediates effective student cognition of learning. In conclusion, the Theory of Metacognitive Action Learning Strategies (MALS) developed from the self-reported qualitative and quantitative data analysis provides a clear, practical, and holistic explanation of a metacognitive approach to learning. MALS in Figure 5.1 clearly illustrated the three dimension of learning processes that begins from students' metacognition that mediates between instruction and their cognition of learning before behavioral evidence of learning can be obtained.

5.4 Implications for Theory of Instruction in Sociology

This study highlighted the need for instructors to have content, pedagogical, and metacognitive knowledge to plan a lesson effectively and to achieve a conceptual change in student cognition of learning. Table 5.5 summarizes the findings of the internal and external metacognitive processes and strategies that can be design to improve Sociology student metacognition to achieve more successes in learning outcomes. The internal factor component consists of metacognitive processes that a student can use to increase his level of metacognition through having an internal conversation with one self, e.g. self-indicating, self-questioning, self-observing, or self-evaluating. The external factors consists of others such as teachers or parents that can

reinforced or encourage or educate the use of metacognitive tools and strategies through an understanding of how the mind thinks by using The Theory of Metacognitive Action of Learning Strategies (MALS) which explains the three dimensional process of student learning. Teachers can administer the MAI for a quick measurement of the level of student metacognition and use the PAI for a more in-depth evaluation and debugging of learning of students' learning strategies. Evidence based portfolio assessment provide feedback for students and teachers to enhancing and monitoring student metacognition.

Table 5.5

The Internal and External Processes and Strategies to Increase Student Metacognition

Factors	Processes & Strategies
1. Internal-self	Reflecting, evaluating, monitoring, controlling, motivating, indicating, questioning, observing, conversing
2. External-others	Positive and realistic expectations from family, peers, & teachers, Positive class climate Metacognitive Awareness Instrument (MAI) Planned Action Interview (PAI) The Theory of Metacognitive Action of Learning Strategies (MALS)

The Theory of Metacognitive Action of Learning Strategies (MALS) in Figure 5.1 enriches the knowledge and understanding of the complex learning process. MALS takes into consideration the three dimension of the learning process, i.e. the metacognitive, the cognitive and the behavioral dimension. It provides an in-depth and holistic view of the multiple layers in the learning process and shows the complexities and challenge for a learner to become experts in the monitoring, controlling and evaluating of each dimension before positive learning achievements is possible. Past research in learning usually focused on the cognitive and behavioral dimensions and rarely takes into consideration the meta-dimension in the learning process.

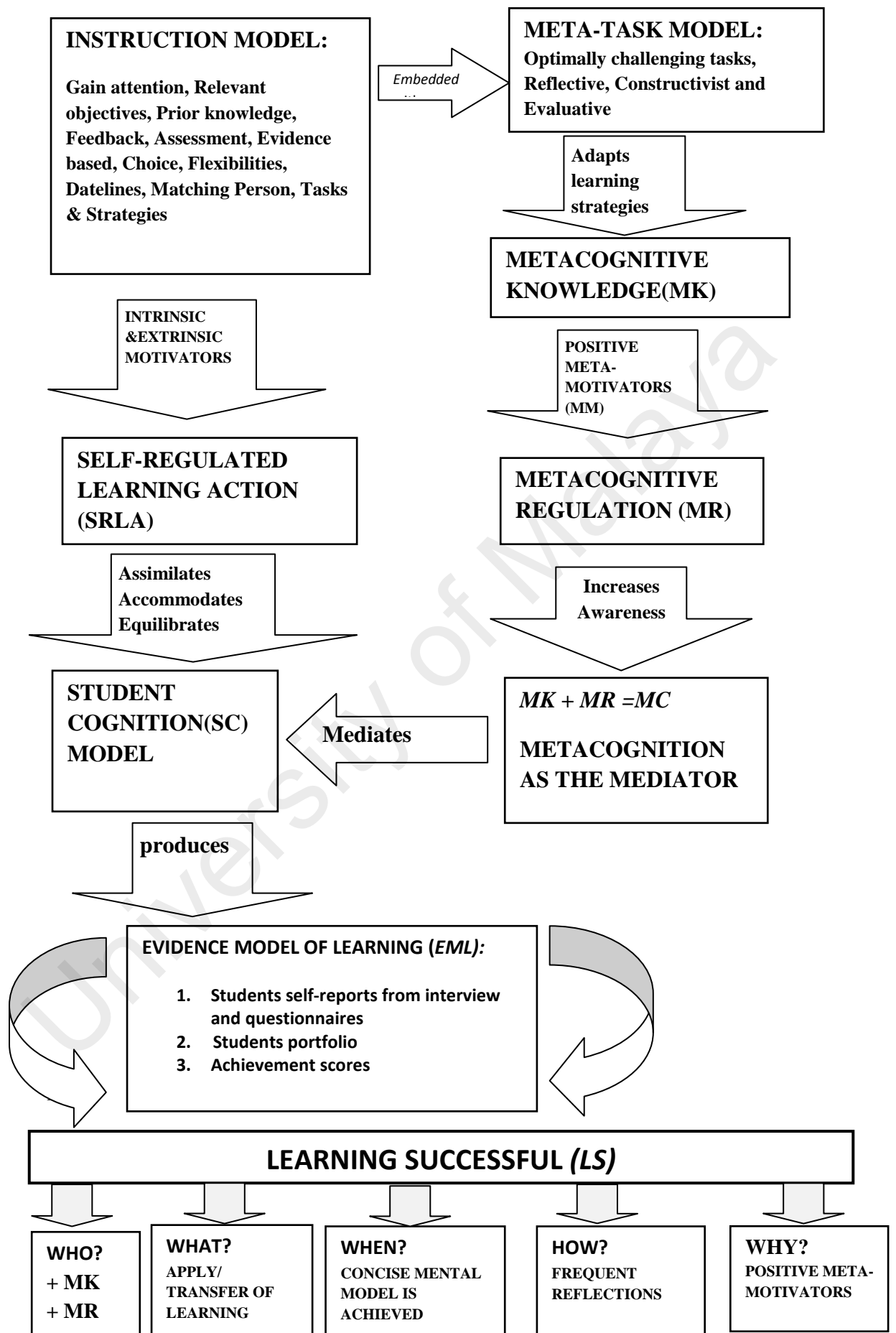


Figure 5.1. The Theory of Metacognitive Action of Learning Strategies (MALS).

This theory is distinguished from traditional contemporary theory of instructional that consists of curriculum, instruction, and assessment triad as it included the metacognitive dimension. Pellegrino (2006) stated that this critical idea of including the metacognitive approach to instruction to help students learn to control and monitor their learning goals and progress has not found its way into contemporary curricular materials and instructional materials.

Figure 5.1 shows how the components of metacognition influence student success in planned action of learning. Metacognitive knowledge and metacognitive regulation are strongly correlated as found in Chapter four. There are strong qualitative and quantitative evidence to show that, if the two components contribute positively to each other, it helps to create high metacognitive awareness especially as practiced among the high achiever. The most salient characteristics of high achievers are their habitual reflection on what, how, and when they learn before, during, and after a lesson.

The Theory of Metacognitive Action of Learning Strategies (MALS) incorporates the three key independent variables, metacognition, meta-motivation, and instructional tasks on student cognition of learning. MALS theory is based on three key theories: The Theory of Planned Behavior by Ajzen and Fishbein (1980); theories on metacognition by Flavell (1987), Schraw and Dennison (1994), Maslow's metamotivators, and the Self-Regulated Learning Model by Zimmerman (1990). The Theory of MALS focuses on how the metacognition dimension leads to the cognition dimension and finally becomes evidential in student behavioral action of learning. It is distinguished from the Theory of Planned Behavior as it not only included planning strategies in the metacognitive regulating component but many other components of metacognition. In addition, Theory of Planned Behaviour by Ajzen and Fishbein focus on beliefs system while MALS focused more on how to motivate metacognitive regulation through the metamotivators and how metacognitive knowledge is increased

through self-control and self-monitoring. MALS is also differentiated from Zimmerman's Self-Regulated Learning Model as Zimmerman focus more on behavioural dimension of control and monitoring whereas MALS focus on metacognitive regulation of cognition, i.e. control and monitoring of the cognitive dimension.

The MALS model of learning integrates the instruction task model with meta-task to increase metacognitive knowledge to adapt metacognitive regulation strategies such as planning, organizing, simplifying, summarizing, monitoring, controlling, managing, debugging, and evaluating to achieve a clear, accurate, concise, and relevant conceptual knowledge. Meta-motivators mediate between metacognitive knowledge and metacognitive regulation to bring about a change in student cognition, and finally cognitive change in self-regulating learning actions such as assimilating, accommodating, and equilibrating their mental schema through frequent reflection, evaluating, and constructing new mental models. The dynamic process of information monitoring helped them to develop clear and concise mental models that culminated in evidential learning behavioral outcomes such as improved learning performance.

Weinstein and Meyer (1994) cited in Weinstein, Husman, and Dierking (2000) also suggested metacurriculum as a method to help students develop effective learning strategies within the content of a subject. Below are discussions on differentiated instruction and the need to design instructions that are embedded with metacognitive tasks for Sociology students.

Future instructional designs will include the metacognitive dimension for subjects in Social Sciences like Sociology embedded with metacognitive-tasks that regulate cognition through optimally challenging, reflective, self-constructive, and evaluative meta-tasks e.g. MAI, PAI, DIVE, or Portfolio assessment will engage student learning and achieve positive learning outcomes.

The findings from Research Question 1, 2 and 5 showed the positive contributions of strategic, creative, and critical use of metacognition by Sociology students to achieve learning gains in the subject. Students reported how they know what they learn by applying sociological theories in explaining daily social life and sociological problems, e.g. social order, social conflict, social inequality. In addition, the implementation of portfolio assessment as one formative assessment approach is suitable for Sociology that deals with large amount of theories, facts, and concepts that make a summative examination approach too stressful for students and they are unable to appreciate the true worth of the subject especially it is about individuals and their social life. Portfolio assessment in Sociology allows students to regulate their cognition and is a strong evidential approach to what students learn about the subject and enabled them to get consistent feedback on their performance throughout the course as they continue to improve on their reading comprehension, writing of argumentative essays, and higher order thinking skills.

The Theory of Metacognitive Action of Learning Strategies (MALS) has extended the knowledge and understanding of how metacognition play the mediating role in future instructional design. The MALS provides a comprehensive approach to Theory of Instruction especially for Social Sciences such as Sociology as it includes the metacognitive, cognitive and behavioral dimensions. It is a realistic and practical approach to instructional design as the behavioral dimension of learning is a measurable form of evidential assessment that provide feedback for further regulation of students' metacognition and cognition. The Evidence Based Portfolio assessment approach provided feedback for students and teachers to enhancing and monitoring student metacognition. It focused on how meta-motivators empower students through positive self-talk, choice, flexibilities, & opportunities.

5.4.1 Differentiated Instruction for Diversity in Learning Styles

The findings from in-depth interviewees identified two types of achievers: the concise type and the detailed ones. The concise type high achievers were able to simplify and sum up what they learnt in their mind in a clear and concise mental model. In addition, they were able to produce a hard copy in students' work products representing their mental model. This is considered the highest level of evidence of self-regulation and metacognition showing the mind has already processed the facts and the interrelationships of ideas, concepts, and theories to be able to come up with a concise mental model of their learning. This showed evidence of learning. The detailed high achiever worked hard for his or her grade and did not enjoy learning for learning itself. The detailed high achievers achieved learning at a great cost of time and effort. They were not risk takers, and were unwilling to let go of much information. In the long term, the concise type high achievers performed better in the final examination compared to the detailed type high achievers. The detailed type high achiever performed better in non-examination type of course work as they were able to elaborate in great details, but under examination condition the overload of information caused them to underperform within the time constraint. Students need to identify suitable course programs to suit their learning styles. This will help them achieve their highest potential. Counseling for course suitability is needed to assess students' learning styles to provide useful advice to reduce students' dropping out of the course.

Effective instruction need to match three main variables: the individual, the task, and the strategy to generate desirable learning outcome. This study showed the need to know if the learner preferred a concise or detailed style of accumulation of knowledge. This suggestion is supported by Flavell (1979) who divided metacognition into metacognitive knowledge and regulation or experiences. He further divided metacognitive knowledge into three knowledge components: person variables, task variables, and strategy variables. He stated that metacognitive knowledge is not much

different from cognitive knowledge, but is differentiated in how it is used. Knowledge is considered metacognitive if it is used in a strategic manner to meet an objective of learning. A clear example of metacognitive knowledge being used in solving a problem: “I know that I (person variable) have difficulty with essays (task variable), so I will answer structured problems first and save the essay assignments for later (strategy variable).” Flavell’s (1979) discussion on person variables showed that there is a need for metacognitive knowledge of person variables such as learning styles, strengths, and weaknesses as an audio or visual or kinesthetic learner will be advantageous to the learner to adapt to each learning situation better. If a student knows that he preferred a concise style or a detailed style of learning, he can choose a course that is examination oriented or coursework oriented as a detailed style is not as suitable for examination based system compared to coursework based system of assessment. Metacognitive knowledge of person variables, task variables, and strategy variables can help instructors and learners to understand themselves and adapt to each learning situation better. There lies the importance of metacognitive knowledge in the learning processes. Figure 5.2 shows the three main components of metacognitive knowledge. Learners need to raise their metacognitive awareness about their knowledge of learning preference, motivation, strengths and weaknesses, their knowledge or experience of tasks, and their knowledge of strategies to solve their learning problems. Learning is optimal when there is a matching of individual, tasks, and strategies. Metacognitive knowledge is the key to match the three main variables.

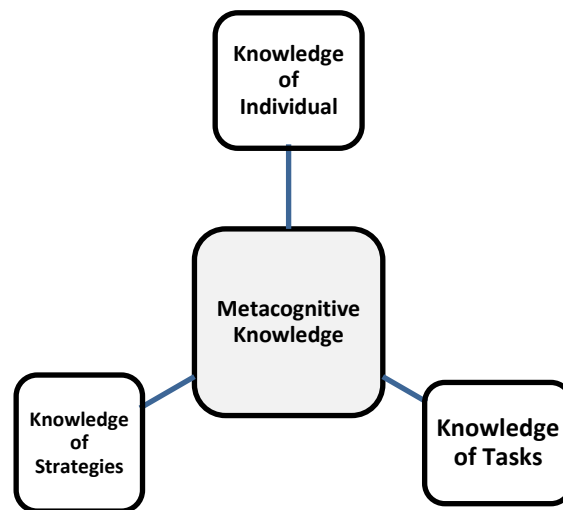


Figure 5.2. The three components of metacognitive knowledge (adopted from Flavell, 1979).

The finding of the profile of a high achiever is useful for effective and efficient instructional design to help average and low achievers to gain the skills to achieve academic gains. The high achiever consisted of a student who is reflective, adaptive, constructivist, concise and deep evaluative self-regulated learner who relate deeply to the ideas, concepts, and the theories learned. Muis and Franco (2010) research study found that profiling students helped in setting standards for learning. They found that individuals profiled as rational and empirical achieved more learning gains which is similar to the findings in this study of the profile consisting of a rational self-constructivist higher achiever who reflects frequently to achieve positive learning outcomes. Thus, this might helped in designing instructional tasks that engages students to be more rational and empirical in their approach to learning, e.g. creating more challenging opportunities for students to increase their epistemological beliefs of how they know what they know. The findings that high achieving students learnt by relating concepts agreed with Bynes and Wasik's (1991) discussion on the key underlying principle of how students' conceptual structure of knowledge are develop through mental relational representatives mentally such as semantic networks and hierarchies. Firstly, instructional design can consists of reflective, constructivist meta-tasks such as organizing, simplifying, summarizing, relating, analyzing, evaluating and synthesizing

content knowledge of the course to create clear and concise mental model practice for all learners on what is learnt for the day or week to develop habitual reflective and evaluative thinkers. Students can be encouraged to be independent constructivists by setting tasks such as creating their own notes or student portfolio of their best works. An output based approach is needed for students to create their own products.

Secondly, tasks should be unstructured problem-based so that students are encouraged to develop evaluative higher order thinking skills to become deep learners who can apply and relate strongly to the ideas, concepts, and theories learnt in the course. Students can be scaffold in the beginning to learn how to judge accurately, and eventually to learn how to evaluate their own work and even their peer's work products. This will encourage student to be confident to think and evaluate themselves independently based on a few strategies or criteria taught. In this way, life-long learners who make sense or meaning of what they learnt rather than rote learned for examination only are created.

Finally, a flexible plan that sets a final dateline at the beginning of the course consisting of student portfolio of work products will be useful to help create independent self-regulating learners. This will help students to track their own progress and time-line for completion, and help students to learn self-regulating skills such as efficient comprehension monitoring, effective information management strategies, and debugging strategies within a timeframe. Many students reported the need to have a dateline in mind to get them to regulate their learning. The findings of the profile of a high achiever can be used to structure instructional tasks designs that help average and low achievers to attain the kind of learning gains that comes so easily to high achiever who possessed some level of metacognitive skills to assist them.

An interesting finding from this study that is the group that has the highest potential to change for the better is the average achievers. The findings from the quantitative analyses showed that it was difficult to differentiate between the average

and the high achievers. This could mean that they share similar characteristics, and the average achievers have potential to improve their learning gains, just like the higher achievers. The average achievers are in the zone of proximal development (ZPD) in learning that Vygotsky (1978) described. This ZPD is the difference between an individual's current level of development and his potential level of development. The average achievers are in the level in which a student can do with help. If a student's metacognitive awareness can be improved, this student has a better chance of developing his full potential. Vygotsky (1978) argued that a simple evaluation of a task completed by one person cannot measure his cognitive development. His theory is about the potential of development of an individual rather than a snapshot evaluation of a child (Galant, as cited in Lutz and Huitt, 2004). His view would agree with the need for continuous formative instead of a single summative examination of learning where it may be too late to develop cognition (Vygotsky, as cited in Tan et al., 2003).

Therefore, a collection of student assignments regulated through student portfolio would be a useful assessment tool to access and assess a student's cognition and subsequently his or her actual performance. In addition, the students' judgment of learning improves over time with increase metacognitive awareness due to maturity or incubation of ideas or experiences. This finding concurs with past research that metacognitive awareness is multi-dimensional and dynamic. An individual's metacognitive knowledge, experiences, and strategies are developing over time. With an increased metacognitive awareness of his or her own personal traits, procedural knowledge of tasks, and knowledge of regulative strategies, a learner will have more control over his level of motivation to regulate his cognitive processes and learning behavior. This is especially accurate for the medium achievers as they are still in the zone of proximal development. These groups, when motivated intrinsically and extrinsically may eventually have integrated regulation, and gain satisfaction from the most autonomous kind of extrinsic motivation as they achieved some successes in the

learning curve (Deci & Ryan, 1985). When extrinsic motivation is in alignment with intrinsic motivation, then the student's volition to learn would be very strong.

However, this is not true for the low achievers. For decades, teachers have been looking for ways to motivate amotivated students. Amotivated means the least self-determined behavior as opposed to intrinsically motivated behavior (Deci & Ryan, 1985). Many low achievers started the course with some motivation but lost it gradually as their person variables and strategy variables do not match the task variables, and therefore they were unable to complete class assignments. Every individual wants to function, grow, and achieve psychological well-being by showing effort, agency, and commitment as suggested by Deci and Ryan's (2002) Self-determination theory (SDT). These needs are seen as universal necessities that are innate and not learned, and they transcend time, gender, and culture (Chirkov, Ryan, Kim & Kaplan, 2003). How did student become amotivated? Deci and Ryan's Cognitive Evaluation Theory (1985) is a sub-theory of SDT, specifies factors explaining intrinsic motivation as a natural, inherent drive to seek out challenges and new possibilities and how social and environmental factors such as class climate or college climate may have hindered intrinsic motivation for the low achievers. Are the tasks not challenging enough or too difficult for the students? Did their psychological well-being suffer from low self-efficacy beliefs when they failed to perform each time? Instruction need to consider task variables and need to train low achievers with strategies to overcome learning difficulties. There is a need to match person abilities with suitable strategies that are embedded in instruction to solve variable tasks. Student motivation is ignited when criteria of learning objectives matches students' individual differences as they have the ability to accomplish the task given. Tasks need to incorporate incrementally more challenging problems to maintain student motivation.

Low achievers have very few learning strategies. They need to be taught how to plan ahead. They need to acquire information management strategies and

comprehension monitoring strategies such as taking concise notes and learning to relate concepts and ideas rather than rote-learning the facts. They need learning experiences of taking rational risks to reduce the amount of information learned, and need smart learning strategies and not just effort. They need to re-learn how to learn, and to become inquisitive about their own learning capabilities. They need to take an active role in their own learning by asking and answering questions. They need to learn procedural knowledge on debugging strategies and to enjoy evaluating their learning progress. Instructional design must provide students with opportunities to learn about what, how, and why they learn. One of the most effective method observed in my 25 years of teaching Sociology, is the need to constantly remind and explain to the class why they need to learn what they learned. Not only do the teachers need to know the objectives of the lesson but the learners need to learn to convince themselves that the effort and time expended will be rewarded. This is consistent with Gagne's(1985) second event of instruction. Gagne's nine events of instruction are: gaining attention, informing learner of objectives, stimulating recall of prior learning, presenting stimulus material, provide learner guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer. According to Gagne, learning is a step-by-step process and each step must be accomplished before the next in order for learning to take place. The first two events are essential to maintain the interest of the students in the class, especially those who are easily distracted and amotivated. The third event of stimulating recall of prior learning could be embedded into the lesson through meta-tasking such as asking students to reflect on what they know and do not know. The fourth event of presenting stimulus material that consists of optimally challenging task is similar to the findings in this study. The next few events such as providing learner guidance, eliciting performance, and enhancing retention and transfer could be similar to meta-tasks of regulating cognition through learning or knowing how to learn to achieve transfer of learning.

Low academic achievers tend to give up easily when they cannot understand, and they did not try other strategies or even seek resources like other books to help them. This is where Gagne's providing feedback stage is important. This is where the instructor needs to scaffold and provide accurate evaluation to the weaker students and provide suggestions on how to debug their problems in the initial stage. A good dose of constructive criticisms coupled with a reward such as praise no matter how small the learning achievement is accomplished by the low achiever would be helpful. They need to rebuild their self-efficacy beliefs before they can develop intrinsic motivation. Praise is an extrinsic reward or motivator that eventually brings about intrinsic motivation when weak students eventually enjoy solving the learning problems themselves. Self-judgment affects overall performance. Students who consider themselves average tend to do just enough to obtain a C grade. Many weak achievers attribute poor memory as the cause of their poor performance. It is almost like self-fulfilling prophecy: 'I have poor memory so I will perform badly' or 'I perform badly because I have poor memory.' Or is this merely an excuse to justify their poor performance to reduce the cognitive dissonance that they experience so as to reduce the stress. A few weak to average students repeatedly attribute their poor performance to weakness in memory. Their self-efficacy beliefs prevented them from improving as they do not strive to do better. Accurate self-knowledge and judgment is crucial to improving academic performance.

Instructors need to be observant and wait for the first joy of success at completing a task by the slow learners and provide reward at the right time to harness optimal motivated effort gradually. This is analogical to the support by your parents when you take your first step in learning to walk or swim, or cycle. The joy of each step of success by the students can be witnessed by any instructor.

Students who are given enough opportunities to learn will develop better judgment of their learning and accurate self-knowledge. Students need to receive

accurate feedback from themselves and teachers to provide an accurate alignment of their expectations, ability, and the amount of effort and time that they need to spend on a task to achieve success. They need to develop realistic assumptions of their ability and prior knowledge before the next event of learning as suggested by Gagne (1985).

Many students, especially the low achievers, said they need external regulating factors such as examination dateline to jumpstart their learning activities. This showed the need for teachers to set a dateline for each assignment or tests to help poor regulators get started. Many students and adults today have great difficulty in just getting started in the face of much distraction due to mass media influence. Recent research has shown the need for some stress to get started. However, too much stress can become distressful or stressful on the student. Excessive strain caused some students, especially the low achievers who are poor regulators, to give up easily. Too much stress or self-perception of coming examination anxiety may be a deterrent to improve performance. The cognitive dissonance experience creates the fear of failure, leading to a sense of learned helplessness that is so negative and strong that weak regulators cannot overcome without help. Scaffolding of tasks in the early stages is needed for these weak students to increase their sense of competency to tackle any learning tasks independently.

Successive sessions of interview shows students' increased reflections on their learning strategies increased discussions with their peers, and increase class competitions. This showed the effectiveness of the PAI as a tool for teachers to raise students' metacognition of their learning strategies. Even a simple question, e.g., "what did you learn today?" can get students to increase their metacognition of the subject.

Many students think metacognition can be trained but it will be somewhat difficult initially, and need a prolonged period to make any students start to reflect on their studies. These findings are supported by Crossland (2010) that metacognition is needed for effective brain information management and support for learning spurts at

different stage. Recent advances in neuroscience also supported that cognitive development takes place until about age 25, and many interviewees in this case study were just beginning to develop high level of metacognitive awareness. It is therefore not too late even to further enhance cognitive skills when many of the pre-university students are about 18 to 19 years old. A few students managed to improve their academic performance as their metacognitive awareness developed during the course of the research.

5.5 Instructional Metacognitive Tasks Design

The findings in research question 4 found that teachers need to design instructional tasks that engage and enhance student metacognition before it mediate between instruction and student cognition of learning. Table 5.6 summarizes the characteristics and types of instructional metacognitive tasks developed in this study that can be implemented in the classroom from the findings in research question two profiling the characteristics of high achievers in Sociology, research question three on the factors that motivate students such as challenging tasks were highly valued, and research question four that discovers the type of instructional tasks that enhanced student metacognition. Research question two profiling of high achievers found the type of processes that shape the characteristic of high achievers in Sociology. Thus, a variety of tasks bank that engages the mind in these processes were developed based on the findings in research question two and research question four such as instructional meta-tasks that requires student to reflect, construct, deconstruct, reconstruct, describe, interpret, validate, evaluate, create, and challenge the students to think about knowing what, how, when, and why they think on sociological theories, concepts, ideas, problems and issues in social life and the individual. Self-reports such as MAI and PAI require the student to reflect upon knowing what he knows, how he knows, and when and why he knows. Meta-tasks create opportunities in the classroom for students to engage and enhance their metacognitive knowledge and metacognitive regulating

strategies. Instructional tasks need not be separated from meta-tasks. If instructional tasks are embedded with meta-tasks, much time and effort can be saved in implementing curriculum in the classroom. Instructional meta-tasks can help students to achieve a clear and concise model of mental schema that will help them enjoy learning with optimal stress to bring out their academic potential in the subject.

Table 5.6
The Characteristics and Types of Instructional Metacognitive Tasks

Characteristics	Instructional Metacognitive Tasks
1. Challenging	Argumentative essays pertaining to sociological problem
2. Creating	Research projects
3. Reflecting	Question and Answer session, group discussions, Self-Reports: MAI, PAI, & Subject Portfolio
4. Constructing	Note-making, organizing, summarizing, simplifying,
5. Evaluating	Peer evaluation of work products
6. Deconstructing	Analyzing stimulus reading materials on Sociological theories
7. Reconstructing	Synthesizing stimulus reading materials on Sociological issues.
8. Describing	Student oral presentation of own work products
9. Interpreting	Think Aloud session on sociological problems and their solutions
10. Validating	Evidence seeking to support reasoning on conclusions derived

Many students, from weak to a few high achievers, faced the problem of getting started due to too many distractions in today's globalized world that is filled with communication technologies such as mobile phone, Internet, and so forth.

Metacurriculum, a method of embedding learning strategy to help students develop effective learning strategies within the context of a content area, was suggested by Weinstein and Meyer, 1994, cited in Boekaerts, Pintrich, and Zeidner, (2005).

Wlodkowski (1985) insisted that the strongest motivation for learning occurs when the

task is valued. Furthermore, Meltzer (2004) developed the funnel model where she wrote about the importance of teaching students the need for executive functions which is part of metacognitive processes. Many weak students described their learning as information becoming clogged and stuck where they cannot initiate new tasks or shift flexibility. She discussed the need to teach various executive functions as part of the learning processes, e.g., planning, organizing, prioritizing, shifting, memorizing, and checking among many alternative approaches to learning. These processes are similar to many metacognitive processes. She discussed the core executive function processes that affect academic performance. There is a need for students to shift flexibly from retrieving and interpreting background knowledge to attending to and interpreting new content. These dual processes also require students to integrate known information with new content, Meltzer argued that flexibility of thinking is needed to interpret words or languages that may be ambiguous, draw inferences and conclusions and process redundant information.

Gaskins and Pressley, cited in Meltzer (2007), stated that the purpose of teaching strategies that address executive function processes are teaching students how to learn to encourage independent learning, flexible thinking, to focus on process and understanding, and help students bypass weaknesses. Gaskins (2005) mapped out the metacognitive goals that he envisioned for students who finished middle school. The following are the metacognitive development and executive functions involving taking-charge goals such as: Knowing when and why strategies, knowing academic success is the product of smart effort and put this knowledge to work, knowing how to monitor and use strategies flexibly and take initiative to apply this knowledge and knowing how to relate important key content ideas and use them to generate and recall other important ideas.

Gaskins and Elliot (1991) defined intelligent behavior as equal to knowledge plus motivation plus control. They discussed with their students on different type of

knowledge such as world knowledge, strategy knowledge, what it means to be motivated, and how to take control of reaching their goals, applying their strategies, checking their progress and modifying plans to achieve one's goals. They taught their students detailed approaches on knowing what they know, knowing how to learn, knowing when, where, and for what reason. They developed interesting strategies on how to develop students' metacognition and executive functions to take charge or control of their own learning.

Strategies to improve student metacognition, e.g., DIVE approach stands for Description, Interpretation, Validation, and Evaluation (Grossman, 2009 and Cunningham, 2007). The DIVE approach was adapted from the DIE approach developed by Janet and Milton Benner, with Kathryn Stillings (1977), which stands for Description, Interpretation, and Evaluation. Validation was a category that Cunningham added to include how a student check one's interpretation of one's learning. The validation approach is similar to the metacognitive knowledge of knowing what you know i.e. the declarative knowledge component of metacognition. Embedding lessons with the DIVE approach will engage students' metacognition and develop their awareness of what, how, when and why they know something or event to further help them monitor their cognition of learning. Other popular strategies of self-questioning are KWL, SQ4R, and IDEAL (Tan et al, 2003).

Garcia et al. (1998) discussed the use of cognitive learning strategies such as rehearsal, elaboration, and organization strategies as part of student metacognitive strategies. Livingston (2003) discussed the need to include task variables into metacognitive instructional design to help the less successful students catch up with their successful peers. She concluded that the study of metacognition has provided educational psychologists with insight about the cognitive processes involved in learning and what differentiates the successful students from their less successful peers. Teachers or instructors need to design instructional tasks that can scaffold less

successful students to achieve academic success. Tasks that are designed and assigned for classroom need to consider how it will help students regulate or control, or monitor their own performance independently.

The Expectancy-Value Theory by Eccles and Wigfield (1995, 2000) explicitly predicts that a student's expectancy for success at and value for a task is directly related to choice of tasks and performance at it. Accordingly, value of a task and success are not independent constructs. A student is motivated if he expects that he will be successful at completion of a task that he values as challenging and his performance will achieve his goals and obtained the rewards that he desired. Students' academic success is dependent on students' goal orientation, expectation for success of performance, task value, and expectation that the completion of task will get him the rewards that he desired. It has been shown that students tend to devalue tasks at which they feel less capable of success (Schweinle et al. (2006). According to Wigfield, Eccles, Schiefele, Roeser, and Davis-Kean (2006), value is predicted to be related to the goals one chooses. Utility value of a task relating current and future goals would be considered by the students, i.e., not only to students' extrinsic goals but also to the immediate and long-term goals that students have internalized. Intrinsic value, defined as enjoyment or interest, would be expected to compare to students' goals of mastery and enjoyment in learning. Goals for an activity and whether or not one expects to be successful affect motivation.

Schweinle and Helming's (2011) research explored college students' explanations of their success and failure in challenging activities and how it relates to students' efficacy, value, and engagement. Their results suggested that most students held one primary reason for success during the challenging activity such as grade (extrinsic factor), mastery goals (intrinsic factor), amotivation, social, and performance. These task reasons for success were more numerous. Task reason for success was important for engagement, intrinsic value, difficulty compared to others, and effort. As

expected, engagement and intrinsic value were highest for those with mastery reasons but lowest for those in amotivation or those who succeeded because they made the grade. Unexpectedly, success was more important for motivation and experience of the activity. These results suggested that it is important to examine not only student goals, but also whether or not students had reached their goals. Although, Schweinle and Helming's findings were not clearly explained, their key findings showed that students' success at the mastery of a task was an important factor to student motivation. When a student successfully completed a task, he is more motivated to put in further effort to succeed in his longer term goal of academic success. Therefore, design of tasks that are challenging but not beyond the skills and capability of the students will spur students on to excellent performance. Tasks that are too difficult or too easy can easily demotivate students. Schweinle and Helming's research findings concurred with Vygotsky (1978), (Csikszentmihalyi (1997, 2000), and Csikszentmihalyi et al. (1993), Schweinle et al. (2006, 2009b), Csikszentmihalyi and Nakamura (1989), Crede and Kuncel (2008), Kaufman, Agars, and Lopez-Wagner(2008) and Steinmayr and Spinath (2009) that designing tasks that are optimally challenging and based on mastery goals achievement, and which are not too difficult and not too easy to be achieved can be a catalyst for student motivation.

Vygotsky (1978) argued that optimal levels of challenge are necessary for the greatest learning. He defined tasks as optimally challenging if they were within a student's ability to perform, but also required effort so that the student must push him or herself to succeed. Optimal levels of challenge are not only necessary for learning and talent development, but also for student involvement, intrinsic motivation, and academic success. Motivation, involvement and success are predicted to be high when there is a balance between the challenges of the tasks and the students' skills, as explained by the Flow Theory (Csikszentmihalyi (1997, 2000) and Csikszentmihalyi et al. 1993). The flow theory argues that when challenge is high but balanced with

students' skills, the stage is set for optimal experiences accompanied by high positive affect, concentration, effort, efficacy, and engagement. Further, Schweinle et al. (2006, 2009b) and Csikszentmihalyi and Nakamura, 1989) suggested that challenge is linked to importance and value. When challenging activities that are not beyond students' skills and that are also perceived as highly important are assigned, motivation can be harnessed. However, students tend to devalue activities in which challenges exceed their skills. Thus, optimal challenge sets the stage for learning, affect, and motivation to learn. Such motivation and attitude variables are strong predictors of academic performance in college. Studies by Crede and Kuncel (2008), Kaufman et al. (2008) and Steinmayr and Spinath (2009) suggested that motivation and attitude variables are even stronger predictors than prior grades or depth of processing. Therefore, tasks that are designed to be optimally challenging can motivate students to greater academic achievements.

Just like how Gaskins and Elliot (1991) defined intelligent behavior as equal to knowledge plus motivation plus control, the findings of this study can also be simplified into three key internal factors for student success: metacognitive knowledge, meta-motivators, plus metacognitive regulation are essential ingredients in student success academically. The key external factors for student success tasks variables and extrinsic motivators. Task variables include metacognitive and cognitive instructional tasks that help plan and monitor student's progress such as a flexible student portfolio of work products as evidence of learning achievements. While extrinsic motivators are factors such as parents, instructors, and the punishment-reward system that operate in society for students' academic success.

This study discovered characteristics of tasks that can develop student metacognition to help them achieve learning gains which concurs with previous findings by Schlechty (2004) and Mislevy et al. (1998) that there is need to focus more on designing quality tasks that focus on the product of lesson taught. They emphasized

the need to focus on evidential work products as it provide a goal that motivates student action and as an observable evidence of students' effort, ability, and performance.

Mislevy et al. suggested the need for a task bank of activities that will provide evidence of learning for assessment and feedback. The characteristics of task identified in this study such as tasks that encourage optimal challenge, variety of choice, clear products, reflexive activities, constructivist, optimal stress, and opportunities for evaluation concur with some elements of Schlechty's (2004) WOW framework for engaging students. The evidential aspect of a learning output is supported by both Schlechty (2004) and Mislevy et al. (1998) on the need for evidence of learning through assessment of student work products.

5.6 Learning Outcomes

This research showed that learning occurs most successfully for students who practice frequency of reflections on their studies. The quantitative research question one (b) found that students with higher level of metacognitive awareness correlate with higher achievement scores in Sociology. The qualitative research question two found high achievers who frequently reflected on their learning obtained higher achievement scores in Sociology and the quantitative research question five also found a significant effect of student metacognition on achievement scores. Through frequency of reflections, they constantly evaluate what they have learnt and what they do not know, and strategize to increase their knowledge of cognition. This finding concur with Tobias and Everson(2002) who stated, that through knowledge monitoring students could differentiate between what they know and what they do not know. They considered knowledge monitoring as a prerequisite to student's ability to evaluate what they know. High achieving students who reflected and evaluated what they know constantly also showed ability to motivate themselves to regulate their cognition through positive self-talk and are then able to regulate their learning behavior. These students are able to show evidence of learning as they have developed concise mental models from frequent

reflections. These concise mental models assist them tremendously in retrieval of facts whenever they needed them to complete a task. The underlying patterns of the metacognition of high achievers such as frequent reflections and evaluation assist them to process, make sense, retain, and retrieve what they learnt more efficiently and effectively. Good learning strategies required constant information processing.

5.7 Implications for Methodology

One of the key findings of this study is that many high achievers also have higher metacognitive level and this is accurate to some extent. But their high metacognition level must be accurately assessed and measured through multiple sources as a few cases of self-report showed that low achievers self-reported a high level of motivation and metacognition on the MAI and MSLQ questionnaire surveys. But, the findings from the in-depth interview and student portfolio provided evidence that showed low knowledge of cognition and regulation of cognition for low achievers. A few high achievers reported extremely low scores on their MAI and MSLQ. The importance of accurate self-knowledge is an important component of cognition for a better judgment of learning. A few weak students tend to score themselves highly on the MAI and excellent students tend to underscore themselves. This showed that high achievers set very high goals and expectations on themselves. For example, Kay considered herself a failure when she scored 6A's out of the maximum seven subjects that she took for 'O' levels. It also showed that weak students were unable to accurately judge their ability. A few low achievers have high expectations, such as scoring an A or B in the coming examination, even when their current performance on every test showed an F or failure. They have many unrealistic assumptions of their ability.

These findings showed that quantitative scores on MAI and MSLQ have to be interpreted carefully. Such self-reports are dependent on students' accurate judgment of learning, their self-efficacy, and their goal orientation and expectations. This study found that the adapted unstructured or in-depth interview PAI protocol is a more

accurate measurement tool for student metacognition and is a better predictor than the structured MAI and MSLQ questionnaire instrument.

Efklides (2001) discussed some concerns about the reliability and validity of single self-report items. He suggested the use of behavioral and performance measures to triangulate and increase the reliability and validity of any study involving latent variables or constructs like metacognitive experiences that cannot be directly manifested. He acknowledged the difficulties of obtaining evidence on cognition or affective processes that are not manifested. He suggested the use of thinking aloud protocols to support single self-report items although he was aware of the limitations of behavioral and thinking aloud measures. In addition, he also suggested the use of measures of effort expenditure and strategies on completion of a task. Measures of metacognitive experiences before, during, and after a task will provide more access to assessment of levels of metacognitive awareness of the learner. Finally, he suggested the use of evidence of performance outcome as a measure of metacognitive experiences.

Many of the suggestions by Efklides (2001) had been applied in this case study research. Evidences of students' levels of metacognitive awareness had been accessed and assessed through self-reports such as questionnaire and in-depth interviews, students' regulation of their work products, and their performance on the subject. The triangulation of sources and methods had helped to increase the reliability and validity of the findings of this research.

Fulmer and Frijters (2009) discussed the need for an alternative approach to measure latent constructs like motivation. They agreed with Elliot (2004) and Keith and Bracken (1996) that the motivational construct is multi-dimensional and therefore needs a multi-dimensional tool to measure. They argued against quantitative self-reports which measure motivation as a state using a questionnaire at a single point in time as unsuitable. They concur with Dornyei (2000) that motivation is a process and can best

be captured by alternative phenomenological approach. Hidi, Renninger, and Krapp (1992) considered the motivational construct as fluid and situation dependent.

Shedivy (2004) stated that the positivistic quantitative analysis is deductive, and tried to measure motivation as a unidimensional construct. But, phenomenological analysis is an inductive process of discovering emergent themes in search of meanings from the interview data, rather than from the researcher's hypotheses, biases, or assumptions. Creswell (1998) defined this qualitative research approach as one that focuses on analyzing individual's accounts, experiences, and themes as a methodology of reduction.

Fulmer and Frijters (2009) presented four major stages in the analysis of data in a phenomenological study with the primary goal of describing a phenomenon. Firstly, the transcriptions of the interviews must be read to gain a sense of the broad themes. Secondly, there is a need to distinguish significant elements of the construct (i.e., motivation) in individual statements. Thirdly, the researcher must formulate the individual statements into overall meanings, which are then reduced to themes. Finally, these themes are synthesized into an overall narrative description of the phenomena, which may aid in creating models of motivational orientations (Creswell, 1998; Yeung, 2004).

Phenomenological research methods such as in-depth interviews and observation also provide an understanding of unobservable aspects of behavior, such as metacognition, and to compare multiple methods to increase reliability (Jarvenoja & Jarvela, 2005; Perry, VandeKamp, Mercer, & Nordby, 2002). The experience sampling method has emerged as a more authentic set of self-report techniques, capturing multiple reports of students' beliefs, affect, and behaviors in natural contexts in real time (Larson & Csikszentmihalyi, 1983). This approach allows for a better understanding of the dynamic patterns in an individual's motivation across time through assessing immediate reactions to different contexts or experiences, e.g., a social studies

test). This method has also been considered as more valid and strongly related to physiological and behavioral responses (Csikszentmihalyi & Larson, 1987) because students reflect on their current emotional and cognitive state, rather than years of school experiences.

Another approach such as the neuropsychological approach shared a common belief that reward is a basic goal in human behavior, and motivation and goal directed behavior are guided by appraisals of rewards, and punishments within the neural systems in the brain (Arana, Parkinson, Hinton, Holland, Owen, and Roberts, 2003). Executive functions then access these appraisals to organize behavior (Taylor, Welsh, Wager, Phan, Fitzgerald, & Gehring, 2004). These responses are typically categorized as approach or avoidance behavior based on positive and negative emotional states (Lang, Bradley, & Cuthbert, 1998). As a result, research has focused on the influence of motivation and value, usually in terms of reward anticipation and reinforcement on cognitive task performance (Taylor et al. 2004). Although, rewards as a form of motivating students is highly discussed in literature, it is rarely practiced as a form of motivating students in a planned action of learning model.

Behavioral measures are becoming quite common in research on student motivation. Measurement tasks used in measuring latent traits such as motivation and metacognition which are considered fluid and situation-dependent on situation faced concerns accounting for reliability and validity issues (Hidi et al., 1992). However, Fulmer and Frijters, (2009) suggested that integrating and mitigating the weaknesses of each approach is a more complex and difficult task. They argued that self-report methodology has strength in construct specificity although it may lack in validity. In contrast, the qualitative behavioral approach has strength in internal validity. In addition, the responses reported sometimes do not match the motivational experience and learning contexts involved. They argued that, although the phenomenological approach captures the ethnographic aspects of motivation, it may be difficult to

generalize the findings to developmental and educational processes. Recent research in validating qualitative research has suggested the duplicity of numbers to increase the reliability of the findings and provide external validity. Fulmer and Frijters suggested the use of alternative approach for attending to the weaknesses of individual approaches whereby the strength of an alternate approach such as quantitative or other qualitative approach is incorporated to triangulate the measurement scheme to increase the reliability and validity concerns.

5.8 Recommendations for Further Research

There is a need for further in-depth studies into the different levels of metacognition as well as metacognitive experiences before, during and after completion of a task. More rigorous research with larger sample sizes with different age, gender groups, or educational levels would allow the findings to be generalizable to a wider population. For example, future studies can explore the causes and effects that relate to females and their higher self-control beliefs compared to males. The literature on past and current research is convergent on the findings of this research and more empirical research at theory building on metacognition and its role as a mediator between instruction and learning will set a strong foundation for the training and development of metacognitive strategies and skills among learners of the future generation. Fagnant and Crahay (2011) stated that in the past theories of mind and metacognition have mainly been treated as independent variables. They argued that recent studies have also highlighted the importance of the overlapping areas between theories of mind and metacognition. Thus to understand how the mind reasons, there is a need for further empirical studies into how metacognition mediates reasoning or thinking especially in student cognition of learning aspects. Further areas of research of interest are the relationship between metacognition, meta-motivation, memory, higher order critical thinking, and learning outcomes.

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