School of Information Systems

Factors and Relationships influencing Self-Regulated Learning among ICT students in Australian Universities

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Doctor of Philosophy
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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated March 2014. The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee (EC00262), Approval Numbers IS_12_33, IS_12_34 and IS_13_19.

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DEDICATION

To my caring and loving husband Daivandran,
I would not be where I am today without you.
Thank you for your constant support, encouragement and love.

To my two gorgeous sons Thanush and Thaneesh,
Thank you for understanding that mommy is always studying, but knowing that you two are all that matters the most.

In loving memory of cousin
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I miss you dearly; you have been a great inspiration.

ABSTRACT

Self-regulation of learning is an essential attribute in higher education learning. Self-regulated learning is learning in which students manage their thoughts, emotions and behaviours for successful learning outcomes (Paul R. Pintrich, 1995, 2004; Philip H. Winne, 2010; Zimmerman, 2002). Higher education usually expects students to proactively plan, monitor, and assess their learning while maintaining high motivation for their academic learning, however, few students naturally do this well, even at the university level. Literature has indicated that students enrolling into universities do not fully develop competence in basic self-regulatory skills, such as setting appropriate academic goals and identifying appropriate learning strategies required to independently self-regulate learning. Thus it is evident that university students need guidance and support in developing self-regulated learning skills in addition to gaining domain knowledge (Bembenutty, 2011a; Busato, Prins, Elshout, & Hamaker, 1998; Paul R. Pintrich, 1995). Much pressure has been placed on university teaching staff to equip students with knowledge and skills necessary not only for employment but also lifelong learning; however, supporting students in self-regulating their learning is not without challenges. The challenges and constraints include heavy workload, teaching staff having a lack of confidence or the knowledge, skills, and personal beliefs about their role and responsibilities in relation to student self-regulated learning. Studies relating to teaching and learning have primarily examined either the student learning issues or staff teaching issues independently. This study, taking into account the two major actors in the tertiary teaching and learning context, investigates the factors that lead to promotion and practice self-regulation of university learning. Specifically this study investigates the factors influencing university student self-regulation of learning and the factors influencing university teaching staff facilitation of student self-regulation of learning.

This study began with a literature review, from where factors were gathered and synthesised to develop two preliminary conceptual models. The models shaped the development of and the survey instruments that included plausible factors and measurements for assessing student self-regulated learning (SRL) model and teaching staff SRL facilitation model. Students and teaching staff in ICT, engineering and science courses in 34 universities in Australia were surveyed. A total of 175

students responded to the student survey and 139 teaching staff responded to the teaching staff survey. The structural equation modelling based on the partial least squares (SEM-PLS) technique was used to analyse the data collected and to assess the student model and teaching staff model. The SEM-PLS utilises a two-step procedure of data analysis. The measurement model is assessed to ensure the accuracy of the structural model. The assessment of the measurement model is performed by examining its construct validity. Construct validity implies how the measurement instrument fits the theoretical concept. Next, the assessment of the structural model involves the test of the explanatory power and significance of the path coefficients between the latent variables. In order to evaluate the predictive power of the independent variables in the structural model, the R^2 value, which explains the variation of the dependent variable, was computed.

With regards to university students' self-regulation of learning, the outcome of this study revealed that *peer influence, family influence, mastery goal orientation, employment prospects, self-efficacy, metacognitive knowledge awareness* and *prior learning experience,* have significant influence on university students' self-regulation of learning. Interestingly, although the literature has firmly attested the significant role of teaching staff in student self-regulation of learning, this study's outcome suggests a reconsideration of this claim. Nevertheless, the impact that teaching staff support can have in facilitating students' self-regulation of learning should not be ignored. This surprising outcome implies that it is necessary for university academic managers and teaching and learning leaders to re- examine the role of teaching academics in their institution. This could commence with understanding the possible challenges in providing the necessary instructions to support student self-regulation of learning alongside imparting domain knowledge, both in general and in domain specific teaching and learning environments.

With regards to teaching staff facilitation of student self-regulated learning, the outcome of the study revealed that *time, reward and recognition, lecturer's beliefs, curriculum deign and demands, policies* and *student diversity* as having significant effects on teaching staff perception of their ability to effectively facilitate self-regulated learning skills in students. While *policies* were predicted to have significant effect, university policy was perceived to negatively impact the ability of

academics to effectively facilitate self-regulation in their students. This could be due to importance placed on the students acquiring content knowledge and skills, their passing rates and how attractively teaching staff could deliver their lessons; instead of students mastering skills beyond content knowledge such planning, self-monitoring, intellectual curiosity; effective communication skills and teamwork skill. This may call for further scrutiny regarding how university teaching and learning policies complement and support the teaching demands and challenges faced by the academics.

This study provided a lens to reflect and evaluate the current policies and practices to cultivate self-regulation of learning in Australian university teaching and learning environments. Outcomes call for academic managers at various levels including top management, teaching and learning department and faculty heads to consider their role in establishing policies and practices likely to lead to support the development of student self-regulation in learning.

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LIST OF KEY TERMS

Achievement Goals refer to the purposes or reasons a student is pursuing an academic learning (achievement) tasks (Paul R Pintrich, 2000 p. 93).

Cognition refers to the mental action or process of acquiring knowledge and understanding through thoughts, experiences, and the senses.

Cognitive engagement refers to the extent to which students' are willing and able to employ meaningful and thoughtful approaches to the learning task at hand. This includes the amount of effort students are willing to invest in working on the task and how long they persist (Corno & Mandinach, 1983).

Cognitive learning strategies include rehearsal, elaboration and organization strategies to understand unit materials and critical thinking which is the extent to which students try to apply prior knowledge to new situations and solving problems, to analyse and evaluate information in a thoughtful manner (Paul R. Pintrich, 2004; Schraw, Crippen, & Hartley, 2006).

Course is a structured combination of approved units which when completed qualifies the student for an award from the university (http://handbook.curtin.edu.au).

Learning Strategies refers to "any behavioural, cognitive, metacognitive, motivational, or affective process or action that facilitates understanding, learning, and meaningful encoding into memory" (C. E. Weinstein, Jung, & Acee, 2010 p. 323),

Mastery Goals refer to goals that orient a student to focus on the task in terms of mastering or learning how to do the task (Paul R Pintrich, 2000 p. 95)

Metacognition – refers thinking about and regulation of one own thinking. In the context of this study metacognition refers to students' awareness, knowledge, and control of their cognition (Claire Ellen Weinstein, Acee, & Jung, 2011).

Metacognitive strategies refer to approaches students invoke to monitor their cognitive strategies and to make progress toward goals. Three general processes make up metacognitive self-regulatory strategies: 1) planning, 2) monitoring, and 3) regulating (Pintrich et al., 1991).

Performance Goals refer to goals that orient a student to focus on the self, ability, or performance relative to others (Paul R Pintrich, 2000 p. 95).

Performance-approach orientation - describes performance-oriented students who approach academic tasks in order to obtain external praise or rewards (Midgley et al., 2000; Christopher A. Wolters, Yu, & Pintrich, 1996).

Performance-avoidance orientation - describes performance-oriented students' whose goal is to avoid failure, therefore shying away from, or investing less effort into challenging academic tasks (Midgley et al., 2000; Christopher A. Wolters et al., 1996).

Self-efficacy - student's judgement of their ability to complete a task (Paul R. Pintrich, 2004).

Self-Regulated Learning (SRL) - refers to learning that occurs from the influence of students' self-generated thoughts, feelings, and behaviours that are oriented toward the attainment of goals (Zimmerman, 2002).

SRL skills - SRL skills refer to a learner's ability or competence to monitor and manage their cognitive knowledge, metacognitive knowledge and their available resources for their learning which includes ability to (1) set appropriate learning goals (2) strategically plan the methods/approaches to achieve the learning goals (3) implement the planned methods accordingly (4) self-monitor their learning approaches and progress (5) self-evaluate one's approaches and progress (6) seek information from valid resources (7) seek assistance when needed and (8) ability to manage time and environment and available resources appropriately to succeed in their learning (Zimmerman, 2002).

SRL strategies - Approaches used by students aimed at acquiring knowledge and skill; and to control and manage their learning progress. Commonly used academic self-regulated learning strategies includes, reviewing, rehearsing and memorising, organising and transforming, seeking information, goal-setting and planning, self-monitoring, self-evaluation, environmental structuring and seeking assistance (C. E. Weinstein et al., 2010; Zimmerman & Martinez-Pons, 1986, 1988).

Task value refers to student's belief about the importance, utility, and relevance of a task (Paul R. Pintrich, 2004).

Unit – is a discrete component of study within a subject area that is part of a course, (refer to http://handbook.curtin.edu.au/definitions.html#U).

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CHAPTER 1
INTRODUCTION

The paradox of education is precisely this - that as one begins to become conscious one begins to examine the society in which he is being educated.

James A. Baldwin (1924 – 1987)

1.1 OVERVIEW

Self-regulation is a fundamental attribute in higher education learning. Higher education usually expects students to be proactive and to independently plan, monitor, and assess their academic learning, however, few students naturally do this well, even at the university level (Busato et al., 1998; Perry & VandeKamp, 2000). Bembenutty (2011a) noted that many university students lack basic self-regulatory skills such as the ability to set academic goals or to identify appropriate learning strategies. University teaching staff are expected to equip students with the knowledge and skills necessary not only for employment but also lifelong learning. Supporting students in self-regulating their learning is not without challenges, however.

In principal, university teaching and learning is a partnership between students and teaching staff, and therefore, this study examines the factors that encourage university students to self-regulate their learning. Understanding these factors helps to facilitate learning and create opportunities and the conditions for students to experience the benefits of self-regulation in their university learning and beyond. When discussing beliefs and teaching practices of teaching staff, Guskey (2002) noted that changes in beliefs and attitudes occurs only with evidence of improvement and positive change. Guskey's (2002) conclusion can likewise be applied to explain student attitudes toward their learning. Specifically, students will be more adaptable to changes in their learning approaches and habits after they see positive improvement in their learning outcomes.

This study also examines factors that influence the way teaching staff facilitate the self-regulation of learning behaviour in students. Guskey (2002) posits that teaching staff only change their beliefs with regard to teaching practices after they have seen successful implementation of new teaching innovations and practices, as demonstrated by improvements in student learning.

The emphasis on graduate employability and lifelong learning skills has further fuelled the need for students to self-regulate their learning (De la Harpe & Radloff, 2008; Jackson, 2014; Nagarajan & Edwards, 2014). In the light of such thinking, higher education institutions have defined attributes that graduates are expected to develop as an outcome of their university education. Universities have developed institutional policies, guidelines and systems to support the development of the identified attributes (Simon C. Barrie, 2007; De la Harpe & Radloff, 2008; Thomas, Barth, & Day, 2013). There is a broad range of literature on teaching and learning practices for student learning, particularly suggestions about how teaching staff should implement instructional practices that not only equip students with knowledge and skills, but also promote the development of student motivation to learn (Ames, 1992; Artino, 2012; Chickering, Gamson, Poulsen, & Foundation, 1987; Entwistle & Tait, 1990; Field, Duffy, & Huggins, 2014; Barbara K. Hofer & Yu, 2003; Lueddeke, 2003). Ideally, teaching and learning can be seen as a partnership between students and teaching staff. Teaching staff with excellent discipline knowledge and teaching skills, together with well-formed teaching and learning policies, guidelines, practices and support systems are necessary for student learning, but they are not enough. Equally important are the kinds of attributes students bring to their studies. These might include things such as skills, willingness and motivation to learn, self-efficacy, and learning aspirations. The best teaching practices may be ineffective if a student is not predisposed to learning. As the old saying goes; ‘you can lead a horse to water, but you cannot make it drink’. Despite the opportunities and conditions created for students by staff, the actual attainment of learning often depends on students having the mind, aspiration and the will to do so (Camahalan, 2006; Claire Ellen Weinstein et al., 2011).

There is also much discussion in the literature about the role and the responsibility of teaching staff to develop students’ discipline knowledge and skills, as well as

equipping students with learning self-regulation skills. Numerous studies have questioned the knowledge of teaching and learning, skills, methods, and beliefs held by teaching staff (Askell-Williams, Lawson, & Skrzypiec, 2012; Dignath-van Ewijk & van der Werf, 2012). Models and initiatives to assist teaching staff in facilitating the self-regulated learning behaviours of university students have also been proposed (Askell-Williams et al., 2012; Bail, Zhang, & Tachiyama, 2008; Bartimote-Aufflick, Brew, & Ainley, 2010; Deborah L. Butler, 2002; Deborah L Butler & Schnellert, 2012; Devlin & Samarawickrema, 2010; Dignath-van Ewijk & van der Werf, 2012). While the proposed models and initiatives may lead to successful teaching and learning partnerships between students and teaching staff, the practical elements and implementation of such initiatives are not without challenges. More importantly, it is crucial to investigate, understand and address the challenges, constraints and limitations faced by teaching staff in their efforts to create the conditions for, or to facilitate, student self-regulation learning behaviours. The literature shows that these challenges and constraints can include teaching staff having a lack of confidence or the knowledge, skills, and awareness of industry requirements needed to develop such attributes in the context of their discipline. Other factors include high workloads, personal beliefs about the importance of self-regulation attributes, and the task of integrating and assessing these attributes and their role and responsibilities in relation to this work (Coates et al., 2009; Dignath-van Ewijk & van der Werf, 2012; Postareff & Lindblom-Ylänne, 2008; Teekens, 2003).

Having considered the extensive research already reported concerning learning and teaching in university settings, this study investigated factors that influence the development and practice of self-regulation learning behaviours from the perspective of university students and teaching staff. This includes behaviours that contribute to the cultivation of life-long learning skills with the potential for a broader impact on employment, family and community. In this research, students and teaching staff in computing, engineering and science courses in 34 universities in Australia were surveyed in order to study the factors influencing the practice, promotion and development of self-regulated learning in university teaching and learning environments.

1.2 RESEARCH BACKGROUND

The self-regulation of learning is an essential element for the cultivation of lifelong independent learning (Järvelä & Järvenoja, 2011; Paul R. Pintrich, 2004; Zimmerman, 2002). Self-regulated learning (SRL) refers to a learner's "self-generated thoughts, feelings, and actions for attaining academic goals" (Zimmerman, 1998 p. 73). Self-regulated learners are viewed as "metacognitively, motivationally, and behaviourally active participants in their own learning process" (Zimmerman, 1986 p. 308). Self-regulation of learning helps students to cultivate better learning habits and enrich their learning skills, to apply learning strategies to enhance their academic outcomes, and to monitor and evaluate their academic progress and performance (Bembenutty, 2011a; Christopher A Wolters & Taylor, 2012; Zimmerman, 1986, 1995b). Students who learn self-regulatory processes will have a sense of control and this encourages them to pay attention to their learning (Zimmerman, 1990). This is akin to students having the "will" and the "skill" to become the masters of their own learning (Paul R. Pintrich & De Groot, 1990; Claire Ellen Weinstein et al., 2011).

The seminal work of Albert Bandura defined the self-regulation of learning as a fundamental component of any major academic endeavour. According to Bandura's (1991 p. 248; 2001) social cognitive theory, "human behaviour is extensively motivated and regulated by the ongoing exercise of self-influence." Bandura (1991) claimed that most human behaviour is regulated by forethought. The forethought process involves people setting goals for themselves and planning courses of action that are likely to produce desired outcomes. Through the exercise of forethought, people motivate themselves and guide their actions in a proactive way so as to achieve their goals. This is regulated by the reciprocal interaction of self-generated influence such as control of thoughts, feelings, motivation, and actions, and by external sources influence such as peers, family and environment (Bandura, 1991). The social cognitive theory of self-regulation proposes that the use of self-regulated learning strategies and skills are essential in any learning process, and that good self-regulated learners can effectively control and regulate their cognition, motivation, behaviour and environment in order to achieve their learning goals (Wade, 1989).

Generally, self-regulated learning (SRL) can be described as a process in which students engage in an iterative process of planning, monitoring and self-reflection, and the evaluation of their cognition, metacognition, behaviour, motivation and environment during their learning process to achieve their academic goals (Pintrich, 2004; Winne and Hadwin, 2010; Zimmerman, 2002). There are many models of self-regulated learning. These models differ in appearance but have little variation in their substance. One widely cited model is Zimmerman's SRL cycle model (Zimmerman 2002), which defines self-regulatory processes in terms of three cyclical phases: forethought, performance or volitional control, and self-reflection. The forethought phase involves processes and beliefs that occur before students engage in learning processes, and include elements of task-analysis, goal-setting, strategic planning, and self-motivation. The performance phase includes processes of self-control and self-observation that take place during the learning process. Finally, the self-reflection phase includes processes that occur after each learning effort, in which students respond to their learning efforts with self-judgement and reaction (Zimmerman 2002). Similarly, Pintrich's (2004) framework for SRL highlights the interactions between cognition, motivation, environment and behaviour over the four phases of the learning cycle, namely forethought, monitoring, control and reflection phases. For each phase, self-regulatory activities are listed in four separate areas; cognitive, motivational and affective, behavioural and contextual.

In these self-regulatory models, feedback from prior performance is used to adjust current learning efforts. Thus, a self-regulated learner continuously adjusts their goals and choice of strategies. Although the SRL models propose a general sequence that students follow as they perform a task, there is no strong assumption that the various phases such as planning, monitoring, and control are hierarchically or linearly structured, such that earlier phases must occur before later phases (Azevedo, 2009; Pintrich, 2004). According to Zimmerman's (2002) model, self-regulation improves with practice, and successful self-regulated learners will draw on their previous learning experiences to build a growing repertoire of strategies and beliefs that enhance their learning. Such students are highly self-efficacious and are perceived as being competent and independent, and thus are highly motivated to regulate their own learning processes. These students will continuously plan,

organise, self-monitor, and self-evaluate at various stages during the learning process (Zimmerman, 1990, 2002).

In sum, students who self-regulate understand themselves as learners and have knowledge about learning tasks and environments. A self-regulated student also takes responsibility for their own learning. In order to develop this responsibility and learner autonomy, the learning environment should encourage and provide opportunities for students to learn and practice self-regulatory strategies and skills. Students who learn self-regulatory processes will have a sense of control and this will encourage them to pay attention to their learning (Zimmerman, 1990, 2002). Teaching students self-regulated learning strategies and skills is thus consistent with the life-long goal of education, which is teaching students to have the "will" as well as the "skill" in becoming an independent learners (Claire Ellen Weinstein et al., 2011).

1.3 RESEARCH MOTIVATION

Many tertiary and older students fail to develop the appropriate cognitive and motivational strategies for self-regulating their learning. Even if students possess knowledge of strategies, they may lack the insight or motivation to apply them at appropriate times (Bembenutty, 2011a; P.R. Pintrich & Zusho, 2002). As a result, some students, despite their high intelligence, prior academic knowledge and school performance, and academic ambitions, face difficulties in their tertiary learning. Those with inadequate self-regulatory skills thus begin their tertiary education at a disadvantage (Bembenutty, 2011a; Paul R. Pintrich, 1995). It should not be assumed that students have these skills when they arrive at university, and it should not be left to chance as to whether they develop the skills or not. It is necessary to promote and foster self-regulated learning skills in students by providing direction and encouragement to engage in planning, self-monitoring, and self-evaluation through appropriate instructional aides in order to help students learn more effectively. There is still much to learn about the factors that influence students in becoming self-regulated learners, as well as the role of teaching staff and faculty in helping students become self-regulated learners (Bembenutty, 2011b; Paul R. Pintrich, 1995).

Realising the importance of academic self-regulation among higher education students, the main purpose of this research study was to investigate factors that can contribute to students becoming effective self-regulated learners.

It is crucial to note that students and teaching staff have an interdependent relationship in a university academic environment. Self-regulation is not an individual's personal characteristic; instead it is a skill that can be acquired and mastered. Students can learn to manage their thinking habits, behaviours and attitudes to improve their academic learning and performance. Previous studies have acknowledged that students can be taught to self-regulate their learning. As such, teaching staff play a crucial role in fostering self-regulation of learning among students (C. C. Chen, 2002; Cleary & Zimmerman, 2004; Palmer & Wehmeyer, 2003; Perry, 1998; Perry & VandeKamp, 2000). Zimmerman (1995b, 1995c) noted that self-regulated learning occurs only if students have some choice and control over their learning. Students need opportunities or conditions to practice self-regulated learning strategies. In this respect, teaching staff play an important role in modelling various learning and thinking strategies and can provide opportunities for students to practice self-regulated learning strategies in planned learning activities. By incorporating strategies for the self-regulation of learning, teaching staff can help students to become aware of alternative ways to approach learning situations. This practice will enable students to reflect on and develop their learning practices and performance. This approach promotes the regulation of cognition and metacognition, and enables students to build on their experiences. Facilitating SRL strategies in students is akin to teaching students the will as well as the skills in learning, which can foster the goal of the life-long independent learning (Camahalan, 2006).

Teaching practices to support SRL amongst students include modelling, scaffolding and other appropriate instructional approaches. These instructions not only ensure students acquire domain and strategy knowledge but also the required skills to function independently, make appropriate choices, and expand their abilities by attempting challenging tasks (Perry, Hutchinson, & Thauberger, 2008). Perry et al. (2008) further noted that teaching staff need to understand the concept of self-regulated learning and its processes, how SRL develops in students, and how it can taught, in order to facilitate and support a student's self-regulated learning skills.

Studies have shown that adjustments made by teaching staff to the learning environment and their teaching practices have positive effects on student development of SRL skills. Such effects included improved self-monitoring, heightened awareness of their quality of performance, and increased dedication to learning (M. Boekaerts, 1997; Cleary & Zimmerman, 2004; Kiewra, 2002; Perry & VandeKamp, 2000; Zimmerman & Schunk, 2001). As Lau (2011) noted, while facilitating SRL in students, teaching staff need to ensure that students acquire domain knowledge as well as the SRL strategy knowledge that they need to manage their learning independently. As part of that process teaching staff are also expected to create opportunities for students to support one another through collaborating, sharing ideas, and brainstorming problem-solving strategies.

The findings of multiple studies indicate a need for teaching staff to adjust their teaching practices and environments in order to provide the context and opportunity to, and for, students to acquire SRL skills (Palmer & Wehmeyer, 2003; Perry, 1998; Perry et al., 2008; Perry, Phillips, & Dowler, 2004). Little is known about the challenges and constraints faced by teaching staff in current university teaching and learning environments, however, in accommodating teaching practices and learning environments that provide for SRL facilitation. Studies have noted that despite positive beliefs about SRL facilitation in their teaching, various elements such as workload and lack of support impede teacher efforts to fully implement it (Dignath-van Ewijk & van der Werf, 2012; Lombaerts, Engels, & van Braak, 2009; Tillema & Kremer-Hayon, 2002). There is a clear need to advance research around critical determinants of SRL promotion and facilitation (Lombaerts et al., 2009). Importantly, investigating these factors may shed light on the extent to which university teaching staff are willing to adopt the concept of self-regulated learning and whether they consciously consider facilitating the self-regulation of learning in their students.

Gaining insights into the challenges and constraints (or positive influences) that affect the facilitation of self-regulation of learning could provide valuable information to help explain the use, or lack thereof, of such SRL practices at university teaching and learning. This perspective motived the research reported in

this thesis, investigating factors that influence teaching staff facilitation of student self-regulation of learning.

1.3.1 Research Questions

The promotion and development of SRL in university teaching and learning environments should include a consideration of the perspectives of both students and lecturers. More specifically, the factors that influence student acquisition and practice of SRL strategies in their learning need to be identified. Similarly, factors that affect the teaching practices of the teaching staff in facilitating self-regulation of learning in their students need to be clarified.

As such, this study addresses the following main research question:

What factors promote the development of self-regulated learning in higher education?

As the promotion and development of SRL in university teaching and learning environments involves students and lecturers, this study addresses the following primary research questions:

1. What factors influence the self-regulation of learning in university students?
2. How and to what extent do the identified factors influence the self-regulation of learning in university students?
3. What factors influence university teaching staff in their facilitation of students' self-regulation of learning?
4. How and to what extent do the identified factors influence university teaching staff in their facilitation of students' self-regulation of learning?

1.3.2 Research Objectives

The main objective of this study is to assess a theoretical framework for examining the contribution of identified factors in influencing the practices of self-regulated learning in university teaching and learning environments. The specific objectives of this study are to:

1. Explore the factors that influence the self-regulation of learning in university students.
2. Evaluate the extent to which identified factors influence the self-regulation of learning in students.
3. Explore the factors that that influence the facilitation of students' self-regulation of learning by university staff.
4. Evaluate the extent to which identified factors influence the facilitation of students' self-regulation of learning by university teaching staff.

1.3.3 Study Population

The focus of student learning and teaching methods varies across disciplines. Studies have revealed that students with different learning preferences perceive their academic environment differently. This suggests that student preferences to study a particular discipline reflect their approach to learning (Entwistle & Tait, 1990; Neumann, Parry, & Becher, 2002; Ramsden & Entwistle, 1981).

There are also significant differences in how academics in different disciplines perceive their teaching role and their teaching and research activities. Moses's (1990) study of four disciplines in an Australian university revealed that academic attitudes towards their teaching and research activities vary between disciplines. Moses (1990) also found that teaching is experienced differently in different disciplines. In disciplines such as English and law, teaching and research interests are very much aligned. By comparison, in other disciplines, such as engineering, teaching activities may not necessarily be aligned with research activities. Similarly, learning occurs differently in different academic disciplines. For example, in physics or mathematics, the ability to memorise facts and the development of problem solving skills are valued. In particular formulating a problem based on defined procedure, performing the necessary calculations, and verifying the rationale used to see if the final solution

makes sense are valued more highly than an elegance of writing style. In contrast humanities and education disciplines expect students to think laterally and to be able to articulate their ideas, read rapidly and widely, and place little importance on ability in mathematical manipulation (Healey, 2005; Neumann, 2001; Neumann et al., 2002).

In general, disciplines of study fall into four broad categories. These are pure 'hard' (for example, physics) and pure 'soft' (for example, history) and applied 'hard' (for example, engineering) and applied 'soft' (for example, education) (Becher, 1994; Becher & Trowler, 1989; Biglan, 1973a, 1973b). Drawing on contemporary literature, Neumann et al. (2002) distinguished between hard pure, soft pure, hard applied and soft applied fields of studies. According to Neumann et al. (2002), pure hard curricula are hierarchical and cumulative in nature. The teaching content is fixed, cumulative and measured quantitatively. The teaching and learning activities are focused and instructive, with an emphasis on knowledge acquisition by students. Students in hard pure fields are expected to have the ability to solve logically structured problems, adeptness at quantitative calculations and a retentive memory for facts. Skills for deploying facts and figures are held in high regard than the elegance of writing style in the pure hard discipline. Conversely, pure soft curricula are more holistic and qualitative, and thus course structures are open and loosely organised. In these areas, teaching and learning activities are regarded as largely constructive and interpretative, being implemented through discussion and debate in face-to-face class meetings. Student learning emphasises critical thinking, the ability to interpret and evaluate different perspectives, and fluency of expression. In applied hard fields, the integration and application of existing knowledge are strongly valued. The curricula emphasises problem-solving and practical skills, which are expected to be the outcome of the degree programme. Teaching methods concentrate on case studies and simulations in relation to professional settings. Similar to pure hard fields, students are expected to retain facts and to solve logically structured problems, however, in an applied hard field, the practical competencies and the ability to apply theoretical ideas to professional contexts are more strongly emphasised. Finally, the knowledge and teaching methods in applied soft fields are close to those used in the pure soft fields. In the applied soft fields, the emphasis is

on personal growth, intellectual breadth and the enhancement of professional practices.

Lueddeke (2003) investigated the characteristics of higher education academics and their preferred teaching approaches. His studies showed that teaching staff in the hard disciplines (such as physical sciences, engineering and medicine) are more inclined to apply teacher-centred approaches to teaching while teaching staff in the soft disciplines (such as social sciences and humanities) generally adopt student-centred approaches. This is further asserted by Virtanen and Nevgi (2010) who reported that hard and applied disciplines adopt traditional teaching methods. In this context, the teaching and learning activities focus on facts, effective competencies, and practical applications, implemented through lectures and problem solving assessed by the teaching staff. Virtanen and Nevgi (2010) noted that soft and applied soft disciplines focused on thinking and creative discussions. The emphasis is often on deep learning though reflection, and through interaction between students and/or the teaching staff, which enhances student awareness of their own thinking and learning processes. *As such interactive and collaborative teaching and learning environments provide opportunities for teaching staff to facilitate SRL strategies in their classrooms and for students to practice their SRL skills in the classroom.*

Further studies in SRL are generally concentrated in the field of education and psychology. There is a paucity of published studies relating to self-regulating learning and IT and engineering courses in university teaching and learning environments, and thus, there is a need to identify the factors that positively affect SRL and how these factors promote the self-regulation of learning among hard-science discipline students. Based on this observation, this study focuses on SRL in hard discipline (pure and applied) courses, specifically, engineering, computing and science students and teaching staff in 34 Australian universities.

1.4 RESEARCH PROCESS

This study began with a review of contemporary literature to identify issues, possible key factors affecting self-regulated learning, and areas of our knowledge and understanding of these matters that are in need of further exploration. The preliminary research models and the respective hypotheses were developed based on that literature review. The development of the research models and the respective hypotheses are detailed in Chapter 3 of this thesis.

The principal data collection method in this research is quantitative; however, qualitative data was also collected through a series of interview sessions conducted in the preliminary phase. The main objective of this qualitative data gathering was to investigate the appropriateness of the factors identified from the review of literature, with regard to students and teaching academics in universities in Australia. The research models used here were then refined to reflect findings emerging from analysis of the study interview data. Once the relevance of the factors identified was verified, the respective survey instruments were developed for quantitative data collection. A pilot study was carried out to ensure the validity and reliability of the survey instruments. The finalised instrument was then administered to the target population using an online web-based survey service. The research process is discussed in detail in Chapter 4 (Section 4.5).

Data gathered using the survey instruments implemented in this study was analysed using a structural equation model based on the partial least square (SEM-PLS) technique. The SEM-PLS statistical technique is described in detail in Section 4.7 of Chapter 4. In the analysis phase, the research hypotheses were tested and the research models were evaluated, based on the data analysis results (Chapter 5). The interpretations and discussions of the findings, as well as the limitations of this study, are presented in Chapter 6. Finally, implications and recommendations for future research are described in Chapter 7. The flow of the research process for this study is summarised in Figure 1.1.

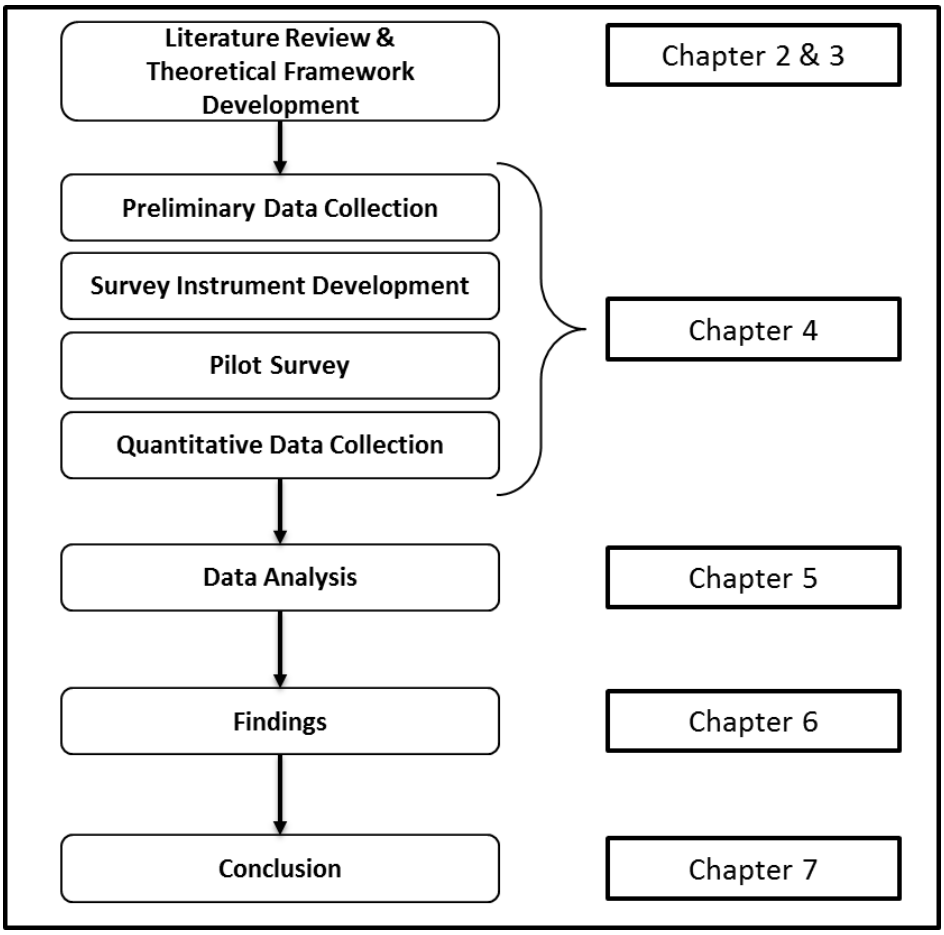

Figure 1.1: Structure of the Research Process

1.5 SIGNIFICANCE OF THE STUDY

Prior studies have examined either elements that affect student SRL, or the way that lecturers can provide SRL instruction to students. The research framework in the current study has expanded this to take into account the role and interrelationship of lecturers and students, in a university teaching and learning environment. The contribution of this study is thus twofold: this study identifies and explains the factors influencing (1) student self-regulation of learning, and (2) teaching staff's facilitation of student self-regulation of learning behaviour.

Although studies have examined the motivational factors and social factors involved in student SRL (Bail et al., 2008; Bakracevic Vukman & Licardo, 2009; Belski & Belski, 2014) and factors affecting teaching staff's teaching and learning approaches (Dignath-van Ewijk & van der Werf, 2012; Lombaerts et al., 2009; Tillema &

Kremer-Hayon, 2002), they are often investigated as separate issues. Only a few published studies have examined the combined effect of motivational factors and social factors in university student SRL. In fact, little is known about the challenges and constraints faced by teaching staff to provide for SRL facilitation. Student and lecturer issues are often not seen as interdependent. There are no significant studies, to the researcher's knowledge, that have addressed the prospective relations between the factors influencing lecturer facilitation of SRL and the factors influencing student practice of self-regulation of learning in a university teaching and learning environment. Thus this clearly indicates the need to advance research around critical determinants of SRL promotion and facilitation in university education (Lombaerts et al., 2009).

Students and teaching staff in 34 universities in Australia were surveyed to study the practice, promotion and development of self-regulated learning in university teaching and learning environments. The main aim of this study was to evaluate the factors that influence university students and teaching staff. Two theoretical models (the construction of these theoretical models is discussed in detail in Chapter 3) were constructed to independently identify and investigate the factors affecting students and teaching staff respectively, in the implementation and practice of SRL behaviour in university teaching and learning environments. The initial theoretical models developed through reviewing the existing literature underwent a screening process using qualitative interview sessions, and a pilot survey implemented to fine-tune and contextualise the research model. The interviews and pilot study suggested adjustments that were needed to the model, which had been primarily developed from the literature. These adjustments involved changes in the interrelationships between some constructs, the omission of some variables, and also the inclusion of some new variables and measurement items. This screening process yielded an integrated research model which now offers an opportunity to examine factors that affect both students and teaching staff in practising and implementing self-regulation of learning behaviour in teaching and learning environments. The development of this model made an important theoretical contribution to the study of student SRL.

This study provides a lens through which to reflect and evaluate the current practices in cultivating self-regulation of learning in Australian university teaching and

learning environments. Integral to this study is the examination of student obligations to honour their end of the educational contract to conscientiously and consistently evaluate their learning goals and adapt their learning strategies throughout their study to improve their academic performance. Accordingly, this research also examined how teaching staff are urged to provide opportunities for students to develop their SRL skills continuously in their learning activities. Interestingly, although the literature has firmly attested the significant role of teaching staff in student self-regulation of learning, this study's outcome suggests a reconsideration of this claim.

The outcome of this study also implies that teaching staff's need the firm support from the academic leadership and management for successful implementation and facilitation of student SRL. The ongoing revision of current teaching and learning practices by academic leaders and managers thus needs to be evaluated and adapted according to the current teaching and learning needs. For education leaders and university policy makers, the outcomes of this research study can be a foundation for establishing guidelines and resources for promoting and integrating self-regulated learning instructions in teaching and learning. This study also calls for academic managers at various levels, including top management, teaching and learning departments and faculty heads, to consider their role in establishing policies and practices likely to lead to supporting the development of student self-regulation in learning.

1.6 ORGANISATION OF THE THESIS

This thesis is structured in seven chapters followed by references and appendices.

Chapter 1 has presented an introduction and overview of the study including a background to the research. The chapter has laid the foundation for the research questions, their corresponding research objectives and the potential significance of the study.

Chapter 2 presents a review of literature relevant to this study. The review of the literature provides the basis for the development of the research models in this study.

Chapter 3 presents the development of the hypotheses and the development of the research model. The chapter also illustrates the model of the study by incorporating the field study results and the factors identified from the literature review.

Chapter 4 describes the research methodology adopted in this study. This chapter details the quantitative research design, survey instruments development and the statistical techniques used during analysis. In essence, this chapter summarises the research process used in the study.

Chapter 5 presents findings from the qualitative interview sessions and quantitative survey data collection. The analysis and results emerging from the measurement model and the structural model for Structural Equation Modelling based Partial Lease Square (SEM-PLS) assessments are described in this chapter. The hypotheses of the thesis are verified based on the analysis results.

Chapter 6 discusses the findings of the PLS results in light of the research questions and the hypotheses proposed in this study. The theoretical and practical implications of these results are discussed in this chapter. This chapter concludes with a discussion of the limitations in this study.

Chapter 7 (Final Chapter) presents the conclusion and future research directions. This chapter reviews the overall study and presents its theoretical and practical

contributions. The chapter then concludes with a brief discussion of possible future research directions in the subject area of this study.

1.7 SUMMARY

This chapter provided background information that defines the scope and motivation for the research questions that underpin the objectives of the study. The significance of the research and definitions of related terms have been discussed. Finally, the organisation of the thesis structure was outlined. The next chapter presents the literature review and outlines the primary research model.

CHAPTER 2

LITERATURE REVIEW

Education is the methodical creation of the habit of thinking.

Ernest Dimnet (1866 – 1954)

2.1 INTRODUCTION

Self-regulated learning (SRL) has its roots in social cognitive theories (Paul R. Pintrich, 1995, 2004; Wade, 1989; Zimmerman, 2001; Zimmerman & Schunk, 2001). According to Bandura's (1991 p. 248; 2001) social cognitive theory, "human behaviour is extensively motivated and regulated by the ongoing exercise of self-influence". Humans have a self-management mechanism that leads them to proactively control their cognition, motivation, and behaviour. These types of control help regulate and evaluate behaviour in response to the environment. This theory proposes that the use of SRL strategies is essential in the learning environment, and that good self-regulated learners can effectively control and regulate their cognition, motivation, and behaviour in order to achieve their learning goals. More specifically, Zimmerman (2002 p. 65) noted that "Self-regulated learning is not a mental ability or an academic performance skill; it is a self-directive process by which learners transform their mental abilities into academic skills". Learning is perceived as an activity that students proactively undertake themselves, rather than as a reaction, a covert process, to teaching.

Self-regulated learners are proactive in their learning efforts and are intrinsically motivated to improve their learning approach. Self-regulated learners are learners who are able to set appropriate goals, make appropriate plans to achieve their goals, and monitor their progress in achieving their goal. These learners continually reflect on the effectiveness of their learning process, thus becoming aware of their strengths and limitations as learners and monitoring their behaviour to improve effectiveness (Paul R. Pintrich, 1995; Zimmerman, 2002; Zimmerman & Schunk, 2001).

2.2 SOCIAL COGNITIVE THEORY

According to Albert Bandura (1991 p. 248; 2001), a social cognitive theorist, "human behaviour is extensively motivated and regulated by the ongoing exercise of self-influence". Bandura established that human functioning is regulated by the "interplay of self-generated and external sources of influence" (Bandura, 1991 p. 249). More specifically, human behaviour is determined by the interaction of personal, behavioural and environmental influences (Bandura, 1986; Wade, 1989) (see Figure 2.1). Personal, behavioural, and environmental influences are interdependent elements that influence human behaviour. Personal influences involve an individual's knowledge and cognitive beliefs, such as self-efficacy and metacognitive knowledge, and affective elements such as anxiety. Behavioural influences involve the actions and reactions of an individual; and environmental influences involve social elements such as peers, family and the surrounding environment. Bandura (1977b, 1991) theorised that the interaction between personal, behavioural and environmental factors is reciprocal, and that a person's behaviour both influences and is influenced by personal factors and the social environment (Bandura, 1991). Personal factors such as a person's knowledge, beliefs and values influence that person's behaviour. A person's behaviour influences the way others (the environment) react to them. The environment in turn, including social interaction, can alter personal characteristics or behaviour (see Figure 2.1). For example, when a lecturer presents a lesson to the students in a classroom, the students reflect on what the lecturer is saying. Here the environment influences a student's knowledge and cognition, a personal factor. A student who doesn't understand a point asks questions. Here the student's personal factors influence their behaviour. The lecturer then reviews the point. In this case, the student's behaviour influences the classroom environment, from presenting the lesson to reviewing a point in the lesson.

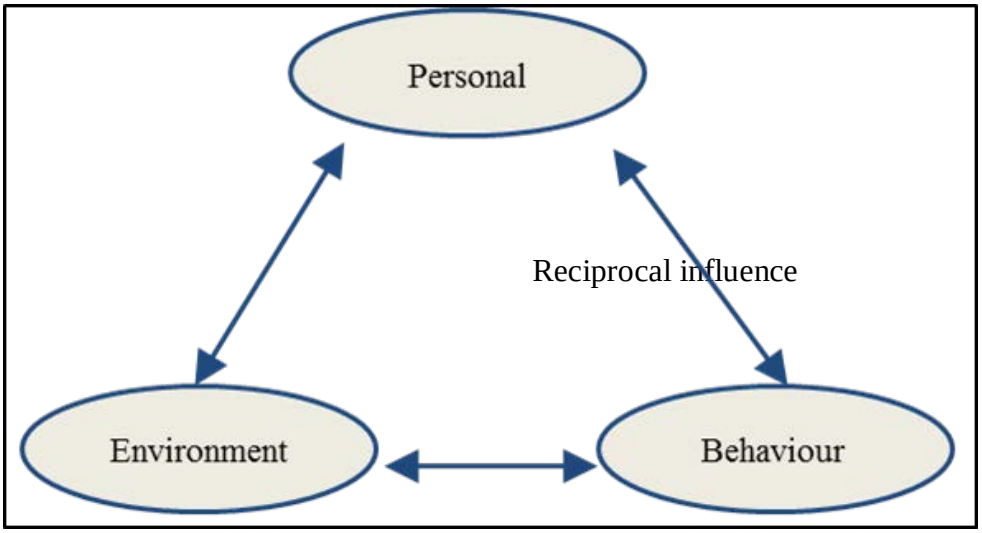

Figure 2.1: Triadic Relationship of Self-regulation (Bandura, 1986)

Self-regulation is a process in which an individual attempts to control their personal, environmental and behavioural factors (the triadic factors), to reach a goal. Bandura (1991, 2001) noted that humans have a self-management mechanism that leads them to proactively control their cognition, motivation, and behaviours. These types of control help them regulate and evaluate their behaviour in response to their environment. The essence of Bandura's triadic formulation is captured in the statement "behaviour is, therefore, a product of both self-generated and external sources of influence" (Bandura 1986 p. 454 cited in Wade, 1989). In short, social cognitive theory proposes that self-regulated learning skills are critical in any learning environment and that good self-regulated learners can effectively regulate their cognition, motivation, and behaviour to achieve their learning goals.

In accordance with Bandura's social cognitive theory (Bandura, 1977b, 1986), Zimmerman (1990) established that a student’s self-regulation of learning is influenced by personal processes, as well as by behavioural and environmental factors. Consequently, self-observation, self-judgment, and self-reactive processes accommodate the regulation of personal, behavioural and environmental factors in a learning environment (Bandura, 1986; Wade, 1989; Zimmerman, 1986).

2.3 SELF-REGULATED LEARNING

Self-regulated learning is learning in which students manage their thoughts, emotions and behaviours for successful learning outcomes (Paul R. Pintrich, 1995, 2004; Philip H. Winne, 2010; Zimmerman, 2002). Self-regulation is a broad concept encompassing a number of interdependent elements. It includes both cognitive elements such as beliefs, perceptions and knowledge; and affective elements such as moods, feelings and emotions. Metacognition is closely related to self-regulated learning (SRL). The term 'metacognition' was introduced by John Flavell (1976 p. 232; 1979), who described metacognition as "one's knowledge concerning one's own cognitive processes and products or anything related to them". Learners who are aware of their metacognition knowledge will be able to better utilise their knowledge and skills in their learning.

A student's effective use of cognitive and metacognitive strategies reflects their self-regulated learning competency. This competency includes the ability to set appropriate goals and plan accordingly to achieve those goals, monitoring and reflecting on their learning processes and adapting learning strategies and behaviours accordingly. It also involves using available resources, including seeking necessary help, as well as the effective management of time and the study environment, while maintaining positive beliefs about one's learning abilities (Paul R. Pintrich, 2004; Claire Ellen Weinstein et al., 2011; Zimmerman, 2002). In short self-regulated learning competency is characterised by the effective use of self-regulated learning strategies (SRLS). Self-regulated learning strategies include cognitive engagement, metacognitive knowledge, and effective resource management. Cognitive engagement involves the mental effort students invest in acquiring and monitoring their comprehension of new knowledge. Metacognitive knowledge concerns student knowledge about themselves as learners, their knowledge of what, how and when to use the appropriate strategies to accomplish a particular learning task. Resource management encompasses the behavioural and environmental components of the self-regulation of learning, which include managing study time and the learning environment appropriately; and knowing when, where and how to seek assistance when necessary (Paul R. Pintrich, 2004; C. E. Weinstein et al., 2010). In short, self-regulated learners are proactive and persistent learners, who are proficient in

monitoring and adapting their learning strategies to achieve their goals. Accordingly, they also possess adaptive motivational beliefs and attitudes that are likely to lead to successful learning (Paul R. Pintrich, 2000b).

In general self-regulated learning (SRL) can be described as an iterative process in which students engage in forethought (planning and goal setting), performance (monitor and control) and self-reflection (self-evaluation and self-judgement) of their cognition, metacognition, behaviour, motivation and environment (context) during their learning process in order to achieve their academic goals. This process takes place when a student's purposeful actions and practices are aimed at the acquisition of information or skills (Paul R. Pintrich, 1995, 2004; Philip H. Winne, 2010; Zimmerman, 2002).

2.3.1 Process of Self-Regulation of Learning

Although there are a number of different SRL models derived from varying theoretical perspectives (Puustinen & Pulkkinen, 2001), all SRL models involve recursive phases. In general, self-regulated learning (SRL) models emphasise the iterative process of goal setting, planning, self-monitoring and the self-evaluation of one's cognition, metacognition, behaviour, motivation and environment (context) during the learning process (Paul R. Pintrich, 1995, 2004; Philip H. Winne, 2010; P. H. Winne & Hadwin, 2010; Zimmerman, 2002).

One such model, grounded in Bandura's social-cognitive theory, is Zimmerman's model (Zimmerman, 2000, 2002). Zimmerman's model (2002) describes self-regulatory processes in terms of three iterative phases: a forethought phase, performance phase, and self-reflection phase (see Figure 2.2).

The forethought phase involves beliefs and processes that occur before a student engages in learning processes, and includes task-analysis and self-motivation. During the forethought phase, a student analyses the learning task, sets specific goals and determines strategies to employ in completing the task. A student's academic self-efficacy, the goals they seeking to achieve, their intrinsic interest in the task and its

value to them, and their expectation of the task's outcome (s) affects a student's task analysis capacity (P. H. Winne & Hadwin, 2010 p. 504; Zimmerman, 2002).

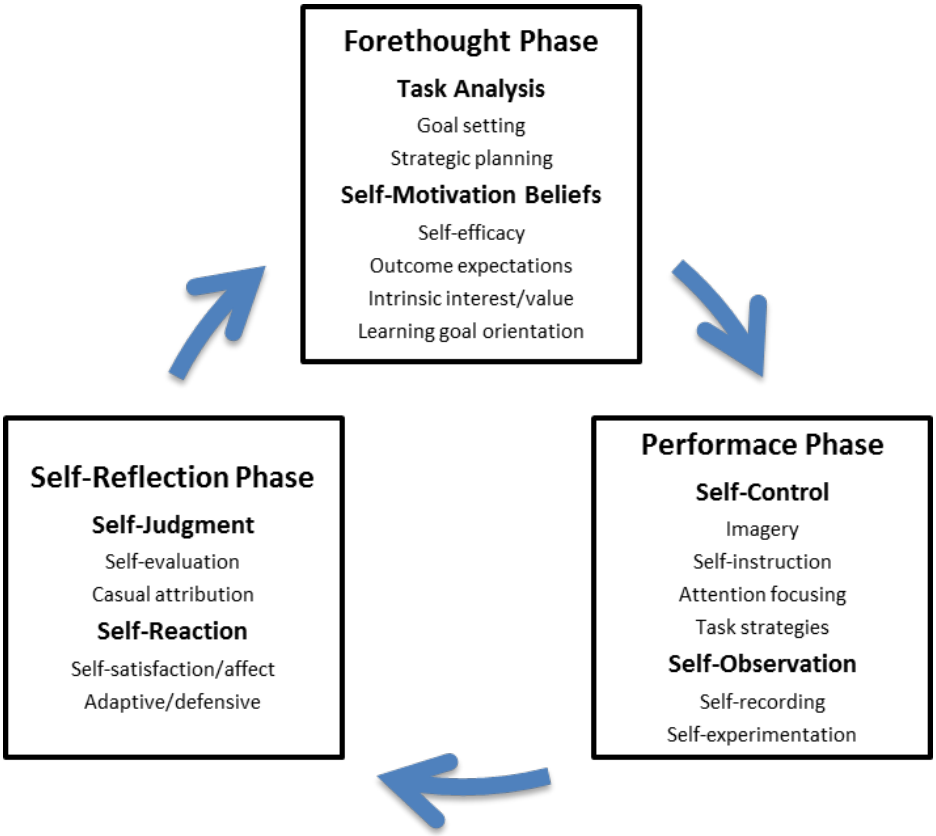

Figure 2.2: Self-regulated Learning Model by Zimmerman (2002)

In the performance phase, students deploy the strategies selected during the forethought phase to better focus and complete their task by utilising self-coaching methods such as imagery, self-instruction, attention focusing, and task strategies. Students generally monitor their progress in the learning task and the effectiveness of those strategies, as well as their motivation for continuing progress toward the goals of the task (Zimmerman, 2002).

In the final self-reflection phase (the reflection on performance phase), students evaluate their performance in the learning task against some standard, such as their prior performance, another person's performance, or against some established standard of performance. Through this process they determine the reasons for their successful completion or the errors made in completing the tasks (casual attribution). During this stage, students must also manage their emotions about the outcomes of

the learning experience. These might include reasons found and reactions to the causes of successes or failures; affective reactions experienced due to the results, as a consequence of attributions made; choice of behaviour for the future, as well as general assessments about the task and the learning environment. These self-reflections then influence a student's future planning and goals, causing the cycle to begin again (Zimmerman, 2002).

Another common model based on socio-cognitive theory is Pintrich's (2004) SRL framework. This framework highlights the interactions between cognition, motivation, environment and behaviour over four phases, namely forethought, monitoring, control and reflection phases of self-regulation. According to Pintrich (2004), these four phases represent the general sequence which the learner follows as they carry out the task. There are no strong assumptions that the planning, monitoring, and control are hierarchically or linearly structured, however, such that earlier phases must occur before later phases. The phases can occur simultaneously and dynamically, producing multiple interactions among different processes. Pintrich (2004) indicated that not all academic tasks explicitly involve self-regulation. Sometimes the performance of certain tasks does not require the student to strategically plan, control and evaluate what they are going to do, but instead, based on the learner's prior experience and knowledge, execution of the tasks can be performed more or less automatically (or implicitly). Feedback from prior phases is used to adjust current learning efforts. A self-regulated learner continually adjusts their goals and choice of strategies (Azevedo, 2009; Paul R. Pintrich, 2004).

In short, both Zimmerman's (2002) and Pintrich's (2004) models capture the idea that the self-regulation of learning not only involves cognitive regulation but also involves the regulation of one's metacognitive knowledge, motivation or emotions, which can lead to the regulation of one's behaviour and adapting one's learning environment accordingly. Importantly, Pintrich and Zimmerman emphasised that SRL skills and habit can be acquired and mastered. Students can learn to manage their thinking habits, behaviours and attitudes to improve their academic learning and performance. Self-regulation also improves with practice. Zimmerman and Pintrich models highlights that feedback from prior performance is used to adjust current learning efforts. Accordingly, successful self-regulated learners will draw on their

previous learning experiences to build a growing repertoire of strategies and beliefs that enhance their learning. Previous studies (C. C. Chen, 2002; Lopez, Nandagopal, Shavelson, Szu, & Penn, 2013; Nota, Soresi, & Zimmerman, 2004) have evidenced that learning of a range of self-regulated learning strategies (SRLS) enables students to be equipped with a repertoire of adaptive alternative methods that can help overcome difficulties in learning. By applying SRLS, students create opportunities to evaluate the strategies used to determine whether they were adequate or inadequate, and then self-evaluate their learning strategies in order to meet a desired goal.

2.4 GRADUATE ATTRIBUTES, LIFELONG LEARNING AND SRL

The development of the knowledge economy grounded in knowledge-based work and resources has called for a shift in employability skills and attributes (Williams, 2005). The knowledge-based economy expects employees have dispositions to self-regulate their knowledge and skills as necessary. The constantly evolving expectations of the digital economy have also changed the outlook of the employer – employee relationship. In the past, loyalty and skill were offered in exchange for the security of a stable job. Today's employees, however, are expected to be more self-directive and to take responsibility for planning, executing and improving their work, as well as self-regulating their learning and development over the course of their working lives (Gow & McDonald, 2000; Williams, 2005). As employees, graduates who are adaptable and flexible in addition to possessing domain-specific skills, also possesses skills that are transferable across changing work sites and different occupations (Williams, 2005).

More recently, educational stakeholders, especially business and employer community have pressured Australian universities to ensure that Australian tertiary graduates are equipped with the knowledge and skills specific to their domain of study. Students also need to be armed with communication and interpersonal skills, critical thinking and the ability to use technology (Pitman & Broomhall, 2009).

In response to these changing expectations of student skill sets, Australian universities have developed lists of graduate attributes as part of their institutional teaching and learning plans, and have engaged in initiatives and/or activities to embed graduate attributes in the curriculum (De la Harpe & Radloff, 2008; Oliver, Jones, Ferns, & Tucker, 2007). Consequently, the focus on graduate employability skills, the shift in perspective to the view of education as a lifelong process, and the development of outcome measures to justify the quality of higher education have influenced the growing importance of graduate attributes (Bath, Smith, Stein, & Swann, 2004; Oliver, 2013).

Generally, the term 'generic graduate attributes' is understood in Australia as "skills, knowledge and abilities of university graduates, beyond disciplinary content knowledge, which are applicable in a range of contexts and are acquired as a result of completing any undergraduate degree" (Simon C Barrie, 2006 p. 217). Hager and Holland (2006 p. 2) posit that graduate attributes include

> *"… thinking skills such as logical and analytical reasoning, problem solving and intellectual curiosity; effective communication skills, teamwork skill, and capacities to identify, access and manage knowledge and information; personal attributes such as imagination, creativity, and intellectual rigour; and values such as ethical practice, persistence, integrity, and tolerance".*

Accordingly, a study by Pitman and Broomhall (2009) revealed the ten graduate attributes most emphasised (out of the 25 distinct attributes identified from 34 universities) by the Australian university sector. These attributes are communication skills, interpersonal skills, problem-solving skills, mastery of disciplinary knowledge, awareness and respect for others, critical/analytical thinking, ethical behaviour, lifelong learning, creative thinking and professional skills. Clearly the graduate attributes are underpinned by life-long learning skills, thereby providing the graduate with skills to deal with a range of situations and contexts in the workplace and society.

Broadly, lifelong learning can defined as "learning that is pursued throughout life: learning that is flexible, diverse and available at different times and in different place" ((LLCQ), 2015). The basic premise of lifelong learning is that it is not

feasible for primary, secondary school or even university education to equip a learner with all the knowledge and skills they need to prosper throughout their lifetime. As such, learners should continuously seek to enrich their knowledge and skills in order to address challenges throughout life. Learners should broaden their learning base by participating continuously in vocational and professional development. It is thus imperative for educational institutions to empower learners to manage their own learning in a variety of contexts throughout their lifetime (Bentley, 2012).

The European Commission (2001 p. 9) noted that lifelong learning has four "…broad and mutually supporting objectives: personal recognition, active citizenship, social inclusion and employability/adaptability". Accordingly Delors (1996) proposed four attributes of lifelong learners as the 'pillars' of a learning society. Delors (1996) emphasised the main foundation or 'pillar' of education as '*learning to live together*' which encompasses exercising tolerance, understanding and the mutual respect of others and their cultures. Delors (1996) further noted that this main foundation is supported by three 'pillars' (Commission, 2001; Delors, 1996; Watson, 2003):

- *Learning to know* – mastering learning approaches that are flexible, critical and enable learning throughout life.
- *Learning to do* – the acquisition and application of skills, including life skills, to innovate and adapt learning accordingly.
- *Learning to be* – the development of a person's mind and body, intelligence, sensitivity, aesthetic appreciation and spirituality.

In this regard, lifelong learning has broad dimensions, recognising learning beyond traditional schooling, from different environments and throughout adult life. The European Lifelong Learning Initiative defines lifelong learning as

> *"... a continuously supportive process which stimulates and empowers individuals to acquire all the knowledge, values, skills and understanding they will require throughout their [sic] lifetimes and to apply them with confidence, creativity and enjoyment, in all roles circumstances, and environments*" (Watson, 2003 p. 3).

In the information age, a student's ability to expand their mind and strive for continuous education is critical to success at work, home and in society in general.

Watson (2003 p. 3) defined the personal characteristics necessary for lifelong learning in the following terms:

> *The individuals most likely to participate in learning, either formally or informally throughout their lives [have] acquired:*
>
> 1. *The necessary skills and attitudes for learning, especially literacy and numeracy skills;*
> 2. *The confidence to learn, including a sense of engagement with the education and training system; and*
> 3. *Willingness and motivation to learn.*

Accordingly, Crowther (2004) noted that a lifelong learner has continuous aspiration for learning and takes ownership and responsibility for their own learning. A lifelong learner is not only equipped with the knowledge and skills to continuously regulate their learning, but they also continuously strive to enrich their learning skills repository. In this regard, the knowledge and values promoted by tertiary institutions influence the attitudes, values and practices in a society and the overall development of the society (Knapper & Cropley, 2000). Higher education institutions play an important role in implementing lifelong learning in society.

2.5 SELF-REGULATED LEARNING IN HIGHER EDUCATION

2.5.1 Student

The self-regulation of learning is a fundamental element in tertiary education. In order for a student to succeed academically, they need the abilities of sustaining cognition, emotion, and behaviour while maintaining positive motivation in pursuing their academic and professional goals. University students should independently plan, monitor, and evaluate their learning while maintaining positive motivation. Unfortunately, not all students enrolled in university education come equipped with self-regulated learning skills. Many undergraduate students lack basic self-regulatory skills, exhibiting difficulties such as an inability to set academic goals and a failure to identify appropriate learning strategies. Many students in their second or third year of an undergraduate programme fail to develop and sustain the appropriate cognitive and motivational strategies or show a decline in regulating their learning (Lieberman

& Remedios, 2007; Stewart, Stott, & Nuttall, 2015). Such declines in student self-regulation are a result of a student's limited repertoire of learning strategies and limited knowledge of domain knowledge and the tasks; their inability to assess tasks characteristics and demands accurately; and inappropriately estimating the skills necessary to accomplish a task. These limitations, in turn, lead to inappropriate goal setting and planning and eventually failure to monitor and control learning (Bembenutty, 2011a; P.R. Pintrich & Zusho, 2002). As a result of these limitations, some students begin their tertiary education in a disadvantaged position, in spite of their high intelligence, prior knowledge, prior high school performance and academic ambitions (Bembenutty, 2011a; Paul R. Pintrich, 1995). It should not be assumed that students have these skills when they arrive at university, and it should not be left to chance as to whether they develop the skills or not.

University education generally affords students the freedom of managing their own time and how they actually go about studying and learning, however, many students have difficulty in managing this freedom in terms of maintaining a balance between the time devoted to learning and cognitive effort, while also working and maintaining family responsibilities and social activities. Acquiring and mastering the skills to manage their study time and learning can enable them to better adapt to academic demands and better balance those demands with the social demands of university life (Paul R. Pintrich, 1995).

Studies have suggested that there is a significant relationship between the use of self-regulation strategies and academic outcomes (Bail et al., 2008; Bakracevic Vukman & Licardo, 2009; Belski & Belski, 2014). Such research suggests that when students are taught self-regulation strategies, they can learn to overcome their weaknesses and be successful learners. Montalvo and Torres (2004) posit that adequate training in self-regulated learning can improve student learning performance and the degree of control over learning. Similarly, Bail et al. (2008) showed how a semester-long self-regulated learning course significantly impacted graduation rates and academic outcomes for a group of underprepared students. If students are not taught the strategies required to self-regulate their learning, they may continually use inappropriate learning strategies, struggle with their learning and consequently be demotivated and drift out of their university education (Bol & Garner, 2011). Bail et

al. (2008) emphasised the need for student SRL support, and that facilitating SRL skills in students can help their understanding of strategies for efficient learning, thus empowering their learning towards the attainment of academic goals.

It is equally important for students to be able to identify their lack of understanding and the need for help, and to seek the necessary assistance. Similarly, it is also important for students to know, and for teaching staff to point out, where students can seek assistance if the need arises (Stuart A. Karabenick & Dembo, 2011).
Social influences can play a role in a student's SRL. Bandura (1977b, 1986, 1991), Zimmerman (1986) and (Wade, 1989) have emphasised the important role of social influences and social context, beginning with observational learning through modelling, verbal description, opportunities for guided practice, social guidance, and feedback; followed by imitation and self-regulation (Hadwin & Oshige, 2011; Zimmerman, 2000). Especially in the context of tertiary education, information or feedback received from social learning situations such as collaborative learning, and social influences such as peers, friends and teaching staff can alter a student's motivation and strategies for the self-regulation of learning (Järvelä & Järvenoja, 2011; Jones, Estell, & Alexander, 2008). Social skills such as asking and responding to questions and asking for help and helping others become essential elements in a university student's academic life. A lack of help in seeking knowledge and skills may cause students to shy away from positive interaction with peers and limit their requests for assistance (Stuart A. Karabenick & Dembo, 2011). As such, self-regulated learning not only impacts a student's ability to individually self-regulate their learning with regard to cognitive and metacognitive elements, but also concerns their ability to regulate knowledge in a social and collaborative context.

How well a student can interact and regulate learning in a social context also impacts on a student's learning. A major issue in higher education is the student dropout rate; especially in the first year of a programme. The extent to which students are able to manage their transition from high school and socially integrate into university education significantly affects the success of their university education. A lack of clear goals, lack of persistence, inadequate study and time management skills, low self-efficacy, lack of academic support service and challenges in social adjustments

are among the reasons for students dropping out of their university education (Gray, Vitak, Easton, & Ellison, 2013; Rausch & Hamilton, 2006).

It is not enough to ensure that first year students are eased into their university life. Continuous support and guidance is needed to ensure students are able to sustain positive motivation and self-regulation learning skills to sustain them through their entire study programme. Studies have recently revealed that there is a significant decline in student mastery goals after their first year in their programmes (Corker, Donnellan, & Bowles, 2013; Lieberman & Remedios, 2007; Stewart et al., 2015). This decline is in part due to a lack of emphasis on a mastery goal approach in the classroom, especially in large university classes. This is further fuelled by an emphasis on the assessment of a student's performance, based on grades, thus indirectly encouraging a performance approach to learning. In the long term a student's lack of competence in effective time management and self-regulation learning skills can also slowly diminish motivation to persist in their studies (Corker et al., 2013; Lieberman & Remedios, 2007; Van der Meer, Jansen, & Torenbeek, 2010).

Stewart et al. (2015) stressed that students need to be made aware of the university expectations and what attributes are valued in teaching and learning, and provide the necessary guidance and support accordingly so that students can attain the expected outcomes. Similarly, students should also be helped to see the value of activities that focus on self-regulated learning skill development, especially when students have no prior experience of such activities and have not experienced courses that consistently include skills development (De la Harpe & Radloff, 2006). In order to support and facilitate student autonomy and self-regulated learning, Stewart and colleagues(Stewart et al., 2015) noted that it is imperative to investigate the influencing factors that shape student motives for studying as their degree progresses. Gaining insight into these influencing factors could provide valuable information to explain the occurrence or absence of SRL practices in student learning and in providing the necessary support for university students in developing and sustaining their motivation and self-regulated learning throughout their study. In particular, this information could help teaching staff and relevant university teaching and learning support staff to identify and provide the necessary instructions,

guidance and support for students. *As such, the main motivation of this research study is to examine the factors that influence students to self-regulate learning in their university education.*

2.5.2 Teaching Staff

Teaching staff are key players in supporting a student's self-regulation of learning. Numerous studies have established that students at any academic level can be taught to self-regulate their learning (Cleary & Zimmerman, 2004; Palmer & Wehmeyer, 2003; Perry, 1998; Perry & VandeKamp, 2000). Students need to be provided with opportunities, choices and control over their learning so as to acquire and practice self-regulated learning skills (Zimmerman, 1995b, 1995c). Teaching staff can thus play a significant role in supporting and facilitating self-regulated learning skills in students (Zimmerman, 1995b, 2002).

Teaching staff support for SRL may include practices such as scaffolding, modelling various thinking and learning strategies and other instructional techniques (Lau, 2011; Perry, 1998; Perry et al., 2008; Perry & VandeKamp, 2000). Such instructional practices enable students in acquiring the domain and strategy knowledge required in making appropriate choices, expand their abilities by attempting challenging tasks and regulate their learning independently. Specifically, in scaffolding practices, teaching staff initiate the regulation of student learning via modelling, guidance, and elaborative feedback that eventually facilitates student development of self-regulatory skills. Scaffolded instructions also contribute to a supportive environment that encourages engagement and persistence in learning and problem solving situations and further enhances student expectations for success (Perry et al., 2008).

Studies have shown that adjustments made by teaching staff to the learning environment and their teaching practice, have positive effects on student development of SRL skills. This might include improved self-monitoring, heightened awareness of the quality of their performance, and increased dedication to learning (M. Boekaerts, 1997; Cleary & Zimmerman, 2004; Kiewra, 2002; Perry & VandeKamp, 2000; Schunk, 1990; Zimmerman & Schunk, 2001). Teaching staff are expected to design tasks and interact with students in ways that encourage SRL.

Teachers need to tailor instruction about SRL to suit unique teaching and learning contexts while creating opportunities for students to support one another through collaborating, sharing ideas, and brainstorming problem-solving strategies (Berger & Karabenick, 2011; Matusovich, Streveler, & Miller, 2010; Velayutham, Aldridge, & Fraser, 2012). In order for teaching staff to acclimate their teaching practices and teaching and learning environments to support and facilitate student self-regulation of learning, it is helpful to understand the concept of self-regulated learning processes. Teachers should also extend their understanding of how SRL behaviours develop, and possess the knowledge and skills regarding how to teach or facilitate the development of those skills in their students (Perry et al., 2008).

Much emphasis is placed on the importance of teaching staff supporting student self-regulation of learning (Palmer & Wehmeyer, 2003; Perry, 1998; Perry et al., 2008; Perry et al., 2004). Less attention however is paid to the challenges, constraints and limitations faced by teaching staff in their current teaching and learning environment, in accommodating their teaching practices and environment to provide for the SRL facilitation. Previous studies have noted that despite teachers having positive attitudes towards the introduction of SRL in their own classroom, different elements such as heavy workloads and lack of faculty support can impede their efforts to fully promote it (Dignath-van Ewijk & van der Werf, 2012; Lombaerts et al., 2009; Tillema & Kremer-Hayon, 2002). It is also not an easy task to embed and facilitate these skills in a discipline-specific curriculum, as this effort requires careful scrutiny of the curriculum and engagement from various players such as curriculum developers, teaching staff in the discipline area and discipline academic managers (Oliver, 2013; Oliver et al., 2007), when integrating SRL skills into the curriculum.

Academic staff may also lack confidence, and the knowledge and skills needed to facilitate self-regulated learning skills in the context of their discipline. The teaching staff's beliefs and attitudes towards facilitating self-regulated learning are important, as are the impact of these on their motivation and ability to engage in this work, and the need to address and, where necessary, change beliefs. While it is emphasised that teaching staff have a "responsibility to teach students not just what to learn but more importantly how to learn" (Camahalan, 2006 p. 194), it is equally important to understand and address the challenges faced by staff in providing support and in

facilitating SRL development by their students, especially in the context of the discipline.

Research by Lombaerts et al. (2009) noted that there is a clear need to advance research around critical determinants of teaching staff's facilitation and support for SRL promotion. Investigating these factors may shed some light on the extent to which university teaching staff embrace the concept of self-regulated learning, and whether lecturers consciously consider facilitating the self-regulation of learning in their students. Gaining insights into the challenges and constraints (or positive influences) that affect the facilitation of self-regulation of learning could provide valuable information explaining the presence or absence of such SRL practices in higher education teaching and learning. *This perspective thus motived the research reported in this thesis, investigating factors that influence teaching staff's facilitation of student self-regulation of learning.*

2.5.3 Research Gap

It is evident from the literature review that factors surrounding student learning and factors surrounding teaching staff's teaching affect the facilitation of SRL in teaching and learning. Although studies have examined the motivational factors and social factors involved in student SRL; and factors affecting teaching staff's teaching and learning approaches, they are often investigated as separate issues. Only a few published studies have examined the combined effect of motivational factors and social factors in university student SRL. Student and lecturer issues are often not seen as interdependent. There are no significant studies, to the researcher's knowledge, that have addressed the prospective relations between the factors influencing lecturer facilitation of SRL and the factors influencing student practice of self-regulation of learning in a university teaching and learning environment. Addressing these gaps is the main purpose of this study.

By addressing the student and lecturer perspectives simultaneously, this research revealed valuable information about the perceptions and expectations that both parties hold in relation to the facilitation and practice of SRL in university teaching and learning environments. The findings of this study provided valuable information

for addressing and providing for tertiary student SRL. The outcome also provided useful information for university academic leaders, academic managers and teaching and learning support staff in succinctly addressing the need and support required by teaching staff in facilitating student SRL. The research findings also provided useful information for teaching staff and curriculum developers in providing instructions and facilitating SRL in students.

2.6 SUMMARY

This chapter began with a description of self-regulated learning that is based upon social cognitive theory (Bandura, 1991, 2001). This was followed by a discussion based on the literature review, which identified the need to integrate self-regulated learning skills into teaching and learning practices in order to fulfil higher education's vision of cultivating a lifelong learning culture in graduates. Lifelong learning is generally emphasised as an essential graduate attribute by the Australian higher education sector. Next a review of the literature emphasised the need to embed self-regulated learning skills in university teaching and learning, and the challenges associated with implementing SRL skills in the curriculum, particularly in a discipline-focused context.

The next chapter extends the literature review to discuss the factors influencing university student self-regulation of learning and the factors influencing teaching staff's facilitation of student self-regulation of learning. Based on the discussion, a student model and a lecturer model, with corresponding hypotheses were developed.

CHAPTER 3

THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Education is what survives when what has been learned has been forgotten.

B. F. Skinner (1904 – 1990)

3.1 INTRODUCTION

A theoretical framework explains the relationship between the concepts, and variables, including the independent, dependent and latent variables, of a study. Accordingly hypotheses are formulated to investigate the relationships between the variables.

The primary research questions in this study are:

1. What factors influence the self-regulation of learning in university students?
2. How and to what extent do the identified factors influence the self-regulation of learning in university students?
3. What factors influence university teaching staff in their facilitation of students' self-regulation of learning?
4. How and to what extent do the identified factors influence university teaching staff in their facilitation of students' self-regulation of learning?

In this study there are thus two dependent variables, s*tudent's self-regulation of learning* (StudentSRL) and *teaching staff's facilitation of student SRL* (LecFacilitationSRL).

In the following section, the dimensions for evaluating student SRL (dependent variable represented as *StudentSRL*) will be described. This is followed by the derivation of the factors influencing (independent variables) student SRL and the development of the respective hypotheses. Subsequently the research model for

student SRL is presented. Next, the construction of suitable measuring items for lecturer's SRL facilitation (dependent variable represented as *LecFacilitationSRL*) is discussed, and this followed by the derivation of the factors influencing (independent variables) lecturer's SRL facilitation and the development of the respective hypotheses. Subsequently, a research model for lecturer's SRL facilitation is presented.

3.2 DERIVING STUDENT SRL DEPENDENT VARIABLE

Self-regulated learning is learning in which students manage their cognition, motivation and behaviour to attain their learning goals (Paul R. Pintrich, 1995, 2004; Philip H. Winne, 2010; Zimmerman, 2002). Self-regulation of learning focuses on how students manage and sustain their learning practices in specific learning environments. Self-regulated learners are able to set appropriate goals and plan accordingly to achieve their goals, monitor their progress, reflect on the effectiveness of their approaches and adapt their learning strategies accordingly.

Zimmerman defines self-regulated learning processes in terms of three cyclical phases: forethought, performance and a self-reflection phase. These three phases are described in detail in Section 2.3.1. In general, the forethought phase involves goal setting and planning processes, the performance phase involves self-monitoring processes and the self-reflection phase involves self-evaluation processes.

3.2.1 Self-Regulated Learning Strategies

Self-regulated learning strategies (SRLS) are approaches that learners use to control, manage and adapt the cognitive, motivational, emotional and environmental influences that affect their learning (C. E. Weinstein et al., 2010 p. 235).

Zimmerman and Martinez-Pons (1986, 1988) have identified fourteen categories of self-regulated learning strategies (SRLS) derived from social cognitive theory. The fourteen SRLS (refer to Table 3.1) include rehearsing and memorising; organising and transforming; goal-setting and planning; keeping records and monitoring; self-evaluation, environmental structuring; self-consequences; seeking information;

seeking assistance from peers and teaching staff; reviewing tests, reviewing notes and reviewing texts (Zimmerman & Martinez-Pons, 1986, 1988). There is no one specific strategy or set of strategies that must be used to achieve success with SRL. The aim of these strategies are to improve student ability in self-regulating their personal functions, their academic performance and their learning environments (Camahalan, 2006). Previous studies (C. C. Chen, 2002; Lopez et al., 2013; Nota et al., 2004) have shown that using a range of SRLS provides a repertoire of adaptive alternative methods that can help students overcome difficulties in learning. By applying SRLS, students create opportunities to evaluate the strategies used to determine whether they were adequate or inadequate, and then self-evaluate their learning strategies in order to meet a desired goal.

Table 3.1: Definitions and examples of self-regulated learning strategies as identified by Zimmerman and Martinez-Pons (1986)

Categories of strategies	**Definitions**
1. Self-evaluation	Statements indicating student-initiated evaluations of the quality or progress of their work, e.g., "I check over my work to make sure I did it correct."
2. Organizing and transforming	Statements indicating student-initiated overt or covert rearrangement of instructional materials to improve learning, e.g., "I make an outline before I write my paper."
3. Goal-setting and planning	Statements indicating student-initiated setting of educational goals or sub-goals and planning for sequencing, timing, and completing activities related to those goals, e.g., "First I start studying two weeks before exams, and I pace myself."
4. Seeking information	Statements indicating student-initiated efforts to secure further task information from non-social sources when undertaking an assignment, e.g., "Before beginning to write the paper, I go to the library to get as much information as possible concerning the topic."
5. Keeping records and monitoring	Statements indicating student-initiated efforts to record events or results, e.g., "I took notes of the class discussion.", "I kept a list of the words I got wrong."
6. Environmental structuring	Statements indicating student-initiated efforts to select or arrange the physical setting to make learning easier, e.g., "I isolate myself from anything that distracts me.", "I turned off the radio so I can concentrate on what I am doing."
7. Self-consequences	Statements indicating student arrangement or imagination of rewards or punishment for success or failure, e.g., "If I do well on a test, I treat myself to a movie."

8. Rehearsing and memorizing	Statements indicating student-initiated effort to memorize material by overt or covert practice, e.g., "In preparing for a math test, I keep writing the formula down until I remember it."
9–11. Seeking social assistance	Statements indicating student-initiated to solicit help from peers (9), teachers (10), and adults (11), e.g., "If I have problems with math assignments, I ask a friend to help."
12–14. Reviewing records	Statements indicating student-initiated efforts to reread tests (12), notes (13), or textbooks (14), to prepare for class or further testing, e.g., "When preparing for a test, I review my notes."
15. Other	Statements indicating learning behaviour that is initiated by other persons such as teachers or parents, and all unclear verbal responses, e.g., "I just do what the teachers says."

Broadly, Zimmerman and Martinez-Pons's (1986) list of SRL strategies can be categorised into cognitive (learning) strategies, metacognitive strategies and resource management.

Cognitive strategies refer to the use of cognitive information acquisition and processing strategies such as rehearsal, memorising, organising and transforming strategies. The use of these cognitive processing strategies also marks the use of surface level processing strategies (rehearsal and memorising) and the use of deep-level processing strategies (elaboration, organisation and transformation strategies) that result in better learning and performance (C. E. Weinstein et al., 2010). How students use surface level and deep level cognitive strategies is part of self-regulated learning process (Paul R. Pintrich, 2004). In this study, the use of cognitive (learning) strategies therefore forms one dimension for measuring student self-regulation of learning (dependent variable StudentSRL).

Metacognitive strategies involve strategies for controlling, monitoring and evaluating one's cognition. This regulation of cognition (metacognitive activities) involves the way students plan and implement their learning strategies; monitor and evaluate their progress, and adapt their learning strategies accordingly to be successful in their learning process (Paul R. Pintrich, 2004; Schraw & Moshman, 1995; C. E. Weinstein et al., 2010; Zimmerman, 2002). In another words, metacognitive activities include goal setting, planning, self-monitoring, self-reflection and self-evaluation of both

learning process and learning outcomes. A self-regulated student would set appropriate learning goals and plan accordingly, choosing appropriate learning strategies, establishing timelines and environment to complete the particular learning task. The student would then implement the learning plans accordingly and monitor their progress in the pursuit of the learning goal. Finally the student would reflect on and evaluate their learning approaches and performance in the learning task or learning outcome. This self-reflection and self-evaluation would then influence the student's future goals, planning and learning approaches (Schraw & Dennison, 1994; Sperling, Howard, Staley, & DuBois, 2004; C. E. Weinstein et al., 2010; Zimmerman, 2002).

The ability to use these metacognitive strategies, goal setting and planning, self-monitoring and self-evaluation is an essential element of student self-regulation of learning. In this study, the dimensions for measuring student self-regulation of learning (dependent variable StudentSRL) include these three metacognitive activities: goal setting and planning, self-monitoring and self-evaluation.

Finally, resource management encompasses the behavioural and environmental components of self-regulation of learning. This includes managing study time and environment appropriately; and knowing when, where and how to seek assistance when necessary (Paul R. Pintrich, 2004; C. E. Weinstein et al., 2010). Managing time effectively is an essential strategy in self-regulated learning. Time management involves scheduling, planning, and managing study time, and allocating time for different activities. University students have various demands on their time. As such, it is necessary for them to know and to establish realistic schedules to manage their learning and other various activities. Planning and managing study time also encourages students to be responsible for their own behaviour and learning. Similarly, managing one's study environment is an essential element of self-regulation. Ideally, a study environment should be organised, quiet and relatively free of distractions (Paul R. Pintrich, 2004; Paul R Pintrich, Smith, García, & McKeachie, 1993).

Another important component in resource management is help seeking. Resourceful and proactive students are able to identify their lack of understanding about

something and subsequently the need to seek help in their learning. Accordingly they would seek the necessary help from both peers and teaching staff to assist their learning (Stuart A. Karabenick & Dembo, 2011; Paul R. Pintrich, 2004). The measurement of a student's self-regulation of learning (dependent variable StudentSRL) in this study therefore includes study time and study environment management and help seeking dimensions.

In sum, in this study the dependent variable student self-regulation of learning (dependent variable StudentSRL) is represented as a composite variable of six dimensions: *cognitive strategies, goal setting and planning, self-monitoring, self-evaluation, time and environment management* and *help seeking*. These dimensions are depicted in Figure 3.1. The dependent variable StudentSRL is modelled as a second-order formative construct with six first-order reflective constructs, *cognitive strategies, goal setting and planning, self-monitoring, self-evaluation, time and environment management* and *help seeking* (see Figure 3.1). Formative and reflective constructs are explained in detail in Section 4.7.2.1.

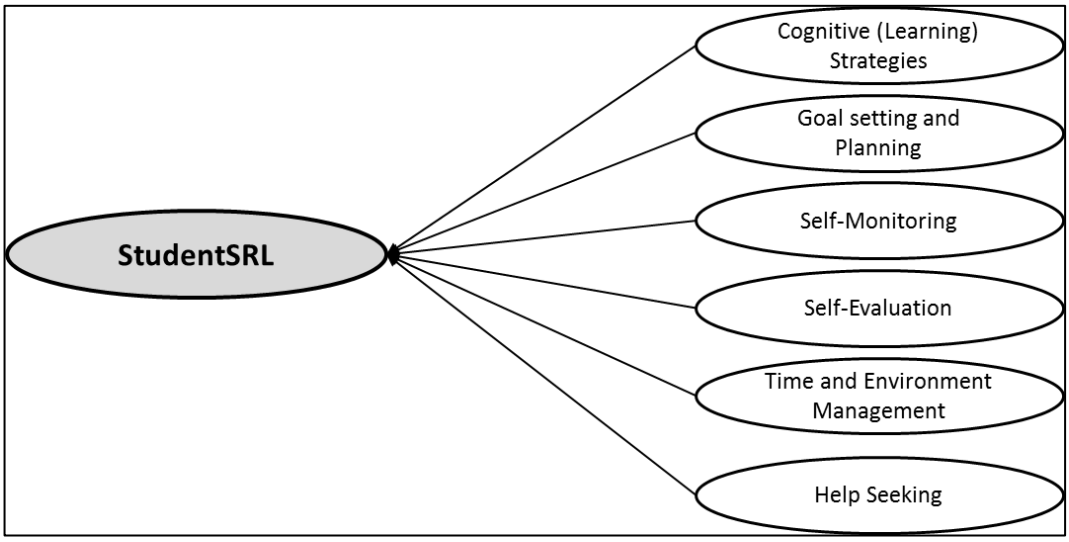

Figure 3.1: StudentSRL (Dependent construct) and its Dimensions (Sub-constructs)

The following section discusses the factors influencing student self-regulation of learning and the formulation of the respective hypotheses.

3.3 DERIVING STUDENT SRL INDEPENDENT VARIABLES AND HYPOTHESES DEVELOPMENT

An independent variable, also known as an explanatory variable, predictor variable, or exogenous variable, has a causal effect or an influence on the dependent variable (Cavana, Delahaye, & Sekaran, 2001). In this study, the factors influencing the self-regulation of learning by university students form the independent variables.

Studies have been undertaken to understand the factors affecting student self-regulation of learning and the approaches to foster self-regulation of learning among students at primary, high school and at tertiary levels (Cabrera et al., 2002; Cohen, 2012; Perry & VandeKamp, 2000). These studies have shown that to become self-regulated learners, students should be aware of their metacognition, and motivation. University students in particular, who are often involved in various extracurricular activities in addition to formal coursework, generally require the ability to manage their emotional, behavioural and social-environmental influences in their university education.

Studies of university student SRL have, however, had variable outcomes. While some studies have shown that university students do internalise self-regulation in their learning (Koestner, Taylor, Losier, & Fichman, 2010), other studies demonstrated that university students do not possess well-developed SRL strategies (Peverly, Brobst, Graham, & Shaw, 2003). Studies have also demonstrated a decline in motivation with the development and advance of years spent studying (Jacquelynne S Eccles, 2005; Jacquelynne S Eccles & Wigfield, 2002; Gottfried, Marcoulides, Gottfried, & Oliver, 2013; P.R. Pintrich & Zusho, 2002; Stewart et al., 2015). This creates a paradoxical phenomenon where student motivation and self-regulation decline as they become more cognitively competent (Schunk, 2005),and therefore, it is important to investigate the impact of various factors on the engagement of university students in self-regulated learning, where greater emphasis is placed on autonomy and independent learning (Bembenutty, 2011a; Paul R. Pintrich, 2004)

Studies have shown that personal influences such as a student's goal orientation (Ames, 1992; Corker et al., 2013; Elliott & Dweck, 1988; Hagen & Weinstein, 1995; Rausch & Hamilton, 2006; Akane Zusho & Edwards, 2011), perception of task value and self-efficacy (Joo, Lim, & Kim, 2013; Lavasani, Malahmadi, & Amani, 2010; Lawanto, Santoso, Goodridge, & Lawanto, 2014; Liem, Lau, & Nie, 2008), prior learning experience (Martin, Wilson, Liem, & Ginns, 2013; Trigwell, Ashwin, & Millan, 2012), metacognitive knowledge awareness (Bakracevic Vukman & Licardo, 2009; Kane, Lear, & Dube, 2014; Schraw, 1998; Schraw & Gutierrez, 2015; Woolley, 2011), and the contextual influences of teaching staff, peers and family have an impact on engagement with self-regulated learning to varying degrees.

In this study personal factors related to *goal orientation, perception of task value, self-efficacy, prior learning experience, metacognitive knowledge awareness,* and social factors *teaching staff, peer influence* and *family influence* are examined to understand the extent to which these factors influence a university student's self-regulation of learning. The following sub-sections discuss these factors in detail and the development of the respective hypotheses in this study.

3.3.1 Goal Orientation

Previous studies have showed that students who plan their learning, monitor their learning progress, reflect on and regulate their thinking, learning and their motivation, are likely to achieve success in the academic endeavours (Scott G Paris & Winograd, 1990; Paul R. Pintrich, 1995, 2004; Paul R. Pintrich & De Groot, 1990; P.R. Pintrich & Zusho, 2002; Schunk, 1989; Schunk, 1990; Schunk & Zimmerman, 2003; Sperling et al., 2004; Claire Ellen Weinstein et al., 2011; P. H. Winne & Hadwin, 2010; Woolley, 2011; Zimmerman, 1990, 1998, 2000). There are various reasons why one student can persist in regulating their learning while another abandons their efforts mid-way. It is crucial to note that having skills in self-regulation alone are insufficient to ensure that they will be used appropriately in various learning situations (Zimmerman & Schunk, 1989).

One important factor contributing to a student's learning is their goal orientation. Goal orientation involves the reasons a student is motivated to achieve a particular

goal, how the student approaches the task, and the standards the student uses to evaluate their performance (Ames, 1992; Christopher A. Wolters et al., 1996). Ames (1992) described goal orientations as "an integrated pattern of beliefs that leads to different ways of approaching, engaging in and responding to achievement situations" (Ames, 1992 p. 261). The types of goals students adopt in their learning are crucial, as they can lead to purposeful self-regulation in academic tasks. The achievement of goal orientation is further categorised into mastery goal orientation and performance goal orientation (Ames & Archer, 1988; Archer, 1994; Christopher A. Wolters et al., 1996).

3.3.1.1 Mastery Oriented Goals

Mastery goal orientation focuses on the intrinsic values of learning (Ames & Archer, 1988; Archer, 1994; Christopher A. Wolters et al., 1996). Students adopting mastery goal orientation are motivated by the task rather than the extrinsic rewards. The student's focus is on understanding how to perform and develop competency with a task. These students perceive learning as an opportunity to understand, to solve problems and to seek challenging tasks in order to acquire and develop new skills, gain new insights into concepts, improve their ability and proficiency over time and achieve successful outcomes (Ames, 1992; Ames & Archer, 1988; Archer, 1994; Dweck & Leggett, 1988; Elliott & Dweck, 1988; Nicholls, 1984).

Positive correlations have been found in a number of studies between a student's adoption of mastery learning and deeper cognitive engagement, and adaptive motivational attributes such as a positive perception of task values, higher self-efficacy, persistence, and effort as well as overall higher self-regulation levels (Ames, 1992; Paul R Pintrich & Garcia, 1994; Christopher A. Wolters et al., 1996). Students with mastery goal orientation set self-referenced goals and self-evaluate their performance based on their development of knowledge, skills, and competence over time rather than through comparing their performance to that of others (Ames, 1992; Ames & Archer, 1988; Elliot, 1999; Elliott & Dweck, 1988; Nicholls, 1984). This is usually demonstrated in sustained or improved performance, gains in mastery, and adaptive attribution patterns (Ames, 1992; Ames & Archer, 1988; Elliott & Dweck, 1988). Often, their sense of accomplishment is derived from the task's intrinsic characteristics, such as the interest, challenge, and enjoyment these tasks

give them. Their sense of self-efficacy is based on the belief that effort will lead to success. For this reason, students adopting mastery goals exhibit sustained or increased positive attitude toward a task and in the face of obstacles (Ames, 1992; Ames & Archer, 1988; Elliott & Dweck, 1988).

While a student's adoption of mastery oriented goals contributes to their self-regulation of learning, studies have also found that the adoption of mastery oriented goals often declines as students progress through a programme of study (Corker et al., 2013; Lieberman & Remedios, 2007; Stewart et al., 2015). An increased focus on knowledge of a discipline, with fewer opportunities for learning choices and decision making, and an emphasis on student performance based on grades, indirectly encourages a performance approach to learning. This may contribute to a developmental decrease in a student's intrinsic motivation. In the long term, a student's lack of competence in effective time management and self-regulation learning skills can slowly diminish their motivation to persist in learning (Carreira, 2011; Corker et al., 2013; Lieberman & Remedios, 2007; Van der Meer et al., 2010).

Based on the preceding discussion, student adoption of mastery oriented goals is an important factor in self-regulated learning. The following hypotheses are thus investigated to evaluate the extent to which this factor influences university student self-regulation of learning (as illustrated in Figure 3.2).

Hypothesis 1a: Students' mastery goal orientation has a significant direct influence on their self-regulation of learning.

Hypothesis 1b: Students' mastery goal orientation influence how they perceive their learning tasks (task value).

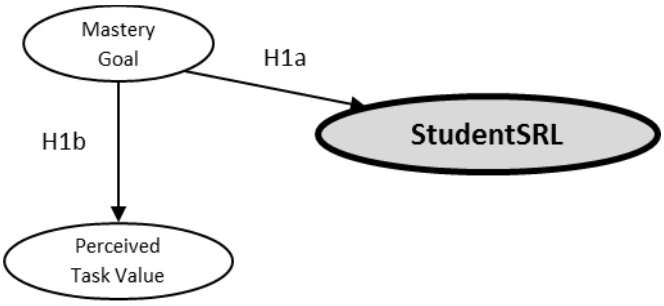

Figure 3.2: Hypotheses 1a and 1b

3.3.1.2 Performance Oriented Goals

Performance goal orientation involves a focus on the impression of ability and performance relative to others. Students with performance orientation concentrate on the adequacy of their own ability, and wish to prove their ability by being successful, outperforming others, or achieving success with minimal effort (Ames, 1992; Ames & Archer, 1988; Elliott & Dweck, 1988). They regard learning as a means to an end, such as demonstrating high ability or pleasing a teacher or other individuals (Nicholls, 1984).

Achievement goal theorists have further distinguished performance orientation as either performance-approach orientation, which is approaching tasks with a desire to succeed in outperforming others, or performance-avoidance orientation which refers to the desire to avoid potential failures (Elliot, 1999; Elliott & Dweck, 1988; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002).

A performance-avoidance goal orientation involves those students who are motivated to avoid being perceived as incompetent or the worst in the group. This orientation evokes self-protective cognitive processes that interfere with task engagement, such as sensitivity to failure-relevant information and anxiety-based preoccupations with self-presentation (Elliot & Church, 1997). Generally, a fear of failure and expectations of low competence motivate students with a performance-avoidance goal orientation to avoid negative outcomes as they attempt to hide their lack of ability (Elliot & Church, 1997; Middleton & Midgley, 1997).

On the other hand, students holding a performance-approach orientation are usually motivated to outperform others by demonstrating their ability and competence. The desire to attain or surpass levels of normative competence motivates students with a performance-approach goal orientation to engage in activities so as to demonstrate their ability (Elliot, 1999; Middleton & Midgley, 1997).

In general, performance oriented students adopt a social self-evaluative perspective where gaining public recognition of their competence is important, as is avoiding negative competence judgments by others (Ames, 1992; Ames & Archer, 1988; Dweck & Leggett, 1988; Nicholls, 1984). They focus on their ability and self-worth,

which is determined by their ability to perform (Ames, 1992). For them, success and a sense of accomplishment is derived from performing better than other students, obtaining high grades, receiving external reinforcement or public recognition for their superior performance, or avoiding looking incompetent (Nicholls, 1984). In this regard, an element of common public or social recognition that influences university students to self-regulate their learning is the prospect of securing future employment opportunities and the desire to have a successful future, wealth, good community standing/status, which motivates many university students to self-regulate to varying degrees. Career aspirations are important to motivate students to work towards their intended career goal. Students associate good grades with better employment opportunities. In turn, better employment prospects lead to opportunities to gain wealth and good social status amongst family, peers and community.

In the context of this study, grade achievement, future employment prospects and success in the future are established as performance oriented goals. The following hypotheses are thus proposed to investigate the impact of these performance oriented goals on student self-regulation of learning (as illustrated in Figure 3.3).

Hypothesis 2a: Students' desire to perform better than others (grades) has a significant direct influence on their self-regulation of learning.

Hypothesis 2b: Achievement of good academic level (grades) has a significant influence on students' future employment prospects.

Hypothesis 2c: Students' concern about employment prospects upon graduation has a significant direct influence on their self-regulation of learning.

Hypothesis 2d: Employment prospects have a significant influence on students' successful future (personal status, power, and value in society).

Hypothesis 2e: Students' desire for successful future has a significant direct influence on their self-regulation of learning.

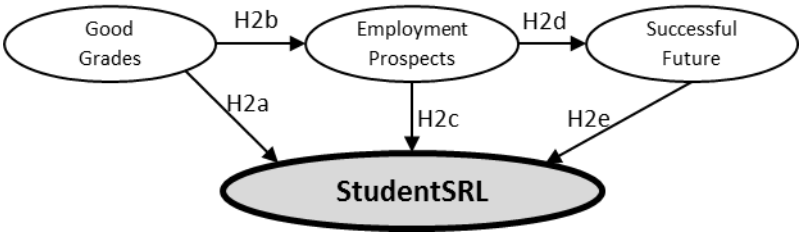

Figure 3.3: Hypotheses 2a, 2b, 2c, 2d and 2e

3.3.2 Task Value Perception

According to expectancy-value theory (Jacquelynne S. Eccles et al., 1983; Wigfield & Eccles, 2000), a student's belief about the value of an academic task (task value) plays a pivotal role in motivation to self-regulate learning and, thus influences achievement-related choices and performance (Jacquelynne S Eccles & Wigfield, 2002; Wigfield & Cambria, 2010b). Task value can be defined as motivation to engage in academic activities (Schunk, 2005; Wigfield & Cambria, 2010b). Schunk (2005) views task value as one of the motivational processes. According to Schunk, students are inclined to use cognitive strategies more often when they perceive their learning tasks as relevant, important, and useful, resulting in a positive learning outcome. Similarly, C. A. Wolters and Rosenthal (2000) theorised that students who perceive that their learning tasks are important, useful and interesting are more inclined to engage in the tasks with greater effort and persist longer toward completing the tasks.

Eccles and colleagues proposed four motivational features of a task value: attainment value, intrinsic value, utility value and cost (Eccles et al., 1983, cited in Jacquelynne S Eccles & Wigfield, 2002). Attainment value refers to the personal importance of doing well in a task, such as a student perfecting their handwriting. Intrinsic value refers to a person's natural interest and curiosity in a particular task. The significance of intrinsic value in academic self-regulation was discussed in the mastery goal orientation section. Thirdly, the utility value is defined as how useful the task is for the student's current and future goals. In other words, students perceive a task is of value if the task is useful for their immediate and future situations. Eccles and her colleagues (Jacquelynne S Eccles & Wigfield, 2002) conceptualised cost as a negative experience in performance anxiety and fear of both failure and success

while engaging in a task. This negative experience also includes the amount of effort needed to succeed at the task and the resulting lost opportunities from making one choice rather than another (Jacquelynne S Eccles & Wigfield, 2002; Wigfield & Cambria, 2010a; Wigfield & Eccles, 1992, 2000).

Studies have showed that students are inclined to show interest in their learning activities and adopt adaptive learning strategies when they are convinced that the learning activities are important and useful. These studies confirm the association between a student's perception of task value and their choice to participate and sustain effort in academic tasks (e.g.: Artino, 2008a; Berger & Karabenick, 2011; Joo et al., 2013; Matusovich et al., 2010; Paul R. Pintrich & De Groot, 1990; Velayutham et al., 2012; Wigfield & Cambria, 2010b).

The findings of Velayutham et al. (2012) indicated that task value influences student self-regulation in science learning. Matusovich et al. (2010) investigated the value beliefs of engineering students that contributed to their choices to engage and persist in earning engineering degrees. Matusovich et al.'s (2010) study revealed that students with high task value perceptions, despite having low interest in a course, show resiliency and determination to earn an engineering degree. Lawanto and colleagues (Lawanto et al., 2014) investigated the three task value components: importance, usefulness and interest. They found that importance ranked higher than usefulness and interest in a course. The participants in Lawanto et al.'s study indicated importance in terms of being beneficial in future classes and its potential to improve the probability of getting a job. This implies that when the students perceive that a learning task contributes to their future benefits or success, they tend to self-regulate their learning process. On the other hand, Noteborn, Bohle Carbonell, Dailey-Hebert, and Gijselaers (2012) found that while task value is positively related to enjoyment and negatively related to boredom, task value did not influence the final achievement outcome.

The preceding discussion suggests that even if a student does not have mastery oriented goals towards their chosen course/degree, the utility value, which is the perceived future use or advantage of pursuing a career in the chosen field, may drive the student to self-regulate their learning. The following hypothesis is thus proposed

to ascertain the impact of task value on student self-regulation of learning (as illustrated in Figure 3.4).

Hypothesis 3: Students' perception of the importance and usefulness of a given task has a direct and significant influence on their self-regulation of learning.

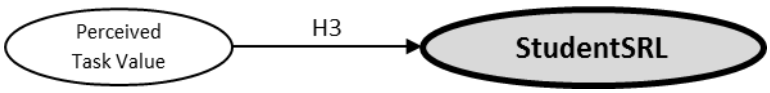

Figure 3.4: Hypothesis 3

3.3.3 Academic Self-Efficacy

Self-efficacy, which stems from social cognitive theory, proposes that one's achievement are influenced by the interactions of personal factors such as thoughts and beliefs, one's environmental conditions and one's behaviour (Bandura, 1986; Bandura, 1997). Bandura (1997) described self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p.3). More specifically, self-efficacy is concerned with self-judgement about one's own capacity to carry out the actions necessary to deal with prospective unpredictable and possibly stressful situations (Bandura & Schunk, 1981). Bandura (1977b, 1989) noted that individuals evaluate their own experiences and thought processes through self-reflection. This self-reflection process prompts people to evaluate, alter and adapt their own environments and social systems.

A more specific element of self-efficacy related to self-regulated learning is academic self-efficacy and this reflects a student's perceived competence with respect to learning tasks in the academic domain (F Pajares & Schunk, 2001). Perceived academic self-efficacy is "personal judgements of one's capabilities to organize and execute courses of action to attain designated types of educational performances" (Zimmerman, 1995a p. 203).

Student self-efficacy and self-regulatory learning strategies are often noted as a crucial predictor of academic achievement that is related to discipline choice and career aspirations (Bandura, 1994, 1995; Britner & Pajares, 2006; Caprara,

Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011; P. Chen & Zimmerman, 2007; Diseth, 2011; Linnenbrink & Pintrich, 2003; Paul R. Pintrich & De Groot, 1990). Student self-efficacy beliefs have a direct influence on their choice of activities, the amount of effort they will expend, and their level of persistence when faced with difficulties, as well as their emotional reaction such as fear and anxiety (Bandura, 1977a; Zimmerman, 1995a). For example, Frank Pajares and Miller (1994) found that self-efficacy had a strong direct effect on student mathematical performance. Students with strong self-efficacy persist and invest more effort on tasks in which they are confident, compared to students with low self-efficacy who lac the confidence to successfully perform the same task.

Self-efficacy also impacts a student's choice and use of learning strategies. Studies (Paul R. Pintrich & De Groot, 1990; Schunk, 1991; Zimmerman & Martinez-Pons, 1986) have demonstrated that self-efficacy beliefs have a reciprocal relationship with the self-regulation of learning abilities. As a student's ability to self-regulate learning improves, their self-efficacy beliefs increase as well, and vice versa. These self-efficacy beliefs encourage students to continuously engage in self-regulatory behaviours that move them toward achieving their goals. Schunk (1991) found that a student's self-efficacy positively correlates to their persistence in working out problems during arithmetic learning. Similarly, Paul R. Pintrich and De Groot (1990) reported that a student's self-efficacy is strongly correlated with the use of active learning strategies.

A student's academic self-efficacy also influences help seeking behaviour. A. M. Ryan, Gheen, and Midgley (1998) found that a student's perception of their academic efficacy influences their decision to seek help. A. M. Ryan et al. (1998) noticed that students who avoid seeking help when they needed assistance, were students who feel less efficacious about their schoolwork. Low self-efficacy students are more likely believe that others perceive their need for help as an indication of their lack of ability and thus, these students avoid seeking help when they need it. In contrast, when students with high self-efficacy encounter failure or difficulty, they do not worry that others will attribute it to their lack of ability and are more likely to secure the necessary help.

Research also reports a positive relationship between self-efficacy and task value (Bong, 2001; Liaw, 2008; Seo & Taherbhai, 2009; Yukselturk & Bulut, 2007). Yukselturk and Bulut (2007) studied an online programming course and reported significant correlation between self-efficacy and the task value of the students, and their achievement scores. Seo and Taherbhai (2009) found that students who believed they can perform a certain task were more likely to find their class interesting, important and useful. Similarly, in a study on the effectiveness of the Blackboard e-learning system, Liaw (2008) found that the self-efficacy of online learners critically influenced their satisfaction with online learning. Similarly, Artino (2008a) study, which investigated relationships among motivational beliefs consisting of task value and self-efficacy, learner perception of learning environment, and the satisfaction of the learners enrolled in an aviator training programme, revealed that self-efficacy and task value were positively correlated with learner satisfaction of the programme. More recently, Tsai, Chuang, Liang, and Tsai's (2011) meta-analysis, which reviewed findings from 46 papers, reported that self-efficacy plays a positive role in learner's attitudes toward internet-based learning. These studies are corroborated by research results reported by Paul R Pintrich et al. (1993); Schunk (1991, 2005); A. Zusho, Pintrich, and Coppola (2003) who revealed that a high level of self-efficacy strengthens academic performance.

In sum, academic self-efficacy not only has direct impact on student SRL but also has a direct influence on student task value perception, which subsequently influences their engagement in self-regulated learning. In order to understand the impact of academic self-efficacy on student task value perception and subsequently self-regulated learning, the following hypotheses are proposed (as illustrated in Figure 3.5).

Hypothesis 4a: Self-efficacy has a direct and significant influence on students' self-regulation of learning.

Hypothesis 4b: Self-efficacy has a direct and significant influence on students' task value perception.

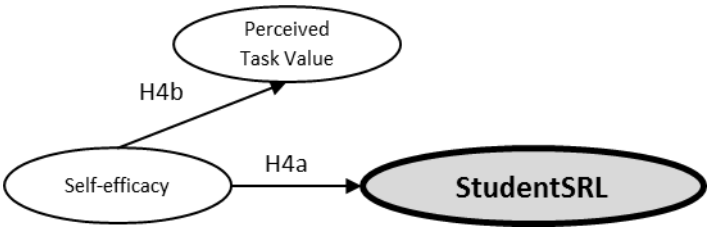

Figure 3.5: Hypotheses 4a and 4b

3.3.4 Metacognitive Knowledge Awareness

Metacognition is closely related to self-regulated learning (SRL). The term was introduced by John Flavell (1976 p. 232; 1979), who describes metacognition as "one's knowledge concerning one's own cognitive processes and products or anything related to them". Similarly, Zeidner (2005 p. 752) described metacognition as the learner's "awareness of their personal resources in relation to the demands of particular tasks, along with the knowledge they possess on how to regulate their engagement in tasks to optimize goal related processes and outcome". In sum, metacognitive knowledge can be described as the awareness of one's cognitive knowledge and resources available, as well as the knowledge to regulate one's cognitive engagement processes and the resources available.

Metacognitive knowledge is an essential component of the cognitive monitoring process and an influential factor in successfully engaging in an academic endeavour. Metacognitive knowledge pertains to student knowledge about themselves as learners, the demands of learning tasks, and strategies to achieve the tasks. Metacognition consists of two main components, namely knowledge of cognition and regulation of cognition (Schraw & Dennison, 1994). Knowledge of cognition involves how much learners understand themselves as learners, strategies, and the conditions under which such strategies are most useful. Knowledge of cognition is categorised into declarative knowledge, procedural knowledge, and conditional knowledge. Declarative knowledge is one's knowledge about oneself as a learner and about the factors influencing one's performance. Procedural knowledge refers to knowledge of the appropriate strategies to solve problems, and conditional knowledge involves knowing when and why to employ specific cognitive strategies (Schraw & Dennison, 1994; Sperling et al., 2004). On the other hand, regulation of cognition involves the way learners plan and implement their learning strategies;

monitor and evaluate their progress, and adapt their learning strategies accordingly so as to be successful in their learning process (Schraw & Dennison, 1994; Sperling et al., 2004)

Studies have demonstrated that teaching children to use metacognitive skills, such as asking themselves appropriate questions and monitoring their own responses for understanding, enables them to be more cognitively engaged in their learning. This implies that learners should be encouraged to actively involve themselves in generating meaning instead of passively receiving information in their learning (Afflerbach, Pearson, & Paris, 2008). Studies have demonstrated that children can be taught to select and use appropriate cognitive strategies and monitor meaning in improving their reading comprehension. Studies have particularly demonstrated positive outcomes between meaning construction and teaching students to actively monitor their own reading understanding by using appropriate metacognitive strategies (Linnenbrink & Pintrich, 2003; Lubliner & Smetana, 2005).

University students acquire new knowledge in several academic topics over a short time. Effective self-regulated students are able to determine what they know and use appropriate knowledge and skills to perform and monitor their learning. These students also continuously update their knowledge as new concepts, facts, and cognitive and metacognitive strategies are acquired (Schraw & Gutierrez, 2015; Tobias & Everson, 2002). Azevedo (2012) noted that university students are expected to utilise various metacognitive processes to determine whether they understand what they are learning, and modify and adapt their goals, planning, learning strategies and efforts accordingly in relation to the dynamically changing contextual conditions. Accordingly, students must also monitor and adapt their motivational beliefs and identify and seek the necessary help to perform a particular learning task. Schraw and Gutierrez (2015) argue that many students lack knowledge and skills in identifying and applying the appropriate cognitive and metacognitive strategies in self-regulating their learning. In particular, university students who can accurately distinguish between what they know and what they do not know appear to be at an advantage over those who are not as skilled at assessing metacognitive awareness (Tempelaar, 2006; Tobias & Everson, 2002).

A student's metacognitive ability to estimate their knowledge accurately is not only related to academic achievement but is also an important element in the student's learning efficacy, and subsequently their self-regulation of learning. In this study the impact of metacognitive awareness involves how well a student is aware of their metacognitive knowledge. In order to understand the impact of a student's metacognitive awareness on their self-regulated learning and self-efficacy, the following hypotheses are proposed (as illustrated in Figure 3.6).

Hypothesis 5a: Metacognitive awareness has a direct and significant influence on students' self-regulation of learning.

Hypothesis 5b: Metacognitive awareness has a direct and significant influence on students' self-efficacy.

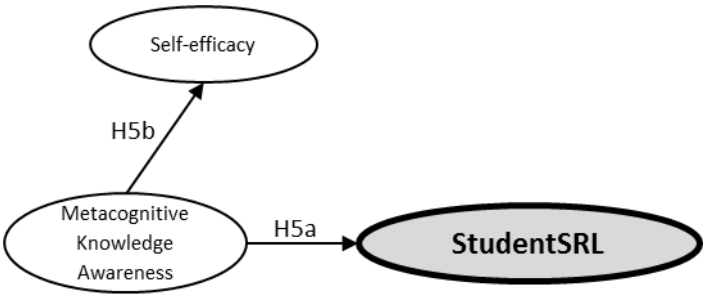

Figure 3.6: Hypotheses 5a and 5b

3.3.5 Prior Learning Experience

A student's prior academic experience influences how they perceive their current learning. This prior academic experience can include domain-specific prior knowledge, general learning experience and academic achievement such as grades and recognition. This could be the student's prior high school learning experience or their learning experience from previous semesters at university. As per the discussion of self-efficacy, learning efficacy is very much influenced by prior learning experience and academic achievement, and how these prior academic experiences have enriched metacognition knowledge and regulation strategies.

Research has shown that a student's prior knowledge can dramatically impact how well new information is comprehended and learned (Hailikari, Nevgi, &

Komulainen, 2007; Thompson & Zamboanga, 2004; Trigwell et al., 2012). Pajares and Miller (1994) noted that prior learning experience has a strong direct effect on student self-efficacy, and thus indirectly impacts maths performance. Similarly, Hailikari et al.'s (2007) study, which investigated the relationships between prior knowledge, academic self-belief, and previous study success in predicting the achievement of 139 university students on a mathematics course, revealed domain-specific prior knowledge to be more predictive of student achievement than other variables included in the study.

McKenzie, Gow, and Schweitzer (2004) investigated the characteristics associated with academic success in first year Australian university students and found that prior academic performance was the most important predictor of student achievement in the first semester of university study. McKenzie and colleagues noted that students who had previously attained high grades (resulting in high university entrance ranks) were more likely to attain high grades at university than students with poorer previous performance. Students demonstrating good prior academic achievement possess higher self-efficacy in their learning activities, thus influencing their effort and persistence in learning at university. This finding corroborates Marton and Säljö's (1984) observation that the way students conceive of what is expected of them in their learning will be a combination of their perceptions of the current task and what those perceptions evoke from their experience of previous tasks. Similarly, Phan's (2011) study demonstrated that prior academic experience has significant impact in the academic self-efficacy of university students, and subsequently their tertiary learning.

Based on the preceding discussion, it is likely that a student's prior learning experiences, either from high school or previous semesters' learning experience at university, has the potential to contribute to their self-efficacy and self-regulated learning. The following hypotheses were established to understand the extent to which prior learning experience impacts university student's self-regulated learning (as illustrated in Figure 3.7).

Hypothesis 6a: Prior learning experience has a direct and significant influence on students' self-regulation of learning.

Hypothesis 6b: Prior learning experience has a significant influence on students' self-efficacy.

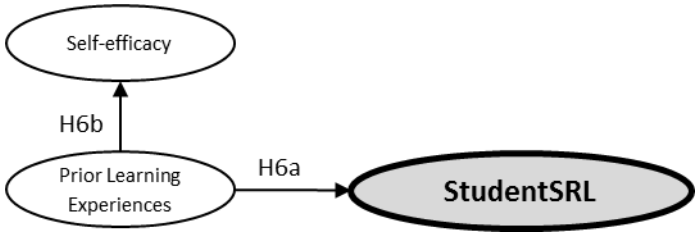

Figure 3.7: Hypotheses 6a and 6b

Bandura (1989) noted that environmental agents influence people's perceptions, thoughts and behaviour. An individual's environment also provides opportunities for acquiring and practicing such perceptions and behaviours. Contrary to common belief, self-regulated learning is "not asocial in nature and origin" (Zimmerman, 2002 p. 69). Students develop their SRL beliefs and skills via modelling, vicarious experiences and/or direct instructions from their family, teachers, peers, and surrounding community (Bandura, 1989). In fact, self-regulated students seek help from others to improve their learning when necessary. In reality, self-regulated learners are not socially isolated learners, but rather they are adaptable learners who can adopt, alter and sustain learning practices in social as well as solitary contexts (Paul R. Pintrich, 2004; Zimmerman, 2002). As such, self-regulated learning is not learning that students embark upon in isolation; a student's social environment influences their engagement in the self-regulation of learning and is impacted by peers, family, lecturers and their surrounding community.

3.3.6 Teaching Staff

Butler and Winne (1995) and Schraw (1998) suggest that teaching staff should emphasise the importance and promote the awareness of metacognition to their students. If metacognition is seen as an important contributor in student learning achievements, then metacognitive instruction is an essential element in enhancing student learning performance. Modelling metacognitive processes, such as showing and discussing how they think about and monitor their performance, can help students to practice similar processes in their own learning. For example, teaching

staff explaining how to monitor the intermediate results in a problem-solving process can help students check for inaccuracies while monitoring their progress (Wang, Haertel, & Walberg, 1993). Such activities not only contribute to students solving problems more adequately and more efficiently but also improve the repertoire of student metacognitive strategies.

Teaching staff articulating a learning strategy, its importance and when it might be applied can help students develop their declarative, procedural, and conditional knowledge. Sturomski (1999) noted that learning is fostered when a student has the opportunity to practice their new knowledge or skill and receives feedback from teaching staff. The learning is further enforced when the student has a chance to apply the knowledge or skill in familiar and unfamiliar situations, with decreasing assistance from others. As such it may be necessary to carefully design learning activities and provide discussion and reflection opportunities to encourage young adults, specifically university students, to develop and practice their self-regulation of learning skills (Sturomski, 1999). In other words, teaching staff have a role in helping students taking ownership of developing and practicing the new self-regulatory skills in their learning process.

In this study the teaching staff component is inspected to understand the extent to which their instructions regarding cognitive and/or metacognitive strategies influence university student SRL. The following hypotheses are proposed to understand the impact of teaching staff's strategic (cognitive and/or metacognitive) instructions on student self-regulated learning (as illustrated in Figure 3.8).

Hypothesis 7a: Teaching staff has a direct and significant influence on students' self-regulation of learning..

Hypothesis 7b: Teaching staff has a direct and significant influence on students' metacognitive awareness.

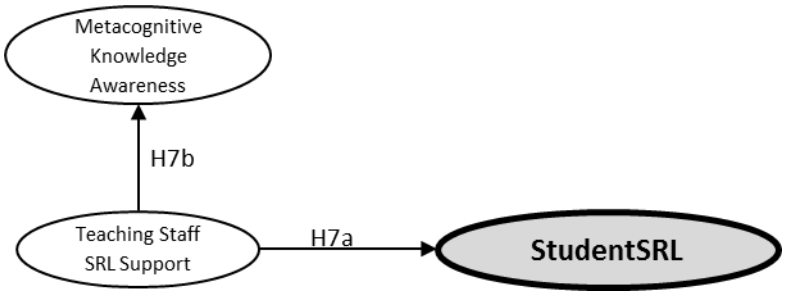

Figure 3.8: Hypotheses 7a and 7b

3.3.7 Peers

Studies (Jones et al., 2008; Manion & Alexander, 1997; Rodriguez, Mira, Myers, Morris, & Cardoza, 2003) have noted that peer collaboration and peer support are an important element in student adjustment to their learning environment, improved self-efficacy and in developing their learning skills. Manion and Alexander (1997) noted that social interactions can lead to sharing of learning strategies among students. They noticed that peer collaboration developed and enhanced the use of student cognitive and metacognitive strategies, as well as enabled students with lower metacognitive levels to understand the usefulness of the strategies. As such, peer collaborative learning seems to be an efficient way to facilitate the sharing of valuable information among students. Similarly, Jones et al. (2008) found that the frequency of discussions with peers has a strong relationship with self-regulated learning. They noted that the frequency of discussions with friends outside school had a more significant association with reported in-class self-regulated learning than did discussions with peers inside the classroom. Jones and colleagues also revealed that the use of learning strategies and regulative abilities was related to the frequency of discussions with friends outside class about sharing learning strategies and regulative abilities.

Rodriguez and colleagues (2003) revealed that peer support has as strong relationship to the general psychological adjustment of tertiary students. They noted that peer support is a significant resource for those facing the challenges of university life. Peer guidance and support, be it through study groups, note sharing or advice about class enrolment and strategies to use, are directly instrumental to university learning outcomes and experience (Richardson & Skinner, 1992).

The preceding discussion demonstrated that peer influence and support is an important element in a student's university learning experience. To understand the extent to which peer influence impacts a student's self-regulation of learning, the following hypothesis is proposed (as illustrated in Figure 3.9).

Hypothesis 8: Peer influence has a direct and significant influence on students' self-regulation of learning at university.

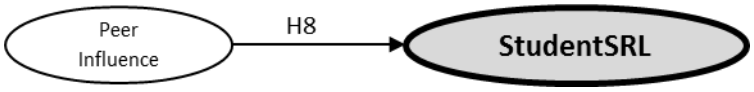

Figure 3.9: Hypothesis 8

3.3.8 Family

Parental influence, including student perceptions about parental style, involvement, and support, impacts student motivation and their achievement goal orientation (Antunes & Fontaine, 2003; Friedel, Cortina, Turner, & Midgley, 2007; E. Gonida, Kiosseoglou, & Voulala, 2007; E. N. Gonida, Karabenick, Makara, & Hatzikyriakou, 2014; E. N. Gonida, Voulala, & Kiosseoglou, 2009; Grolnick & Ryan, 1989; Gutman, 2006; Wentzel, 1998).

Gonida et al.'s (2009) study revealed that perceived school and parent mastery goals significantly influenced active behaviour in the classroom in terms of student attention, effort, and persistence during schoolwork. Gonida et al. (2009) noted that students who felt that their parents continually focused on improving themselves and developing new skills, have a positive engagement in learning and adaptive coping strategies in challenging learning situations.

Similarly, Gutman (2006) noted that student achievement in maths was influenced more by parent mastery goals than by parent performance goals. Similarly, Gonida et al. (2014) noted that students who perceive parental emphasis on mastery learning are more likely to adopt mastery-oriented goals in their learning and are inclined towards help seeking behaviour. On the other hand, perceived parental emphasis on performance has a strong association with negative outcomes such as

discouragement of personal mastery orientations and maladaptive help seeking attitudes.

The preceding discussion suggests that parental influence forms the basic foundation for a student's perception of learning. In this study, the family influence encompasses the influence of parents as well as siblings. To investigate the extent to which family influence is carried forward to tertiary education and its impact on a student's self-regulated learning at university the following hypothesis is advanced.

Hypothesis 9: Family influence has a direct and significant influence on students' self-regulation of learning at university.

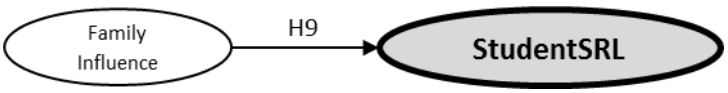

Figure 3.10: Hypothesis 9

3.4 THE DERIVED STUDENT SRL RESEARCH MODEL

Based on the discussion in Section 3.3, a research model, the student SRL model, has been constructed to illustrate the relationship between the factors identified in this study. The student SRL model, as depicted in Figure 3.11, connects the identified factors influencing student self-regulated learning (independent variables) and the dimensions used to measure the StudentSRL (dependent variable) in this study. The arrows within the research model signify the possible relationships between the factors. As such, 18 hypotheses were developed to describe and test the relationships between these factors.

The objective of the research model is (1) to identify the main factors influencing university student SRL, and (2) to understand the extent to which the identified factors influence university student SRL. The outcome of the model could help in comprehending the main areas on which to focus in order to facilitate student self-regulated learning in tertiary education.

In a student SRL model, nine main factors (*mastery goals, performance goals, task value, self-efficacy, metacognitive knowledge awareness, prior learning experience, teaching staff, peer influence* and *family influence*) are formulated as significantly influencing student self-regulation of learning. In relation to university students, the *performance goals* are examined in light of *good grades, employment prospects* and *successful future*. In sum, 11 constructs (factors) are investigated in relation to the self-regulated learning of university students. The 18 hypotheses developed to test the relationship between these 11 factors and the dependent construct (StudentSRL) were illustrated in Figures 3.2 to 3.10

The StudentSRL construct (dependent construct) is made up of six dimensions (sub-constructs). These dimensions are *learning strategies, goal setting and planning, self-monitoring, self-evaluation, time and environment management* and *help seeking*. The relationship between the dependent construct and its dimensions (sub-constructs) is illustrated in Figure 3.1 in Section 3.2 (see also Figure 3.11 below).

The model applies higher-order modelling to conceptualise a StudentSRL construct. That is, the StudentSRL construct is conceptualised as a higher-order construct of two or more latent variables. The StudentSRL construct has been conceptualised as a higher-order construct of *learning strategies, goal setting and planning, self-monitoring, self-evaluation, time and environment management* and *help seeking*. An in-depth explanation of StudentSRL construct as a higher order construct is provided in Section 4.7.2.1.

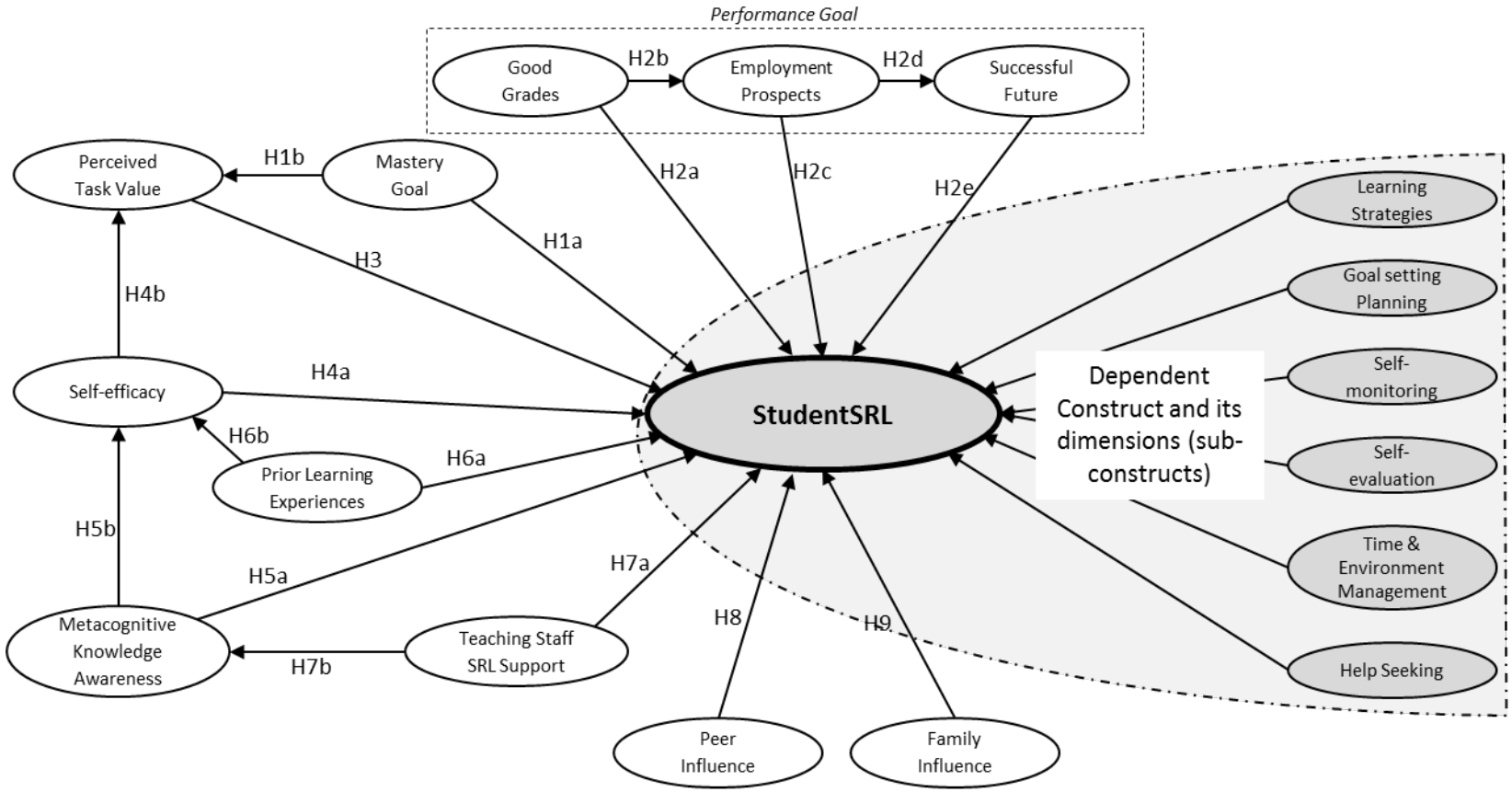

Figure 3.11: The Student SRL Research Model and Hypotheses

3.4.1 Summary of Hypotheses

In sum, nine main hypotheses have been defined to describe a total of 18 relationships to be tested for a significant influence on university students self-regulation of learning, as depicted in Figure 3.11. Table 3.2 provides the summary of the hypotheses.

Table 3.2: Hypotheses Summary for Student SRL

Hypothesis	Hypothesis Statement
Hypothesis 1a (H1a)	Students' mastery goal orientation has a significant direct influence on their self-regulation of learning.
Hypothesis 1b (H1b)	Students' mastery goal orientation influence how they perceive their learning tasks (task value).
Hypothesis 2a (H2a)	Students' desire to perform better than others (grades) has a significant direct influence on their self-regulation of learning.
Hypothesis 2b (H2b)	Achievement of good academic level (grades) has a significant influence on students' future employment prospects.
Hypothesis 2c (H2c)	Students' concern about employment prospects upon graduation has a significant direct influence on their self-regulation of learning.
Hypothesis 2d (H2d)	Employment prospects have a significant influence on students' successful future (personal status, power, and value in society).
Hypothesis 2e (H2e)	Students' desire for successful future has a significant direct influence on their self-regulation of learning.
Hypothesis 3 (H3)	Students' perception of the importance and usefulness of a given task has a direct and significant influence on their self-regulation of learning.
Hypothesis 4a (H4a)	Self-efficacy has a direct and significant influence on students' self-regulation of learning.
Hypothesis 4b (H4b)	Self-efficacy has a direct and significant influence on students' task value perception.
Hypothesis 5a (H5a)	Metacognitive awareness has a direct and significant influence on students' self-regulation of learning.
Hypothesis 5b (H5b)	Metacognitive awareness has a direct and significant influence on students' self-efficacy.
Hypothesis 6a (H6a)	Prior learning experience has a direct and significant influence on students' self-regulation of learning.
Hypothesis 6b (H6b)	Prior learning experience has a significant influence on students' self-efficacy.
Hypothesis 7a (H7a)	Teaching staff has a direct and significant influence on students' self-regulation of learning.
Hypothesis 7b (H7b)	Teaching staff has a direct and significant influence on students' metacognitive awareness.
Hypothesis 8 (H8)	Peer influence has a direct and significant influence on students' self-regulation of learning at university.
Hypothesis 9 (H9)	Family influence has a direct and significant influence on students' self-regulation of learning at university.

3.5 DERIVING THE LECTURER SRL FACILITATION RESEARCH MODEL

Researchers have widely acknowledged that the self-regulation of learning is an important predictor of student success in and beyond school (Perry, 1998; Philip H. Winne & Perry, 2000; Zimmerman, 2001). Self-regulated learning is neither a personality trait nor fixed attribute of a learner. Instead, SRL is an evolving attribute in learners. Students can learn self-regulatory strategies such as goal setting, strategy use, and self-evaluation by means of instructions, modelling, prior learning experience and self-reflection, and can control their behaviours and attitudes in order to improve their academic learning and performance. With practice and experience, the students can become more effective self-regulated learners (C. C. Chen, 2002; Paul R. Pintrich, 1995; Zimmerman, 2002).

Studies have shown that instructional programmes on cognitive and metacognitive strategies would improve student learning outcomes. These cognitive and metacognitive instructions can be implemented as an independent course or embedded in teaching and learning instructions. C. E. Weinstein et al. (2010) noted that generic learning skills can be taught to students in an independent introductory level course. These generic learning skills could encompass general cognitive, metacognitive, and motivational strategies that can be applied to any course of study. These generic skills can then be further enforced and developed by embedding domain-specific learning strategies in the course content. Embedding cognitive and metacognitive instructions in teaching instructions can range from simple instructions such as paraphrasing a lesson to complex instructions such as developing, implementing, monitoring, and modifying a preparation plan for completing a project (Claire Ellen Weinstein et al. (2011). Often student learning difficulties relate to their incompetence in identifying and employing the appropriate self-regulatory strategies in their learning process. Paul R. Pintrich (1995) noted that this approach would provide students with the opportunities to apply and practice skills learned from stand-alone courses in their domain-specific courses. Barbara K. Hofer and Yu (2003) investigated the impact of a semester-long undergraduate introductory course called *Learning to Learn*, designed for teaching university students to be self-regulated learners. The outcome of the study indicated an increase

in student mastery-oriented learning, use of cognitive strategies and their self-efficacy for learning. The outcome also demonstrated a decline in student test anxiety over the term, as well as an increase in their appreciation of the course. In sum, the findings of Barbara K. Hofer and Yu (2003) suggest that instructional programmes that target a range of cognitive and motivational elements of learning add significant value to student learning at the university level. This "learning to learn" course is especially valuable to first year university students in easing their transition from high school learning into a university learning environment. Corroborating Hofer and Yu's (2003) claims, Bail et al. (2008) found that students who undertook the self-regulated learning course showed a significant increase in their academic performance four semesters later.

Instructions on self-regulated learning strategies could also embedded in domain-specific teaching content and instructions. Kiewra (2002) suggested that the incorporation of strategy instructions in the curriculum would gradually transfer learning responsibilities from the teaching staff to students, thereby contributing to the development of lifelong learning skills. This transition process could begin by teaching staff introducing the strategies and demonstrating how and when these strategies could be applied, and providing the time and opportunities for students to discuss, reflect upon, and practice the strategies with realistic tasks. Teaching staff could then gradually diminish their guidance of student self-regulation of learning, as students assume responsibility for their strategic learning. Facilitating self-regulated learning strategies in teaching instructions requires teaching staff to adopt specific methods, materials, and instructional strategies in fostering reflective discourse about the tasks, the selection and use of appropriate strategies to solve problems, and effective learning, among teaching staff and students, as well as between the students (S.G. Paris & Paris, 2001; Wehmeyer, Agran, & Hughes, 2000).

Since it has been recognised that self-regulatory strategies can be taught (Zimmerman, 2002), teaching staff play a crucial role in promoting and facilitating SRL in students. For self-regulated learning to occur, students should be provided with some degree of choice and control over their learning which implies that students should be provided with the conditions and opportunities to apply and practice self-regulatory skills (Zimmerman, 1995b). As such, teaching staff could

model various learning and thinking skills while providing tasks and opportunities for students to apply and practice these strategies in their learning activities.

Lau (2011) noted that facilitating self-regulated learning in students entails that teaching staff not only ensure domain knowledge and strategy knowledge acquisition but that they also need to ensure that students are able to operate independently, making appropriate choices, and expanding their abilities by attempting challenging tasks. As such teaching staff are expected to create conditions where students can support one another through collaborative learning, sharing ideas and brainstorming problem-solving strategies.

Although teaching staff would agree that facilitating students to be more self-regulative would be ideal, the practice does not come without challenges. Previous studies have suggested that teaching staff should adjust their teaching practices and environments in order to provide the context and opportunity for students to acquire SRL skills (Palmer & Wehmeyer, 2003; S.G. Paris & Paris, 2001; Perry, 1998; Perry et al., 2008; Perry, Phillips, & Hutchinson, 2006; Perry & VandeKamp, 2000), however, little is known about the extent to which university teaching academics embrace the concept of self-regulated learning and whether teaching staff consciously consider facilitating the self-regulation of learning in their students. Moreover, the challenges, constraints and limitations faced by teaching staff in their current teaching and learning environment need to be taken into consideration while implementing the strategies suggested by theory in the classroom.

Gaining an insight into the challenges and constraints (or positive influences) that affect the facilitation of self-regulation of learning could provide valuable information in explaining the occurrence or absence of such SRL practices in higher education teaching and learning. Eight factors are examined in this study to understand the extent to which they influence teaching staff facilitation of student self-regulated learning. These eight factors are: *time constraints, reward and recognitions, lecturer's beliefs, lecturer's knowledge, student diversity, curriculum, policies* and *collegial commitment.* The following sub-sections discuss these factors in detail and the development of the respective hypotheses.

3.5.1 Deriving Variables and Hypotheses Development

3.5.1.1 Workload Constraints

Developing lessons and creating tasks for students to apply and practice self-regulated learning strategies, and subsequently providing the conditions and support for the implementation of SRL practices in and out of classroom, is no small feat. Many teaching academics would agree that the major obstacle in facilitating student self-regulation of learning is the time required to prepare the necessary lessons, and instructing students in the use of the relevant strategies (Monique Boekaerts & Cascallar, 2006; Scott G Paris & Winograd, 2003).

Studies have revealed that time constraints and heavy workloads are two of the practical barriers for academics wishing to engage with SRL practices and provide real support and opportunities for SRL implementation in their teaching and learning (Deborah L Butler & Schnellert, 2012; Lau, 2013). This is somewhat corroborated by Norton, Sonnemann, and Cherastidtham (2013), who found that in Australia, the development of teaching academics is constrained by their heavy teaching workloads. Teaching academics who are already stretched by their workload are not likely to pursue additional developmental opportunities. This was further suggested by a 2010 survey, which revealed that many teaching academics do not believe their overall workload is manageable (Bexley, James, & Arkoudis, 2011). Accordingly, Coates et al. (2009) reported that Australian academics recorded the highest number of working hours in universities globally. In 2007, junior academics and senior academics were reported working 43.8 hours and 50.4 hours per week respectively, across teaching, research, service and administration. These hours are high compared to the hours worked by full-time employees in other sectors in Australia, an average of 39.4 hours per week in 2007 (Coates et al., 2009).

Academics in Australian universities have complained that they spend too much time on administrative and accountability tasks that reduce the time available for their primary tasks, which are teaching and research (Bexley et al., 2011; Norton et al., 2013). Consequently, this affects academic time investment in integrating SRL-based instructions in their teaching, on top of their existing workload. The above arguments lead to the following hypothesis.

Hypothesis H1: Workload (time constraint) has a significant influence on teaching staff's facilitation of student self-regulated learning.

3.5.1.2 Reward and Recognition

Many academics in Australia believe that teaching is not highly valued by their institutions. Teaching is widely perceived as less important than research for career progression. Bexley et al. (2011) reported that around 70 percent of Australian academics believed research and scholarly activities were rewarded with promotion in contracts, compared to 30 percent who believed that teaching effectiveness was valued. Their study also reports that many academics believe that as a determinant of promotion, teaching excellence ranks behind not only research but also leadership, administration, and a capacity to attract external funds for research (Bexley et al., 2011).

Kreber (2002 p. 19) stressed that "excellence in teaching and the scholarship of teaching are indeed different and should be recognized and rewarded in their own right". Kreber argued that the academics who choose to practice the scholarship of teaching only should be lauded for efforts and recognised accordingly; as often the reward and recognition of teaching scholarships is concerned with enquiry into teaching and learning in one's discipline, the development of pedagogical content knowledge, and peer reviewed publications and presentations, excluding the practice of teaching scholarship (Kreber, 2002). It is evident that the facilitation of SRL in students is no small feat; it takes great effort and time to purposefully design teaching activities and to engage students in self-regulated learning. As such, the time and effort to implement SRL instruction in teaching practice should be recognised accordingly. It is hypothesised that:

Hypothesis H2: Reward and recognition has a significant influence on teaching staff's facilitation of student self-regulated learning.

3.5.1.3 Lecturer Beliefs

The literature on teaching approaches and styles has demonstrated that student approaches to learning are influenced by the way teachers teach (Entwistle, 2005; Kember & Kwan, 2000). As surmised by M. F. Pajares (1992) in his review article, a lecturer's beliefs strongly influence their behaviour in teaching and learning. Lecturer beliefs may include their general perception about teaching and learning process and their SRL fostering beliefs. The teaching and learning process can be perceived as either knowledge transmission process or knowledge constructing process. On the other hand, SRL fostering beliefs include beliefs about SRL instructions methods and approaches to integrate SRL strategies instructions into the lesson content, as well as measures taken to support transfer of strategy use to other contexts. Previous studies have determined that lecturer beliefs are stronger predictors of lecturer behaviour rather than lecturer knowledge (Kagan, 1992; M. F. Pajares, 1992). In line with Kagan's and Pajares' revelation, Kramarski and Michalsky (2009) found that a lecturer's ability to foster SRL is associated with their pedagogical knowledge as well as with their beliefs about student-centred learning. These findings clearly suggest that lecturer beliefs affect innovations in teaching and learning, and thus influence the integration and development of SRL practices (B.K. Hofer & Pintrich, 1997).

Accordingly, Postareff, Lindblom-Ylänne, and Nevgi (2007) noted that any adaptation or changes to the current teaching beliefs and approaches of teaching academics can't be expected to take place over short period. Postareff and colleagues (2007, p.569) pointed out that "…shorter training courses do not have a positive effect on teaching, but the training needs to be more constant in order to be effective". Any initiatives that may require change in the curriculum, or in teaching and learning practices should take into account the beliefs of teaching staff, as the values and beliefs held by staff impacts their engagement in teaching and learning tasks and their perceived ownership of the curriculum (De la Harpe & Radloff, 2008). To understand the impact of teaching staff beliefs on their facilitation of student self-regulated learning, the following hypothesis is proposed.

Hypothesis H3: Teaching staff beliefs have a significant influence on teaching staff's facilitation of student self-regulated learning.

3.5.1.4 Lecturer Knowledge

Previous studies have suggested that teaching staff should provide the context and opportunities for students to acquire and practice SRL skills (Palmer & Wehmeyer, 2003; Perry, 1998), however, it should be noted that for teaching staff to provide the conditions and opportunities for students to apply and practice SRL skills, they need to equipped with pedagogical knowledge about cognitive and metacognitive strategies for learning in addition to their domain-specific content knowledge (Kiewra, 2002; Schraw, 1998; Schraw et al., 2006). Accordingly Teekens (2003) pointed out that "most lecturers in higher education have little knowledge of educational theory. They teach their subject from experience, often based on how they were taught themselves. They assume that students understand the hidden messages of their teaching style, which, in fact, is usually the case" (p. 115).

Although lecturers may acknowledge the importance of supporting their students in becoming self-regulated learners and have positive beliefs towards SRL, not all lecturers are sufficiently knowledgeable and trained in facilitating SRL strategies in students (Dignath-van Ewijk & van der Werf, 2012; Perry et al., 2008). This is further asserted by Perry et al. (2008) who found that most teachers agree that there is value in supporting students to become self-regulated learners. However, although the teachers generally agreed that it is important to help students to become academically effective and independent learners, many teachers in Perry's research reported that they were not sure about the kinds of support that students need and how to provide such support for their students. If this is an issue faced by teachers in general, then they may not be able to provide adequate support for their student SRL.

Woolley (2011 p. 147) noted that "very few teachers are adequately trained to assist students in becoming independent learners". Often insufficient information about, and training in, providing such instruction or support deters teaching staff from providing instruction in this area (Wehmeyer et al., 2000; Woolley, 2011). Teaching staff who have never received formal instructions in teaching or facilitating cognitive and metacognitive strategy use may also feel uncertain about their ability to teach

these skills. As Zohar (2006 p. 335) notes "…teachers cannot teach effectively what they do not know". Supporting Zohar's statement, Cornford (2002) suggested that, in order for the successful facilitation of SRL in classrooms, teaching staff need to have the knowledge and skills of a repertoire of effective learning strategies, as well as know how to teach learning-to-learn and problem solving strategies.

A lack of pedagogical knowledge can be the result of limited teaching experience, which can affect a teaching staff's facilitation of SRL in students. Novice teaching staff who are still developing classroom problem solving skills are likely to adopt information transmission strategies. As a result they may avoid the enquiry approach to learning and classroom problems in their teaching activities (Postareff, Katajavuori, Lindblom-Ylänne, & Trigwell, 2008; Postareff et al., 2007). They are more likely to adapt teaching approaches that focus on organising and presenting the learning content rather than facilitating student self-regulated learning skills.

Based on the preceding discussion it can be surmised that helping teaching staff to develop an effective way of integrating SRL into their teaching would have to start by creating an awareness of direct and indirect ways to foster self-regulation of learning. The following hypothesis is thus proposed to ascertain the influence of SRL knowledge on teaching staff's SRL facilitation.

Hypothesis H4: Teaching staff's knowledge of fostering self-regulated learning has significant influence on teaching staff's facilitation of student self-regulated learning.

3.5.1.5 Curriculum Design and Demands

Teaching academics deliver a defined curriculum and syllabi. Formally incorporating SRL instructions and assessment strategies into the curriculum will ensure that it is considered part of the subject matter delivered.

Boud and Falchikov (2005) noted that external influences on educational institutions such as those from government and professional bodies have caused both students and teaching staff to pay more attention to summative than to formative assessment. Formative assessments are particularly important to help students in identifying their strengths and weaknesses and to target areas that need work.

Formative assessments further help teaching academics or faculty to recognise where students are struggling and to address problems immediately. Key skills that students should achieve in their undergraduate learning may be addressed under the topic of fulfilling graduate outcomes, but Boud and Falchikov (2005) point out that it is common for these to be marginalised in disciplinary debate.

Hicks (2007 p. 7) noted that "It would appear that while the term curriculum is largely used in a narrow way in Australian universities, generally focusing primarily on course content and structure, the scope and complexity of curriculum is beginning to receive more attention." Thus having a clearly defined curriculum with strategies that cultivate student skills in self-regulated learning in the curriculum in order to equip students for lifelong learning is essential, as this will form a framework, and will guide academics in their teaching. In order to understand the impact of the design and demands of the curriculum on teaching staff facilitation of student SRL, the following hypothesis is proposed.

Hypothesis H5: Curriculum design and demands have significant influence on teaching staff's facilitation of student self-regulated learning.

3.5.1.6 Policies

The management and leadership practices of academic managers have a critical impact in shaping the academic environment and in turn this academic environment influences the academic perceptions of teaching and learning, and thus affects teaching quality in an academic intuition (Ramsden, Prosser, Trigwell, & Martin, 2007).

Prosser and Trigwell (1997) found that variations in how university teaching staff approached their teaching relates to the way they experienced the context of teaching. When teaching staff perceived their class sizes to be not too large, they are more likely to report using a teaching approach aimed at making learning possible through a focus on changing student understanding. When class size was perceived as being too large, they were more likely to use a teacher-centred approach and use a strategy of transmitting information (Ramsden et al., 2007 p. 141). This finding suggests that in order to integrate SRL-based instructions in teaching practices,

university teaching and learning environments should provide such opportunities and resources accordingly.

The management and leadership practices of academics and policy makers critically impact the shaping of the academic environment to promote and foster SRL in university learning environment. In turn, the support provided in an academic environment for the promotion of SRL influences the perception of academics fostering SRL, and thus motivates the implementation SRL-based instructions in their teaching practices (Ramsden et al., 2007). In order for the promotion and integration of SRL in teaching and learning to be adequately supported it is necessary for both resourcing and funding to be in place, as well as champions from academic management.

DeRoche (2006) suggested that professional development opportunities, such as workshops, peer training, and self-guided instruction, are a means for academics to learn about and implement SRL-based instructions in their teaching activities. DeRoche's argument is further supported by Devlin (2013, p.242), who suggested that "embedding and sustaining good teaching and learning practice in the current Australian context require high-level support within an institution. Effective support was found to include both senior executive championing of teaching and learning enhancement, and institutional investment in the form of funding and the resourcing of positions and initiatives, allocated as part of the university's planning and budget cycle". Failure to provide adequate support, such as guidelines and procedures, can lead to the perception of difficulties integrating SRL strategies in teaching instructions and consequently impede their acceptance, promotion and development in teaching and learning.

Perry et al.'s (2008) study indicated that lecturers, mentors, and faculty associates have to come together in discussing SRL and practices that guide lecturers in fostering SRL in students. Perry's study reports that there is significant predictive relationship between student teacher SRL practices and the faculty associate who mentors them.

In short, academics require time, space, and opportunity to work with colleagues and leaders within and across faculties. Also important is the opportunity to seek out colleagues with similar levels of commitment and/or complementary knowledge (Deborah L Butler & Schnellert, 2012). Faculty and academic policies and management have a responsibility to provide time, resources, and structured opportunities for collaboration amongst the educators in an academic environment. Based on the above discussion, it is thus hypothesised that:

Hypothesis H6a: University policies have significant influence on teaching staff's facilitation of student self-regulated learning.

Hypothesis H6b: University policies have significant influence on teaching staff's knowledge on fostering self-regulated learning.

Hypothesis H6c: University policies have significant influence on curriculum design.

3.5.1.7 Student Diversity

Cultural diversity in Australian universities is not a new phenomenon. Although cultural diversity could lead to better learning and interaction outcomes between students from different cultural backgrounds, it also poses challenges and demands for educators, academic managers and faculties in providing for marked cultural differences in motivation, learning attitudes and thinking styles between western and non-western students. Academics teaching in international settings need to be equipped with a range of skills and competencies that include adopting appropriate practices to address the needs of international learners. Cultural inclusivity in curriculum and pedagogy is equally important in addressing the needs of culturally diverse student groups (Dunn & Wallace, 2006).

As Teekens (2003) points out, different academic traditions can have very different views on professional identity, curriculum validation, and student assessment. These views can easily clash. In some countries, rote learning and the reproduction of facts are very important; students from such a tradition will not easily adapt to a teaching style that requires problem solving and group work. As such, transnational teaching staff need to have a good understanding of the socio-cultural, political, legal and

economic contexts of student's home countries. The teaching staff also need to understand transnational student circumstances, which commonly combine study with work pressures, and struggling to balance their work, study and family responsibilities (Gribble & Ziguras, 2003).

Finally, there is a clear need for cross-cultural research, and research with ethnically diverse populations. Since most studies on self-regulation are based in North American settings, studies with diverse populations are valuable in showing how well motivational and self-regulation principles generalise across student populations. More research is needed on how self-regulation may be moderated by ethnicity (P.R. Pintrich & Zusho, 2002). Self-regulation studies based on diverse populations make a significant contribution, as teachers are increasingly confronted with greater student diversity in their classes. The impact of student diversity on teaching staff facilitation of student SRL is hypothesised as follows.

Hypothesis H7: Student diversity has significant influence on teaching staff's facilitation of student self-regulated learning.

3.5.1.8 Collegial commitment

Collegial commitment or peer support is an essential part of any teaching and learning environment. Studies have indicated that keeping up to date with ever changing teaching and learning needs and requirements requires opportunities for ongoing reflection, and support and guidance from peers (Borko & Putnam, 1998; Ramsden et al., 2007). More importantly, the "practices of academic managers, and in particular heads of departments, are critical to the development of a collegial commitment to student learning" (Ramsden et al. 2007).

As noted by Perry, establishing communities of practices will provide opportunities for lecturers to come together as a community of teaching and learning professionals. Such communities of practice will help them identify goals for themselves and their students as they design and implement activities addressing those goals, and monitor and evaluate their progress toward the achievement of the goals, all with the guided and sustained support of teaching staff and researcher colleagues (Borko & Putnam, 1998). Further collaboration amongst lecturers will help them to develop their own

self-regulation as they teach and model SRL for their students. It can thus be surmised that lecturer perceptions of their collegial commitment to student learning have a significant influence on lecturer facilitation of SRL in students. The following hypothesis was proposed to understand the influence of teaching staff perception of collegial commitment on their facilitation of student SRL.

Hypothesis H8: Teaching staff's perception of collegial commitment to student learning has a significant influence on their facilitation of student self-regulated learning.

3.5.2 The Derived Lecturer SRL Facilitation Research Model

Based on the discussion in Section 3.3.1, a research model, the lecturer SRL facilitation model, has been developed to illustrate the relationship between the factors identified in this study. The arrows within the research model signify the anticipated possible relationships between the factors. As such, ten hypotheses were developed to describe and test the relationships between these factors.

The objective of the research model is (1) to identify the main factors motivating or hindering teaching staff in facilitating self-regulated learning skills in students; and (2) to understand the extent to which the identified factors influence teaching staff's SRL facilitation. The outcome of the model could help in comprehending the main areas on which to focus in order to assist and support teaching staff in facilitating self-regulated learning skills in students.

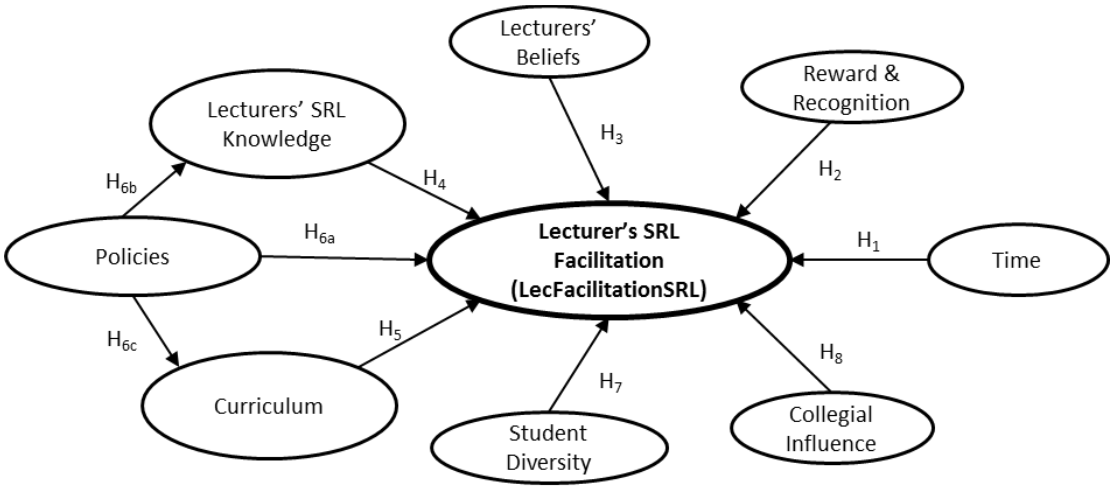

Figure 3.12: The Teaching Staff's Facilitation of Student SRL Research Model and Hypotheses

3.5.2.1 Summary of Hypotheses

In sum, eight main hypotheses have been defined to describe a total of ten relationships to be tested for significant influence on SRL facilitation by teaching staff as depicted in Figure 3.3. Table 3.3 provides a summary of the hypotheses.

Table 3.3: Hypotheses Summary for Lecturers' SRL Facilitation

Hypothesis	Hypothesis Statement
Hypothesis 1 (H1)	Workload (time constraint) has a significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 2 (H2)	Reward and recognition has a significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 3 (H3)	Teaching staff beliefs have significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 4 (H4)	Teaching staff's knowledge of fostering self-regulated learning has significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 5 (H5)	Curriculum design and demands have significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 6a (H6a)	University policies have significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 6b (H6b)	University policies have significant influence on teaching staff's knowledge on fostering self-regulated learning.
Hypothesis 6c (H6c)	University policies have significant influence on curriculum design.
Hypothesis 7 (H7)	Student diversity has significant influence on teaching staff's facilitation of student self-regulated learning.
Hypothesis 8 (H8)	Teaching staff's perception of collegial commitment to student learning has a significant influence on their facilitation of student self-regulated learning.

3.6 SUMMARY

This chapter reviewed extant literature related to student self-regulated learning and lecturer facilitation of self-regulated learning skills in students. Based on the review, nine original factors were identified for the student model. The nine factors were then reframed into eleven because of the performance goals being examined in light of good grades, employment prospects and successful future. Based on the eleven factors the student research model incorporated hypotheses corresponding to the potential relationships between identified factors and the extent of student self-regulation of learning were developed. Similarly, based on the relevant literature review, eight constructs were identified as influencing factors for a lecturer model and the incorporated hypotheses corresponding to the potential relationships between identified factors and the extent of lecturer facilitation of SRL in students were developed. The next chapter discusses the research methodology, design, and implementation used to collect the data required in this study.

CHAPTER 4

RESEARCH METHODOLOGY

If we knew what it was we were doing, it would not be called research, would it?

Albert Einstein (1879 – 1955)

4.1 INTRODUCTION

This chapter presents the research design, research methods, and analytical tools and techniques employed to attain the objectives of the study. The discussion of the adopted research methodology commences with a consideration of the research approach, process and the design. The following section describes the development of the survey instrument used to collect the necessary quantitative data. The subsequent sections describe the measures taken to ensure the quality of the data collected from the survey, as well as the ethical considerations that were taken into account in the research approach. This is followed by a section presenting the administration and analysis of a pilot study using the survey to test the validity and reliability of the instrument. Finally, the last section describes the administration of the actual survey for the main data collection and briefly discusses the data analysis techniques chosen to analyse and interpret the collected data.

4.2 RESEARCH PARADIGM

A research paradigm is a set of philosophical beliefs that provide guidelines and principles for a researcher in selecting challenging issues, developing models and theories, establishing criteria for methodology, instrument design and data collection, and also providing principles, procedures and methods appropriate for looking at similar phenomena (Cavana et al., 2001). Based on the epistemological, ontological, procedural and methodological concerns, several dichotomous paradigms that shape the research philosophies and research approaches have been proposed in the literature, namely positivism versus interpretivism, quantitative versus qualitative,

induction versus deduction, and exploratory versus confirmatory (Fitzgerald & Howcroft, 1998). In general, research paradigms can be classified into three broad categories:. These are positivism, constructivism, and critical theory, which are discussed below.

The positivism research paradigm is often associated with quantitative research approaches and is the default paradigm for most scientific research (Creswell & Clark, 2007, 2011). This research paradigm assumes that there is one true reality that can be discovered by means of rigorous empirical study (Creswell, 2009; Guba & Lincoln, 1994). Positivists believe that the social reality is objective and external to them. Researchers in this paradigm are neutral observers, as their values, beliefs and biases do not influence the outcome of the research (Creswell, 2009; Guba & Lincoln, 1994). Positivist researchers are expected to remain separate from their research subjects in order to ensure objectivity during data gathering and analysis. Positivist research is concerned with hypothesis testing, involves deductive reasoning and uses measureable concepts. Accordingly, a large sample of data is required to generalise the research results (Creswell, 2009).

On the other hand the constructivism (also known as interpretivist) research paradigm attempts to interpret the inter-subjective meanings where a phenomenon is explained through multiple explanations or realities, rather than by one causal relationship or one theory. This is often used as the research paradigm for qualitative research (Cavana et al., 2001; Creswell, 2009). The philosophical assumptions of this paradigm permit the development of subjective meanings of an individual's experiences of certain issues, in order to understand a certain phenomenon. Researchers adopting the interpretivist stance are fully involved with what is being researched and directly interact with their research subjects while investigating the subjects' perceptions of the phenomenon being investigated. The interpretation of an issue is subjective and is based on the researcher's own experience and interpretation. Interpretivist research involves inductive reasoning, as such, and usually only requires only a small sample to lead to theory generation (Creswell, 2009). The constructivist (interpretivist) paradigm thus provides a researcher with the flexibility to look at an event from multiple realities, and can find the source of a problem, but with limitations regarding the generalisability of the results.

Researchers adopting a constructivist/interpretivist approach consider social reality as being subjective, with the only way to understand it being to examine the perceptions of the individuals being investigated. There should thus be multiple realities. An interpretivist is fully involved with their research subjects, usually by interaction and involvement with what is being researched. If the researcher has taken an interpretivist stance, then their belief in conducting the research concerns investigating the perceptions of the subject being researched, and being personally involved in the research. Interpretivist beliefs are influenced by what is being researched; they report on the perceptions of material being researched according to their own interpretation.

Lastly, the critical theory research paradigm involves the philosophical assumption that reality is shaped by social, political, cultural, economic, ethnic, and gender values (Guba and Lincoln 1994). In critical research, a critical stance is taken towards taken-for-granted assumptions about organisations and information systems, and where the aim is to critique the status quo "through the exposure of what are believed to be deep-seated, structural contradictions within social systems" (Myers & Klein, 2011 p. 19). The researchers in this paradigm work to acquire a single apprehensible reality, but believe that reality is shaped by social values and also by influences from other forces.

This study is primarily guided by a positivist research paradigm, as it involves theory testing, which includes developing theoretical hypotheses to be tested, making extensive use of quantitative methods to objectively measure the variables and determine the causal relationships among the constructs under study, in order to explain and predict student self-regulation of learning and lecturer facilitation of SRL in engineering, computing and science faculties in Australian universities.

In the next section, the research methodology of this study is discussed.

4.3 RESEARCH METHODOLOGY

Research methodology is governed by a research paradigm. To some extent, the choice of research methodology dictates the particular tools used for the study (Leedy & Ormrod, 2010). Crotty (1998 p. 3) defined research methodology as the "strategy, plan of action, process, or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes".

A positivist or quantitative research approach employs experimental research methodologies or survey research methodologies. Experimental research attempts to determine whether a specific treatment or intervention influences an outcome (Creswell 2009). Experimental research generally consists of two groups, where one group is given a set of activities (called intervention), which are withheld from the other group, which serves as a control group. The impact of the treatment is then assessed using quantitative analysis techniques.

Survey research methodology provides a quantifiable description of the trends, attitudes or opinions of a population by studying a sample of that population (Creswell, 2003). Survey research design involves acquiring information such as characteristics, opinions, attitudes, previous experiences or practices about one or more groups of people from the population under study using questionnaires or structured interviews. The researcher tabulates and analyses sample responses by means of quantitative analytical techniques. The findings of surveys can then be generalised, or claims made about the population from the sample (Creswell, 2003; Leedy & Ormrod, 2010).

Research methodologies employed by interpretivist or qualitative studies include (i) case studies which aim to understand a particular individual or situation, or a small number of individuals in depth for a defined period of time; (ii) ethnography which aims to understand how behaviours reflect the culture or a group; (iii) phenomenological study which attempts to understand people's experience, perception, and perspectives from the participants' point of view and understanding of a particular phenomenon; and (iii) grounded theory which derives a theory from

analysis of data using a prescribed set of procedures (Creswell, 2003; Leedy & Ormrod, 2010).

According to Creswell (2003), a quantitative approach is best if a research problem seeks to identify factors that influence an outcome, the utility of an intervention or to understand the best predictors of outcome. On the other hand, if the researcher seeks to understand a concept or phenomenon because little research has been done on it, then a qualitative approach is more suitable.

As this study is guided by the positivist paradigm and seeks to identify factors and understand the best predictors of student self-regulation learning and lecturer facilitation of student self-regulation of learning, a quantitative approach employing survey research methodology was deemed suitable.

4.4 RESEARCH METHOD

Whilst the research methodology provides a general plan to conduct a research project, the research method specifies the forms of data collection, analysis and interpretation (Creswell, 2014). Generally there are two methods of collecting data in survey research: questionnaires and interviews. Factors such as the purpose of the study, time constraints, available budget and resources and the weaknesses and strengths of each method influence the choice of a survey method. (Cavana et al., 2001; Creswell, 2012).

Interviews in survey research typically come in the form of structured interviews and unstructured interviews. In a structured interview the researcher asks a standard, predetermined set of questions and nothing more; in semi-structured interviews researchers usually ask one or more customised questions in addition to the standard set of questions to probe further or for clarification purposes. In general, an interview session provides the interviewer with the ability to gain insights into the respondent's answers, collect sensitive data, ask complex questions, record interview sessions and yield the highest response rates, however, interview surveys place high demands on time and expense in order to gather data and provide wide population coverage.

Questionnaires can take the form of a mailed questionnaire or web-based questionnaire/survey. Mailed questionnaires are a convenient way to reach a geographically dispersed population sample, however, the return rates of mail questionnaire are typically low. They are also expensive since they involve the costs of postage, photocopying and labour. The method is laborious since envelopes have to be labelled and questionnaires need folding and putting into envelopes, return envelopes prepared, and follow-up telephone calls made or reminders sent for non-responses. Another problem is time. Due to the time constraints of this technique, mailed questionnaires were not feasible for this study.

In contrast, web-based questionnaires/surveys are much cheaper than mail questionnaires since they require only a one-time setup and can offer shorter administration time. Web surveys are indicated for target audiences with internet access, such as university students and teaching staff, as in this study. Web-based surveys also allow the effective and economical surveying of a geographically dispersed population, as in this study, which surveyed students and teaching staff at 33 Australian universities. This study used the online survey service provided by the university, *Qualtrics* online survey *s*oftware. Online or web-based surveys were deemed the most appropriate type of data collection for this study because they are more efficient in designing and distributing the survey to participants in a wide area, receive quicker responses, and reduce postage and copy costs. The majority of students and teaching staff in Australia have access to the internet, indicating that a web-based survey would be a more efficient and economical survey method. Additionally, the web survey service used in this study, the *Qualtrics* online survey software, codes the data automatically, eliminating hand-coding, thus shortening the time required for data entry, reducing errors in data entry, and saving the researcher time and resources (Cobanoglu, Warde, & Moreo, 2001).

This section elaborated the research paradigm, methodology, and method adopted in this study. The next section will provide an overview of the research process undertaken in this study.

4.5 RESEARCH PROCESS

The research process has several phases, beginning with research problem formulation through to reporting and evaluating research results. Once the research problem has been identified, literature reviewed and the purpose of the research has been specified, the research design must be developed. Research designs are procedures for collecting, analysing and reporting research findings (Creswell, 2012).

The flow of the research process for this study is shown in Figure 4.1. The process started with a review of the relevant theories in order to provide the theoretical background for the research. The relevant literature was reviewed to identify issues, gaps, and potential key variables in this study. Based on the review of the literature, the initial research models and the respective hypotheses were developed. The development of the research models and the respective hypotheses are explained in detail in Chapter 3. The main purpose of the research models was to illustrate the relationship between the factors identified in this study.

Although the main data collection for this study involved quantitative data, qualitative data was also collected through a series of interviews conducted in the preliminary phase of data collection. The main objective of the interviews was to investigate the relevance and appropriateness of the factors obtained from the review of the literature, in the context of Australian university students and lecturers.

Once their relevance was verified, a survey instrument was designed to collect the quantitative data needed to test the hypotheses developed in this study. The research model was refined following semi-structured interviews. For example, a respondent proposed that the diverse nature of the cultural and educational background of students could possibly affect lecturer teaching approaches and indirectly the facilitation of SRL. *Although not initially included, this observation led to the addition of student diversity as a factor in the lecturer model.*

At the instrument development stage, the latent construct measurement items (indicators) were developed through the literature review and responses from

interview sessions. The survey instruments were pre-tested to detect any biased or ambiguous questions, and to ensure that the respondents could understand the questions clearly. Measurement items (indicators) of the latent constructs were established from the literature as well as from the interview responses. The survey instrument was then pre-tested to ensure that respondents could understand the questionnaire and to determine whether there were any biased or ambiguous questions. Subsequently, a pilot study of the survey was conducted to ensure the validity and reliability of the instrument. The finalised instrument was then administered to the target population using an online web-based survey service.

Once the data had been collected it was analysed using the structural equation modelling (SEM) component-based partial least squares (PLS) approach. An overview of this statistical technique is provided in Chapter 5 (Section 5.4). In the analysis phase, the research hypotheses were tested and the research model evaluated based on the data analysis. This was followed by the interpretation of the findings and consideration of the limitations of the study in Chapter 6. Finally, the implications and recommendations for future research are described in Chapter 7.

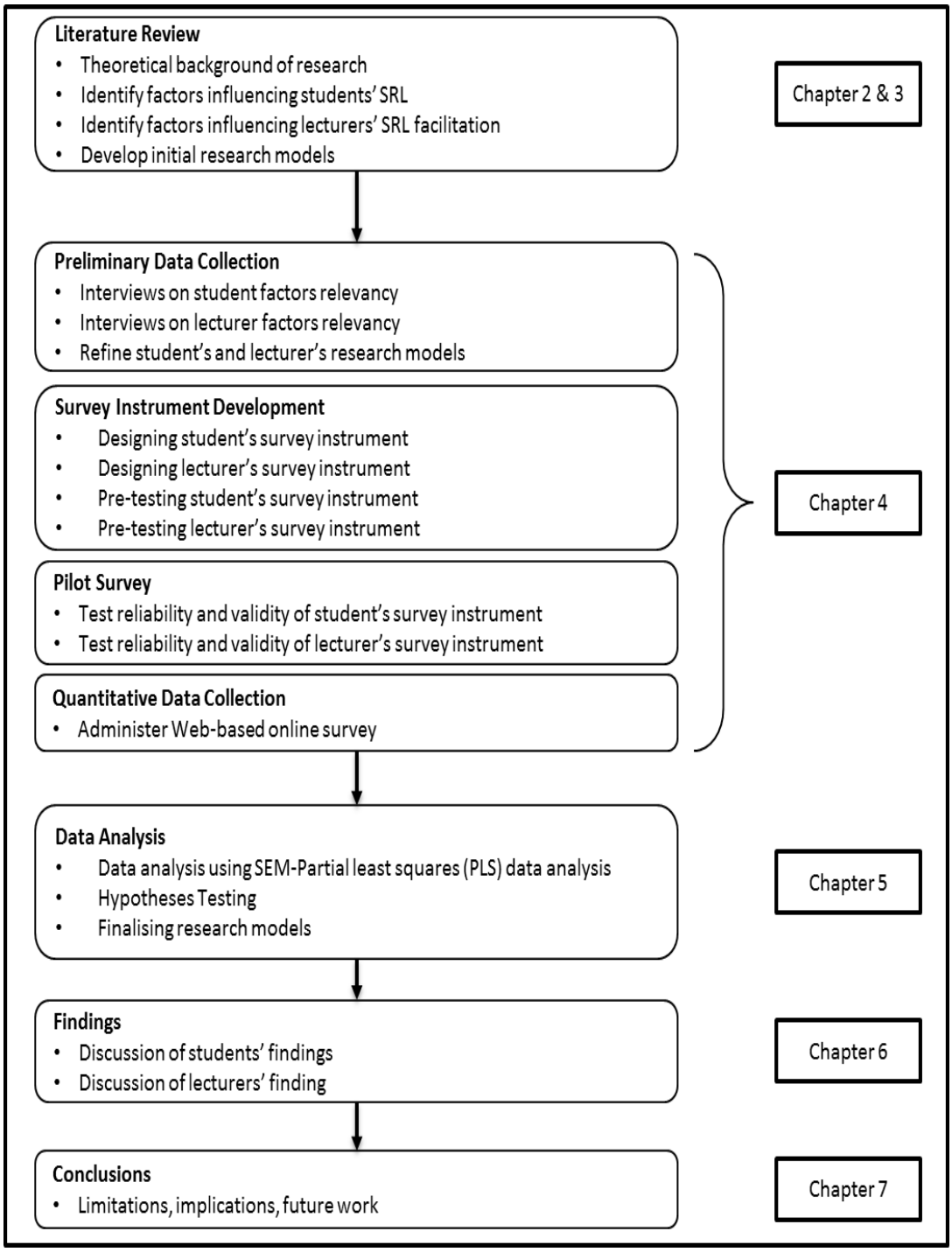

Figure 4.1: Overview of the Research Process

4.6 RESEARCH DESIGN

Research designs are specific procedures involved in the research process specifying how to conduct a systematic and organised investigation, which covers data collection, data analysis and reporting the results (Creswell, 2012, 2014).

Based on the nature of the research problem, it has been established that this study is grounded in positivist paradigm and adopts a quantitative survey-based research approach. The following sub-sections discuss the research design adopted in this study.

4.6.1 Unit of Analysis

The unit of analysis refers to the level of aggregation of data during the data analysis stage and usually depends on the questions or hypotheses that the researcher seeks to answer. As this study seeks to identify the factors that influence SRL practices of university students, the unit analysis of this study is Australian university students and lecturers in computing, engineering and science courses.

4.6.2 Sample Selection

Sample selection is one of the major tasks in a research project, and particularly in survey research. Sampling is the process of selecting a subgroup of the target population that the researcher plans to study for the purpose of making generalisations about the target population (Creswell, 2012).

In quantitative studies, researchers employ either probability sampling or nonprobability sampling approaches. In probability sampling, each individual from the population participating in the study is representative of that population and has an equal chance of being chosen as participants in the study. Probability sampling is particularly important when the representativeness of the sample is crucial for generalising the findings of the study. Nonprobability sampling is adopted when the researcher selects participants because they are available, convenient, or represent some characteristics the researcher seeks to study (Creswell, 2012).

Since the aim of this study is to eventually generalise the findings to all university students and teaching staff in computing, engineering and science courses in universities in Australia, the probability sampling approach was chosen.

4.6.3 Preliminary investigation

The initial model was developed through the literature review to explain the factors that affect student self-regulation of learning and lecturer facilitation of SRL in higher education. The model was then evaluated for its consistency and suitability within the context and for its adequacy in explaining issues, according to the study's objectives through qualitative data collection. A field study was conducted by interviewing nine students and seven lecturers to identify the relevance and appropriateness of the factors obtained from the literature, especially in the context of Australian higher education.

The objectives of the interview were to:

i. explore the current situation with respect to university students and lecturers in order to investigate the relevance and appropriateness of the identified factor dimensions in the context of higher education in Australia;
ii. determine the factors or items that may constitute the dimension in order to aid in developing its measurement items.
iii. seek out and identify concepts and procedures that might not be reported or recognised in the literature review.

The following sub-sections discuss the selection of the interview respondents, the interview design and analysis process.

4.6.3.1 Participants

With prior permission from the head of the school, students and lecturers from the School of Information Systems, Curtin University were invited to participate in the interview sessions. The Human Research Ethics Committee's approval for this preliminary qualitative data collection phase was obtained (Approval Number: IS_12_33 and IS_12_34). Student participants were purposively sampled for year of study and had taken some study units at the School of Information Systems. Ten

participants from each year of the course, Year 1, Year 2 and Year 3 (or final year) were emailed requesting an interview appointment. Three first year students, three second year and three third year or final year students consented to the interview sessions. Ten lecturers were emailed requesting an interview appointment and seven lecturers consented to participate in the interview sessions.

4.6.3.2 Semi-Structured Interview Procedure

This study adopted a qualitative method to explore and further probe the factors that affect students in self-regulating their learning, particularly in higher education. A semi-structured interview approach was used for the interviews. While having an overall structure and direction, a semi-structured interview allows the flexibility for the interviewer to include relevant unstructured questioning (Ayres, 2008). In this approach, the interviewer has a list of pre-determined questions to cover during the interview, however, during the interview, they have the flexibility to probe further into the participant's response by asking additional related questions. This approach may result in unexpected and insightful information to further enhance the interview findings.

Two interview protocols were developed to facilitate the interview process. One protocol was used for student interviews and the other for lecturers. The interview protocols enabled the researcher to gather insights into the research problem in order to investigate and refine the items that were believed to be important factors in student self-regulated learning.

The interview commenced by providing a brief introduction to the study undertaken by the researcher, along with the objectives and purpose of the study. The researcher began asking question according to the prepared interview protocol. The interview protocol for students aimed to probe the factors that encourage students to self-regulate their learning. The interview protocol for lecturers was aimed to probe factors that affect a lecturer's facilitation of student self-regulated learning. The interviews were recorded and transcribed manually by the researcher. The semi-structured interview guide for students and lecturers is provided in Appendices B and D respectively. The results of the interview are discussed in Section 5.2.

4.6.3.3 Analyses of Qualitative Data

This study employed the content analysis technique to analyse the qualitative data (Leedy & Ormrod, 2010). The themes, sub-themes and concepts explaining the variables and factors were explored by the inductive process. Inductive content analysis is a qualitative method of content analysis that enables the researcher to identify themes from recordings and transcripts of conversations. Inductive content analysis relies on inductive reasoning, in which themes emerge from the raw data through repeated examination and comparison (Leedy & Ormrod, 2010).

Accordingly, the recorded interviews were transformed into interview transcripts and were repeatedly examined and compared in order to identify the themes and variables that were supported by the literature which was discussed earlier in Chapter 3, and to identify any variables that were not identified during the literature review.
Sections 5.2.1 and 5.2.2 present presents the findings from the student interview analysis and lecturer interview analysis respectively. The outcome of the field interviews and the extensive literature review provided the rationale for the construction of the hypotheses. The qualitative study finally refined the study model and developed hypotheses that formed the basis of the quantitative study, the main concern of this research.

4.6.4 Survey instrument development

This study is based on quantitative survey research methodology (see section Methodology). Thus the main mode of data collection is web-based survey. Prior to developing a survey instrument, Creswell (2012) suggested that the researcher should first determine whether a survey instrument is already available or consider modifying an existing instrument to measure the necessary variables. If there is no prior instrument, then the researcher needs to design the instrument. The measurement items for the constructs in this study were adapted from prior research and/or questionnaires in order to ensure the content validity of the scale used. Content validity refers to how well the measurement items represent the concepts (constructs) defined in the study (De Vaus, 2002). Prior published research and/or questionnaires have established the content validity of the measurement items of particular concepts or construct. As such adapting measurement items from prior

research and/or questionnaires ensures the content validity of the measurement items used in this study. A review of the relevant self-regulated learning literature led to the identification and categorisation of the existing measures that were suitable for this research. Initial scale items were adapted from multiple sources for several of the constructs identified. For example, the measurement items for *cognitive learning strategies*, *goal setting and planning*, *self-monitoring*, *self-evaluation*, *time and environment management*, and *help seeking* sub-constructs were adapted from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich and colleagues (Paul R Pintrich, 1991; Paul R. Pintrich & De Groot, 1990; Paul R Pintrich et al., 1993) and the Metacognitive Awareness Inventory by Schraw and Dennison (1994).

In this study, two questionnaires or survey instruments, the student's survey and the teaching staff's survey were developed to evaluate the student model and teaching staff models developed in Chapter 3.

The scaling technique was used to measure the response to the questions in the survey. The scaling technique or rating scale is often used to measure behaviour, attitudes or phenomena that cannot be assessed directly (DeVellis, 1991; Leedy & Ormrod, 2010). This study utilised the Likert-type rating scale with the help of the semantic differential scale. The semantic differential scale allows a set of concepts to be evaluated on a bipolar adjective pairs scale (e.g.: No influence and Strong Influence) (DeVellis, 1991; Schibeci, 1982).

Preston and Colman (2000) suggested that different scales may be suitable for different purposes. They noted that scales with small numbers of response categories yield scores that are generally less valid statistically and less discriminating than those with six or more response categories. Preston and Colman's findings also reveal that scales with seven and ten response categories were reported as relatively easy to use and yielded more reliable and valid responses. Preston and Colman (2000) emphasised that a 10-point scale is most appropriate where there is major concern about face validity. The literature has suggested that a seven point Likert scale is more suitable for unsupervised or electronically distributed questionnaires and that the correlation coefficient decreases with a reduction in the number of scale

categories, affecting all statistical analyses based on the correlation coefficient (Finstad, 2010; Givon & Shapira, 1984). This study has thus adopted a 10-point rating scale.

The target respondents for this survey were students and teaching staff from computing courses (including information systems, information technology, computer science), engineering courses and science courses (e.g.: lecturers, sessional academics, tutors) in universities in Australia.

The survey instrument development consisted of three different phases: the development of measures for the constructs in the study, the design of the survey questions, and pre-testing of the survey instrument prior to main data collection.

4.6.4.1 Measurement Constructs for Student's Questionnaire

The StudentSRL construct, the dependent variable in this study, was manifested by six dimensions. The six dimensions (sub-constructs) are *student's use of cognitive learning strategies*, *goal setting and planning*, *self-monitoring*, *self-evaluation*, *time and environment management*, and *help seeking* sub-constructs.

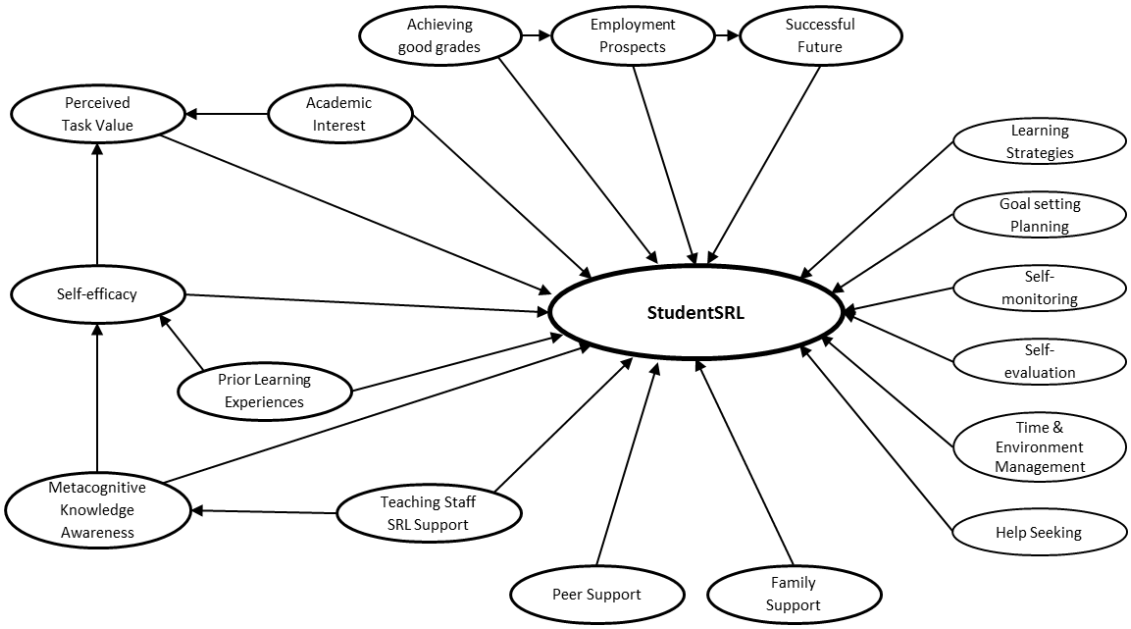

Figure 4.2: Student Model (as described in Section 3.4)

The measurement items for these six sub-constructs were adapted from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich and

colleagues (Paul R Pintrich, 1991; Paul R. Pintrich & De Groot, 1990; Paul R Pintrich et al., 1993) and the Metacognitive Awareness Inventory by Schraw and Dennison (1994). The items were worded according to the needs of the study and for the purpose of improving the face validity of the items. Table 4.1 lists the measurement items adapted for the StudentSRL dependent construct.

Table 4.1: Measurement items for StudentSRL Dependent Construct

Sub-constructs	Measurement Items	Adapted from
Students' use of Cognitive (Learning) Strategies	1. When I study, I pull together information from different sources, such as lectures, books and discussions 2. I create my own examples to make information more meaningful 3. I draw pictures, diagrams or tables to help me understand, while learning 4. I try to translate new information into my own words. 5. I ask myself, if what I'm learning is related to what I know. 6. I consciously focus my attention on important information 7. I use outlines or other organisational structures (e.g.: mind maps) to help me organise my thoughts. 8. I often question things I hear or read to decide if I find them convincing	(Paul R Pintrich, 1991) and (Schraw and Dennison, 1994)
Goal setting & planning	1. I set specific goals before I begin a learning task 2. I organise my time to best achieve my learning goals. 3. Before I begin a task, I plan on how I will complete the task. 4. When I study, I set goals for myself in order to direct my learning process. 5. I think of several ways to solve a problem and choose the best one.	(Paul R Pintrich, 1991) and (Schraw and Dennison, 1994)
Self-monitoring	1. I constantly monitor my learning progress in the unit/course. 2. I ask myself periodically if I am meeting my goals. 3. I find myself pausing regularly to check my understanding. 4. I periodically review to help me understand important relationships. 5. I ask myself questions about how well I am doing while learning something new.	(Paul R Pintrich, 1991) and (Schraw and Dennison, 1994)
Self-evaluation	1. I change my learning strategies when I fail to understand. 2. I stop and go back over new information that is not clear. 3. I ask myself if there was a better way to do things after I finish a task. 4. I adjust my way of studying based on my performance in my unit/course. 5. I ask myself how well I accomplish my goals once I'm finished.	(Paul R Pintrich, 1991) and (Schraw and Dennison, 1994)
Time and environment management	1. I usually study in a place where I can concentrate on my learning tasks. 2. I make good use of my study time.	(Paul R Pintrich, 1991)

	3. I have a regular place set aside for studying. 4. I spend LESS time on my studies because of other activities. 5. I always to stick to my study schedule.	
Help seeking	1. I often set aside time to discuss the unit/course materials with my fellow students. 2. I look for confirmation of my understanding from my fellow students. 3. I try to work with other students from this class to complete the learning tasks/assignments. 4. I ask my teaching staff to clarify concepts and skills I don't understand well. 5. When I can't understand something in my unit/course, I ask another student for help. 6. I ask others for help when I don't understand something. 7. I try to identify students in each class whom I can ask for help if necessary.	(Paul R Pintrich, 1991) and (Stuart A Karabenick & Knapp, 1991; Kozanitis, Desbiens, & Chouinard, 2007)

Use of *learning strategies* is the first sub-construct. This measures the extent to which students use various learning strategies. The *goal setting and planning* sub-construct measures the extent to which students plan their studies. *Self-monitoring* and *self-evaluation* sub-constructs measure the extent to which students keep track of, and fine tune learning progress. *Time and environment management* includes students managing and regulating their time and their study environments. Managing study time involves not only scheduling and managing study time but also the effective use of the allocated study time. Environment management involves students choosing a suitable place to study and manage the distractions in the environment. Peer learning concerns the extent to which students collaborate with other students in their learning, and finally *help seeking* involves students knowing if and when they need assistance, and where and from whom they can seek help. In this study, these six sub-constructs together establish the extent to which a student self-regulates their university learning, and define the dependent construct, *StudentSRL*, in the student model.

Several constructs influencing university students' self-regulation of learning, have been identified based upon the relevant literature and carefully shaped into multiple-item measures. Table 4.2 shows the measurement items for the identified constructs: *mastery goal (academic interest), good grades, employment prospects, successful future, task value, self-efficacy, metacognitive awareness, prior learning experience,*

teaching staff influence, family and friends influence and *peer influence* constructs (refer to Figure 4.2).

Table 4.2: Measurement Items for Constructs in Student SRL Model

Constructs	Items	Adapted from
Academic Interest - Mastery Goal	1. It is important to me to improve my knowledge and skills than getting a good grade. 2. I want to develop deep understanding of what I am learning in my unit/course. 3. I want to learn new knowledge in my area of study. 4. I desire to acquire new knowledge. 5. I want to master the course I am learning. 6. I like the subject matter that I am learning.	(Dowson & McInerney, 2004), (Paul R. Pintrich, 2000a), (Paul R. Pintrich, 2000b),(Paul R Pintrich, 1991), (Midgley et al., 2000)
Good grades	1. I want to achieve good grades. 2. I want to get better grades than others. 3. Getting good grades is more important than understanding the new knowledge and skills. 4. SRL helps me to learn strategically to achieve good grades. 5. I want to achieve high marks in my units/courses.	(Dowson & McInerney, 2004), (Paul R. Pintrich, 2000a), (Paul R. Pintrich, 2000b),(Paul R Pintrich, 1991), (Midgley et al., 2000)
Employment prospects	1. I want to have a job with good income. 2. Good learning at university means good life in the future. 3. I want ensure I have good career opportunities once I graduate. 4. Desire to pursue a career that is intellectually challenging.	(Dowson & McInerney, 2004), (Paul R. Pintrich, 2000a), (Paul R. Pintrich, 2000b),(Paul R Pintrich, 1991), (Midgley et al., 2000)
Successful Future	1. I self-regulate my learning because it increases my opportunities for financial security. 2. Success at university will ensure high standard of living in the future (not necessarily good career of financial security but a more balanced life, e.g.: good social well-being). 3. It increases my opportunities for a better-paid and more satisfying career. 4. I desire to have high standard of living. 5. I desire to have position of respect and high status in the community.	(Dowson & McInerney, 2004), (Paul R. Pintrich, 2000a), (Paul R. Pintrich, 2000b),(Paul R Pintrich, 1991), (Midgley et al., 2000)
Task value	1. The knowledge and skills I'm learning is valuable to me. 2. The knowledge and skills I'm learning are relevant for my future career. 3. The knowledge and skills I'm learning are very interesting. 4. The activities in the unit/course are very stimulating to my knowledge. 5. I believe I will use the knowledge and skills that I learn at some point in the future.	(Paul R Pintrich, 1991)

Self-Efficacy	1. I have confidence in my learning abilities. 2. I am confident I can perform well in my studies. 3. I am confident I can complete all my learning tasks. 4. I am handling my learning at university very well. 5. I have the skills required for my university learning.	(Paul R Pintrich, 1991)
Metacognitive awareness	1. I know what I'm expected to learn in the unit/course. 2. I have control over how well I learn. 3. I am aware of the learning strategies I use while I am learning. 4. I use different learning techniques depending on the situation. 5. I am aware of my learning efforts. 6. I am aware of my existing knowledge and skills. 7. I know my strengths and weaknesses as a learner.	(Schraw and Dennison, 1994), (Sperling et al., 2004)
Prior Learning Experience	1. My previous primary and secondary school learning experiences help me to self-regulate my learning now. 2. My previous post-secondary learning experiences (if you have any). 3. Self-regulating helped me gain good grades in the past. 4. I learn my self-regulating learning skills from my previous school and postsecondary learning experiences. 5. My previous teachers/lecturers have taught me to self-regulate my learning.	(Paul R Pintrich, 1991)
Teaching staff	1. My teaching staff guide me to self-monitor my learning. 2. My teaching staff guide me to self-reflect my learning effectively. 3. My teaching staff guides me on how to self-regulate (plan, self-monitor, self-evaluate) my learning. 4. My teaching staff help me to learn effectively. 5. My teaching staff encourage me to self-regulate my learning. 6. My teaching staff emphasises the importance of self-regulated learning.	(Kozanitis et al., 2007)
Family and friends	1. My family and friends motivate me to excel in studies. 2. I want to prove my abilities to my family and friends. 3. I want to fulfil my family's expectations of being a successful graduate. 4. I want my parents and family to be proud of my academic achievements. 5. My parents taught me to self-regulate my learning since I was young.	(Paul R Pintrich, 1991)
Peers	1. My peers and I help each other to learn better. 2. My peers and I motivate each other to learn. 3. My peers and I teach each other to learn effectively. 4. My peers and I share various ways to self-regulate our learning.	(Paul R Pintrich, 1991)

4.6.4.2 Measurement Constructs for Lecturer's Questionnaire

Based on the review of the relevant literature, eight factors, *time, reward and recognition, lecturers' belief on facilitating SRL, lecturer's knowledge of SRL facilitation, collegial influence, university policies, curriculum design and demands and student diversity*, were identified as influential factors for lecturer facilitation of SRL in students (refer to Figure 4.3), and the identified constructs were carefully shaped into multiple-item measures. The dependent construct of the lecturer model, *LecFacilitationSRL* (dependent variable) is measured using five items (*DV1, DV2, DV3, DV4 and DV5*). These five items or questions (refer to Table 4.3) were established based on the *StudentSRL* sub-constructs, namely, goal setting and planning, self-monitoring, self-evaluation, time and environment management and help seeking (listed in Figure 4.2 and Table 4.1). Table 4.3 lists the measurement items for the dependent construct *Lecturer's SRL facilitation* and the eight identified independent constructs.

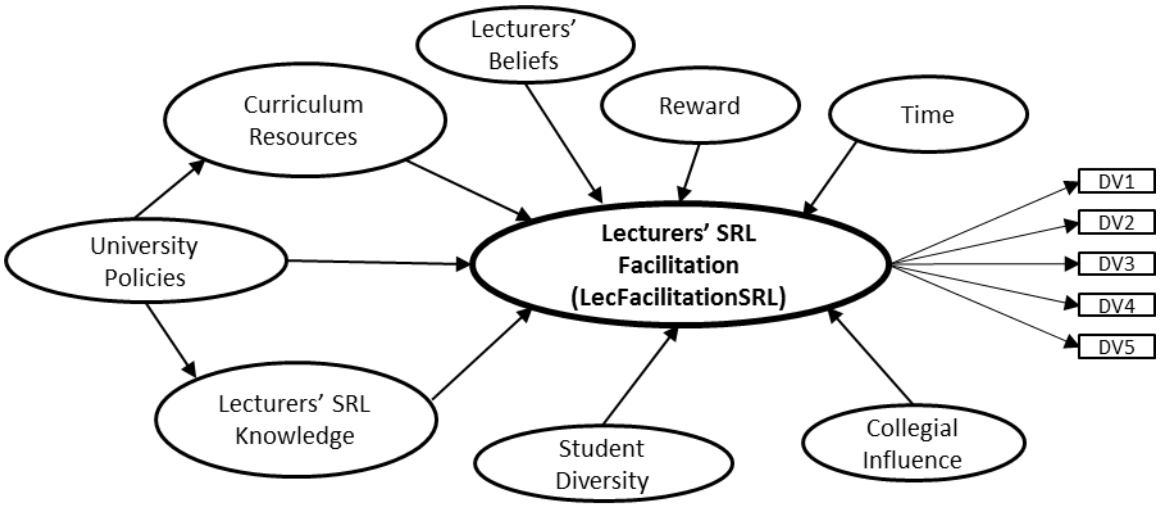

Figure 4.3: Lecturer's SRL Facilitation Model (as described in Section 3.5.2)

Table 4.3: Measurement Items for Constructs in Lecturer's SRL Facilitation Model

Constructs	Items	Adapted from
Lecturer's SRL Facilitation (Dependent Variable)	DV1. How much do you facilitate planning activities such as goal setting and task analysis in your students' learning process? DV2. How much do you facilitate self-monitoring activities in your students' learning process? DV3. How much do you facilitate self-reflection activities in your students' learning process? DV4. How much do you guide your students in managing their learning resources (e.g. time management, study environment)?	Questions formulated based on *Student SRL* construct

	DV5. How much do you guide your students in seeking help when necessary (e.g. direct/show where can find help)?	
Lecturers' belief on facilitating SRL	1. I believe it is essential to promote the development of self-regulation among students. 2. Facilitating students to self-regulate their learning will help them to become independent learners. 3. The instructions of SRL strategies lead to students being better in evaluating their learning. 4. Lecturers/teaching staff have to provide opportunities to students to build up their own knowledge in a collaborative way or together with their teaching. 5. I believe teaching students SRL will make them better independent learners. 6. The university should promote the complete development of their students including the self-regulation of their learning. 7. I believe lecturers should facilitate self-regulated learning in students on top of teaching the subject matter.	(Dignath-van Ewijk & van der Werf, 2012; Oolbekkink-Marchand, van Driel, & Verloop, 2006)
Lecturer's knowledge of SRL facilitation	1. I am NOT familiar with the teaching of self-regulated learning (SRL). 2. I have never been taught how to include SRL in my teaching. 3. There is NO training provided on how to teach or facilitate SRL at tertiary level. 4. There are no clear instructions on how to implement self-regulated learning in teaching activities. 5. I find it difficult to implement SRL in my teaching despite my interest in SRL.	(Dignath-van Ewijk & van der Werf, 2012)
Collegial influence	1. Staff in my department often shares ideas to guide students' learning. 2. My peers achieve successful results by guiding students to self-regulate their learning. 3. My colleagues make effort to improve students' self-regulated learning skills. 4. My department emphasise on improving students' self-regulation of learning.	(Ramsden et al., 2007)
University policies	1. There is no policy or direction to promote or to include self-regulated learning (SRL) skills in my teaching activities. 2. Development of self-regulation among students is not taken into consideration while assessing the performance of my unit. 3. I Don't get sufficient support to incorporate SRL in my teachings. 4. There are no frameworks and strategies to embed SRL across the curriculum. 5. I am encouraged to explore various ways to guide students' learning.	(Bexley et al., 2011; Devlin, 2013; Kreber, 2002)
Curriculum design and demands	1. The performance of the unit is assessed based on the students' grades and not by their acquired SRL abilities.	(Bexley et al., 2011; Devlin, 2013; Kreber,

	2. Students' Self-Regulation of Learning skills are not evaluated in the curriculum. 3. Priority is given to students acquiring subject matter knowledge and not SRL skills within the unit. 4. There are no adequate teaching aids and instructional guides to facilitate SRL in teaching activities. 5. It is challenging to incorporate SRL within the current established curriculum due to limited teaching time.	2002)
Student diversity	1. Facilitating self-regulated learning in students from diverse educational background is challenging. 2. It's challenging to facilitate self-regulated learning in students' with varying language and cultural background. 3. The increasing diversity of the student body makes the mix of expectations from teaching staff more complex. 4. It is challenging to facilitate self-regulated learning in students with varying learning abilities. 5. The increasing diversity of the student body makes SRL facilitation more complex.	(Oolbekkink-Marchand et al., 2006)
Rewards and recognition	1. My efforts to help students to self-regulate their learning are recognised and rewarded. 2. I am recognised and rewarded accordingly for supporting the self-regulation among my students. 3. There is NOT sufficient reward and recognition for the extra effort to teach students self-regulated learning skills. 4. My efforts in facilitating self-regulated learning skills in my students are NOT recognised.	(Bexley et al., 2011; Devlin, 2013)
Workload (Time constraint)	1. I lack the time to design and facilitate self-regulated learning (SRL) strategies to students on top of my teaching, research, and other responsibilities. 2. It would take a lot of effort and time to learn about SRL and implement it in my teaching. 3. It is challenging to incorporate SRL within the current established curriculum due to limited teaching time. 4. Creating opportunities for students to practice SRL skills takes time (at least initially). 5. Teaching weeks and contact hours are just adequate to cover subject matter issues.	(Bexley et al., 2011; Devlin, 2013)

The *time* construct measures the extent to which time availability or constraint affects a lecturer's incorporation and facilitation of SRL strategies in their teaching. The *reward and recognition* construct measures the extent to which lecturer feel noted and appreciated for their effort and time investment in SRL facilitation activities. The *lecturer's belief on facilitating SRL* construct measures the academic

teaching view of incorporating SRL instructions in their teaching activities. Conversely, *lecturer's knowledge of SRL facilitation* measures whether teaching academics possess the required knowledge to provide SRL instruction in their teaching. The *collegial influence* construct measures the extent to which the teaching practices of fellow teaching academics influence the incorporation of SRL instructions in teaching. The *university policies* construct measures the extent to which the current implementation of policies supports SRL facilitation in teaching. Similarly, the *curriculum design and demands* construct measures whether SRL instructions are part of the current teaching syllabi. Finally the *student diversity* construct measures the extent to which cultural and educational background diversity affects SRL facilitation in students.

4.6.4.3 Pre-Testing the Survey Instrument

The survey instrument was validated prior to the pilot study. The main objective of pre-testing is to ensure that the questions being asked accurately reflect the information the researcher desires, and that the respondents can and will answer the questions and address any problems in the content of questionnaire. The types of problems that may be encountered in a questionnaire include confusion about the overall meaning of the question, misinterpretation of individual terms, concepts and/or questions, the inability or unwillingness to answer questions or to the length of time required to respond. Questionnaire formatting, such as numbering, wording, and the layout or ordering of questions may lead to the loss of vital information, particularly in self-administered questionnaires, if not identified and addressed appropriately (Grimm, 2010).

Five students and five teaching academics at an Australian university were invited to pre-test the student questionnaires and lecturer questionnaires respectively. In this pre-testing phase, the respondents were informed that the questions were being developed and their expertise was required to enhance the questionnaire, and asked to focus on the wording, clarity, and validity of the questions. They were asked how they would rephrase a question and whether there were alternative answers that they would have preferred.

The respondents scrutinised the questionnaire from different perspectives and gave their feedback, which ultimately enhanced the content validity of the questionnaire. In addition to respondent feedback on the content of the questionnaire, the overall length of time taken and difficulties that arose during completion of the questionnaire were also inspected. Based on the respondent feedback and suggestions, the questionnaires were amended accordingly. Table 4.1 and Table 4.2 show the amended student questionnaire and Table 4.3 show the amended lecturer questionnaire.

4.6.5 Pilot Study of the Survey

A pilot test of a questionnaire is a procedure in which a researcher makes changes in an instrument based on the feedback from a small number of individuals who complete and evaluate the instrument (Creswell, 2012). A pilot study helps a researcher to test the survey instrument and identify unanticipated problems. This feasibility study includes assessing the steps in the survey process that need to take place as part of the main study; assessing resources such as time and budget problems that can occur during the main study and assessing any human and data management problems (Thabane et al., 2010).

The pilot study was conducted between October 2013 and December 2013 in five universities. Students and lecturers in computing, engineering and science courses were surveyed in the pilot study. Before the pilot study data collection, this research was approved by the Curtin University Human Research Ethics Committee (Approval number: IS_13_19). First, the heads of school/department were contacted to seek permission to survey their lecturers and students. Some universities required further ethics approval at their university and the necessary formalities were undertaken or fulfilled as requested. Upon approval from the Head of School/Department and, (where necessary) ethics clearance from the respective universities, the lecturers in the respective schools and department were invited to participate in the survey via email. The lecturer contact information was obtained from their school's or department's website. Similar to the actual survey, the email invitations included an introduction to the study; the importance and purpose of the study; an assurance of participant privacy; and ethics approval information. The

definitions of key terms and instructions on how to complete the survey were also provided on the first page of the questionnaire. Lecturers were also requested to help in distributing a message to the students that contained a hyperlink to the student survey. Similar to lecturer survey, the introduction of the study; importance and purpose of the study; assurance on participant privacy; ethics approval; and the definitions of key terms and instructions on how to complete the survey were provided on the first page of the student questionnaire. Lecturers were requested to either email the message to their students and/or put up the message as an announcement on their learning management system. The surveys for both lecturers and students were administered online, using the Qualtrics online survey service to create and distribute the surveys. MailChimp, an online mail marketing service (www.mailchimp.com), was used to manage delivery of the emails to the lecturers.

There were 31 lecturer and 29 student usable responses received for the pilot study. Johanson and Brooks (2010); and Julious (2005) suggest that a sample size of 10 - 40 is ideal for pilot studies. The pilot study results were analysed using IBM SPSS Statistics 21.0 software. Correlations coefficients for all measurement items in each construct were computed and, items with coefficient values less than 0.4 were removed from the questionnaires (De Vaus, 2002; Hair, Ringle, & Sarstedt, 2011). Cronbach's alpha coefficients were computed for each construct's measurement items to test their reliability, De Vaus (2002) suggested that the Cronbach's Alpha value of the measurement items should be higher than 0.7. As such, where necessary, several items were dropped in order to maintain an overall measurement items reliability value higher than 0.7. The finalised questionnaires with measuring item codes and descriptions are included in Appendix D and E.

4.6.6 Quantitative Data Collection

The finalised survey instruments, with modifications from both the pre-test and pilot study, were distributed to teaching staff and students in computing, engineering and science courses in 34 universities in Australia between March 2014 and June 2014.

As in the pilot study, heads of school/department were contacted to seek approval to email the survey to lecturers. Upon approval, if required, the necessary ethics

approval was sought in the respective universities. Lecturers were then emailed to request their participation in the survey and to subsequently forward the student survey invitation message to students via email and/or announcement in their learning management system. The email invitations were followed by two subsequent reminder emails during the periods of March 2014 and June 2014.

In some instances, university student services departments were also contacted to advertise the survey invitation institutionally through student portals, newsletters and other student media. By the end of June 2014, a total of 157 responses from lecturers and 198 responses from students had been collected.

4.7 QUANTITATIVE DATA ANALYSIS TECHNIQUE

The structural equation modelling (SEM) approach using the partial least square (PLS) technique was employed for data analysis. SEM is a second generation statistical analytical approach which incorporates the assessment of a measurement model and the structural model analysis in the same data analysis (Gefen, Straub, & Boudreau, 2000). Additionally, SEM enables the construction of unobservable variables (referred to as latent variables (LV)) measured using observed variables as indicators (also called measurement items) (Haenlein & Kaplan, 2004).

First generation techniques such as analysis of variance, discriminant analysis and multiple regression analysis methods share three common characteristics. The first characteristic is that the first generation statistical techniques are suitable for simple and straightforward research models. The second characteristic is that these techniques assume that all variables are measureable or observable. Finally, the first generation techniques theorise that all variables are measured without significant errors. First generation statistical techniques are able to analyse only single relationships between the independent and dependent constructs at a time. This increases the possibility of measurement error, when all relationships in a particular model need to be considered (Haenlein & Kaplan, 2004). In contrast, SEM provides the ability to "i) model relationships among multiple predictors and criterion variables, ii) construct unobservable LVs, iii) model errors in measurements for observed variables, and iv) statistically test a priori substantive/theoretical and measurement assumptions against empirical data (i.e., confirmatory analysis" (W.W. Chin, 1998a, p. vii).

Unlike first generation regression tools, SEM not only assesses the structural model, which is the assumed relationship between a set of dependent and independent constructs, but also evaluates the measurement model, the loadings of observed items (measurements) on their expected latent variables (constructs). The combined analysis of the measurement and the structural model enables: (i) measurement errors of the observed variables to be analysed as an integral part of the model, and (ii) factor analysis to be combined in one operation with the hypotheses testing. In SEM, factor analysis and hypotheses are tested in the same analysis. SEM techniques also

provide fuller information about the extent to which the research model is supported by the data than do regression techniques, and provide researchers with a comprehensive means of assessing and modifying theoretical models (Gefen & Straub, 2005; Gefen et al., 2000).

The availability of covariance-based software packages such as LISREL, EQS, Amos, SEPATH, and ROMANA, and component-based software packages such PLS-PC, PLS-Graph and SmartPLS have contributed to the increased use of SEM techniques (W.W. Chin, 1998a). The covariance-based SEM aims to obtain a model's goodness of fit. The covariance-based SEM method uses a maximum likelihood (ML) function that attempts to minimise the differences between the sample covariance and those predicted by the theoretical model (Gefen et al., 2000). Among the underlying assumptions of the covariance-based method are that the observed variables follow a specific multivariate distribution and that the observations are independent of one another. As the covariance-based SEM is based on the concept of goodness of fit rather than significance testing, the method does not confirm a theory beyond reasonable doubt, but only demonstrates that the available data is consistent with the proposed theory (Hair et al., 2011). The use of a covariance-based method could be problematic in obtaining a good fit for complex models with more indicators.

The partial least square SEM (PLS-SEM), is a second-generation multivariate technique method that aims to maximise the predictive power of the model rather than its goodness of fit. It works by minimising the variances of dependent variables, observed variables, and latent variables (Wynne W Chin & Newsted, 1999; Hair et al., 2011). As reported by Chin (1995), covariance-based SEM is superior on mathematical grounds, and correlation-based SEM is superior on practical grounds. The covariance-based structural equation modelling software, such as AMOS and LISREL considers reflective items when analysing both measurement and structural models while component-based structural equation modelling software, such as PLS-Graph and SmartPLS, can handle both reflective and formative measures in estimating the measurement model and structural model. Table 4.4 lists the main differences between the covariance-based structural modelling approaches, such as LISREL, and the PLS approach.

Table 4.4: Comparison of Covariance-Based and Component-Based PLS Approaches

Criterion	Covariance-based approach	PLS approach
Objective	Parameter oriented	Prediction oriented
Required theory base	Requires sound theory base	Does not require sound theory base
Approach	Covariance based	Variance based
Statistical assumptions	Normal distribution and independent observations (parametric)	Predictor specification (nonparametric) distribution free
Parameter estimates	Consistent in all conditions	Consistent as both indicators and sample size increase
Latent variable scores	Indeterminate	Explicitly estimated
Epistemic relationship between LV and its indicators	Can be modelled in reflective mode only	Can be modelled in either formative or reflective mode
Observations on indicators	Ratio preferred	Nominal, ordinal, and interval Scaled
Implications	Optimal for parameter accuracy	Optimal for prediction accuracy
Model evaluation	Goodness of fit (overall model fit)	High R^2, jack-knifing or bootstrapping for significance test
Model complexity	Small to moderate complexity (e.g. fewer than 100 indicators)	Large complexity (e.g. 100 constructs and 1000 indicators)
Model identification	Potential identification problem	No identification problem
Sample size	At least 150–200 cases	10 times the largest number of predictors in the model
Best suited for:	Confirmatory research and theory testing	Exploratory research and theory building (confirmatory research)

Source: Adapted from Wynne W Chin and Newsted (1999); Gefen et al. (2000); Haenlein and Kaplan (2004); Hair et al. (2011).

Based on the comparisons listed in Table 4.4, the PLS approach is more applicable to this study for a number of reasons. First, the prediction ability of the PLS technique suits the objective of this study, which is identifying the factors influencing the development of SRL. Second, compared to a covariance-based approach, PLS does

not assume any distributional form for measured variables as the covariance-based method does, which better fits a normal distribution. As the available data does not fulfil the parametric multivariate normality assumption of covariance-based SEM, the non-parametric assumption of PLS approach was used in this study. Finally, the PLS approach caters for the analysis of a highly complex model with small sample sizes and supports both formative and reflective constructs. In PLS-SEM, the minimum sample size should be equal to the larger of the following: i) ten times the scale with the largest number of formative (i.e. causal) indicators used to measure one construct, or ii) ten times the largest number of structural paths directed at a particular latent construct in the structural model (Hair et al., 2011). In the student model, the largest number of structural paths directed at a particular latent construct (*StudentSRL*) is eleven. As such, the required minimum sample size to assess the student model is 110. Similarly in the lecturer model, the largest number of structural paths directed at a particular latent construct (*lecturer facilitation of SRL*) is eight. Thus the required minimum sample size to assess the lecturer model is 80. Since there were 175 student cases and 139 lecturer cases, the minimum sample size for both models was more than adequately met.

The PLS software employed in this study was SmartPLS (version 2.0), which was developed by Christian Ringle and his team at the University of Hamburg in Germany (C. M. Ringle, S. Wende, and , & A. Will, 2005). The measurement and structural component for the student and lecturer models has to be explicitly developed before data analysis. The following sub-section provides a discussion of the two components of model building and explains how these models are assessed and used in the PLS-based SEM technique.

4.7.1 The Measurement Model Assessment

A measurement model describes the relationships between the observed variables and the constructs. The measurement model describes how the latent constructs (unobservable variables) are constructed and their measurement items (indicators) are related (Wynne W Chin & Newsted, 1999). Latent constructs, also known as unobservable variables, are measured by indicators or observable variables.

During the measurement model assessment phase, the construct validity of the measurement items is assessed. Construct validity describes how well the measurement items relate to the constructs. Construct validity is assessed through two main elements: 1) convergent validity and 2) discriminant validity (De Vaus, 2002).

4.7.1.1 Convergent Validity

Convergent validity is measured through individual item reliability and internal consistency reliability, which evaluates how closely items in a single construct correlate.

Item reliability indicates the amount of variance in a measure that is due to the construct rather than to error (Fornell & Larcker, 1981). Convergent validity is established when each of the measurement items has a loading coefficient above 0.70 and loads with a significant *t*-value of at least 1.96 on its corresponding latent construct (Gefen & Straub, 2005). If the loading is less than 0.7 then the item is removed.

Internal consistency is a measure of reliability. It is measured through composite reliability and average variance extracted (AVE). Composite reliability is similar to Cronbach's Alpha although without the assumption that all indicators are equally weighted, and is not affected by the number of items in the scale. AVE was proposed by Fornell and Larcker (1981), and is a measure of the amount of variance in the item explained by the construct, relative to the amount due to measurement error (Fornell and Larcker 1981). To achieve internal consistency reliability a construct's composite reliability should be greater than 0.7 and the AVE should be greater than 0.5 (Fornell & Larcker, 1981; Hair et al., 2011).

4.7.1.2 Discriminant Validity

The second assessment of construct validity is discriminant validity, which evaluates the degree to which the constructs differ (Gefen & Straub, 2005). Discriminant validity is established when each measurement item correlates weakly with all other constructs except for the one with which it is theoretically associated (Gefen & Straub, 2005). For the assessment of discriminant validity two measures, Fornell-

Larcker criterion and cross loadings, are evaluated (Gefen & Straub, 2005; Hair et al., 2011). Both approaches for assessing discriminant validity were important in adequately proving discriminant validity at construct level as well as at item level.

Discriminant validity at construct level is measured using Fornell and Larcker's (1981) discriminant validity test. Fornell and Larcker's (1981) suggestion involves estimating the average variance extracted (AVE) used as an effective criterion to prove discriminant validity among reflective constructs. The Fornell–Larcker criterion postulates that a latent construct shares more variance with its assigned indicators than with another latent variable in the structural model. In statistical terms, the square root of AVE should be greater than the inter-construct correlations when the constructs are considered to have adequate discriminant validity (Gefen & Straub, 2005).

Discriminant validity at item level is measured using a cross-loading matrix, which presents the loadings and cross-loadings of measurement items (indicators). The cross-loading matrix displays the constructs in columns and the measurement items in rows. This enables the researcher to check the item–construct correlation at any point. The correlation matrix thus provides an opportunity to compare the construct–item correlation for discriminant validity. The loading of items within a construct (shown in columns) should be greater than the loading of any other item within the same column in order to prove discriminant validity among the constructs. Table 4.5 provides a summary of assessments and corresponding threshold values for convergent validity and discriminant validity.

This section provided a discussion of the measurement model and outlined the assessment criteria of the model using PLS. The next section describes the assessment of the structural model in PLS analysis.

4.7.2 The Structural Model Assessment

The structural model describes relationships between the dependent (endogenous variable) and independent (exogenous variable) constructs in a structured relational framework or model (Gefen et al., 2000). More specifically, the structural model,

using the PLS technique, estimates path coefficients, *t* -statistics, standard errors and R^2 to examine the hypothesised relationships. The path coefficients indicate the strengths and direction of the relationships, *t* –statistics and standard errors indicate the significance of the influence, and the R^2 value indicates the amount of variance explained. The variance associated with the dependent variables describes the explanatory power of the proposed model and is measured by the R^2 values. As proposed by Falk and Miller (1992), this study uses 0.10 as the cut-off value for the explanatory power of the dependent variables under the theoretical framework. Structural models permit second order constructs or factors modelling. The following sub-section explains construction second-order factors in structural equation modelling.

4.7.2.1 Second Order Constructs

Conceptual definitions of constructs are often specified at a more abstract level, and such constructs need to be modelled using multiple formative and/or reflective first-order constructs. The SEM-based structural model enables the modelling of conceptual constructs (latent variables) at a higher level of abstraction via second order factor modelling. The second order constructs are not directly connected to any measurement items (indicators), instead they are connected to the first order constructs and are measured by the measurement items of the first order factors (W.W. Chin, 1998a; Jarvis, MacKenzie, & Podsakoff, 2003). Unlike the standard first order construct, a second order construct is not directly connected to any measurement items (indicators). The second-order construct is formed from the first order constructs (Chin and Gopal 1995) and those first order constructs can be formed as formative or reflective of underlying second order constructs as shown in Figure 4.4.

In the formative second-order approach, the first order constructs have direct causal relationships from the first order constructs to the second order construct, that is, the first order constructs cause the second order construct (Haenlein & Kaplan, 2004). In other words, the second order formative constructs are formed by their respective first order constructs (refer to Figure 4.4). The first order constructs are not correlated and measure different underlying dimensions of the second order constructs (W.W. Chin, 1998b). For example, the *StudentSRL* construct (second

order formative construct), the dependent variable in the student model (refer to Figure 3.2 in Section 3.2) is measured by *learning strategies, goal setting and planning, self-monitoring, self-evaluation, time and environment management* and *help seeking* (first order constructs). The measurement indicators (first order constructs) are not correlated and the variation in the latent construct (second order formative construct) does not lead to variation in its indicators. More clearly, a student's practice of *self-regulated learning* does not necessarily mean that the student uses all SRL strategies (*goal setting and planning, self-monitoring, self-evaluation, time and environment management* and *help seeking)* in their self-regulation of learning. The *StudentSRL* construct has thus been identified as a second order formative construct.

The first-order constructs are formed by reflective indicators (refer to Figure 4.4) which represent the same underlying concept and are assumed to be correlated and co-varied. It is important that the correct approach is selected carefully as a misspecification of construct could increase type I and type II errors (Petter, Straub, & Rai, 2007). The following section describes the assessment criteria for the structural model in PLS.

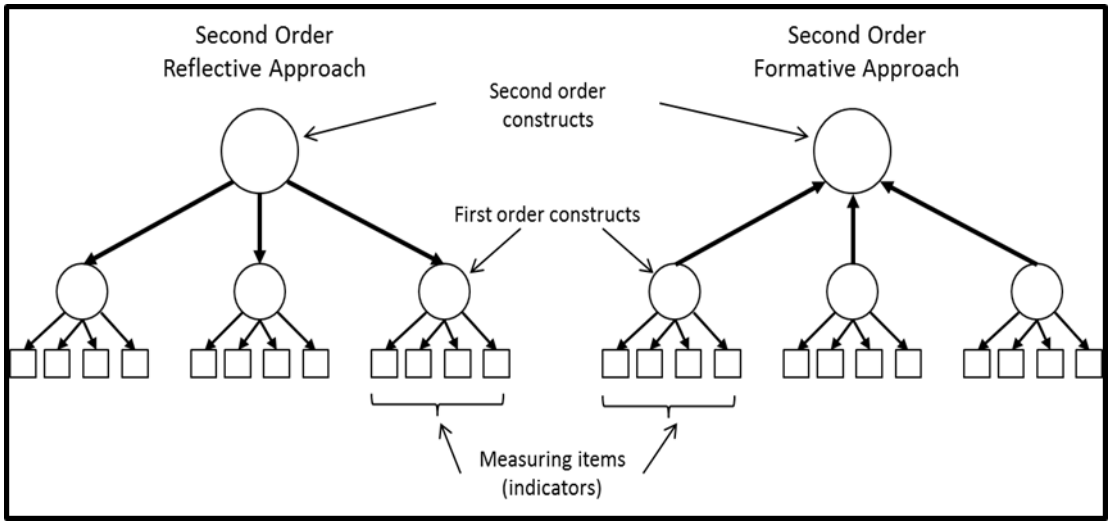

Figure 4.4: Second order constructs – Reflective and Formative Approaches. Adapted from Haenlein and Kaplan (2004).

The assessment of the structural model involves evaluating the explanatory power or predictive ability of the model, path coefficient significance assessment and direct, indirect and total effects assessments.

4.7.2.2 Explanatory Power of the Model

The explanatory power or predictive ability explains the variances associated with the dependent variables (endogenous variables) that determine the explanatory power of the proposed model. The R^2 values of the dependent variables of the model were examined to evaluate the predictive ability or the explanatory power of the independent variables in the structural model (W.W. Chin, 1998b). The R^2 values indicate the amount of variance in the dependent latent constructs in the model, and thus the proposed overall model could be evaluated, which is essentially the same as the interpretation of R^2 values in a multiple regression analysis. The dependent latent constructs are *student SRL*, *self-efficacy*, *employment prospects*, *metacognitive knowledge*, *successful future* and *task value* in student SRL structural model and *lecturers SRL facilitation*, *curriculum* and *lecturers SRL knowledge* in lecturer's SRL structural model. The R^2 values of the structural equations for these dependent constructs provide an estimate of the proportion of the variability in the constructs that is explained by their respective independent constructs.

4.7.2.3 Path Coefficient Assessment

The next assessment of the structural model is to determine the size and significance of the path coefficients. The path coefficients indicate the strength of the relationship between latent variables. The size and significance (t-values) of the path coefficients were calculated in order to address the effects of the constructs and their underlying relationships according to the proposed theoretical framework. The hypothesised relationships between the constructs in the model can be calculated by two methods, namely, 'bootstrap' or 'jackknife' (Gefen et al., 2000). Although the 'jackknife' method takes less time for estimation, it is viewed as less efficient than the bootstrap method because it is considered an approximation to the bootstrap (W.W. Chin, 1998b). As such, the 'bootstrap' method is commonly preferred in the PLS framework as it produces both a t-value and an R^2 value. The technique of bootstrapping, employed for calculating the *t*-statistic is a similar to the traditional *t*-test that is used to interpret the significance of the paths between study constructs

(Gefen et al., 2000). It is important to note that PLS has some advantages, as it is ideal for assessing the path loadings and structural relationships between the study constructs which could handle both formative and reflective constructs (Fornell & Larcker, 1981; Jarvis et al., 2003) and it also did not require a normal distribution of data.

4.7.2.4 Direct, Indirect and Total Effects Assessment

Finally, the structural model allows the assessment of mediating (indirect) effects, direct effects and total effects of the independent constructs on the dependent constructs. A direct effect represents the relationship between an independent and a dependent construct. An indirect effect is the effect of an independent construct on a dependent construct through one or more intervening or mediating constructs (Hoyle, 1995). The total effect of an independent construct is deduced from the sum of direct and indirect effects of the independent construct on a dependent construct.

The terms ‘mediating effect’ and ‘indirect effect’ have been used by researchers interchangeably. Preacher and Hayes (2004) differentiate them by noting that a mediated effect must have the assumption that a total effect is present with only one intervening variable; an indirect effect does not have that assumption. Among the many methods of assessing indirect effects, Baron and Kenny (1986) suggested using the Sobel (1982) test, which is a direct test of an indirect effect. This test was used in this study. The Sobel test evaluates whether the indirect effect of the independent variable on the dependent variable through the mediator variable is significant. The choice of Sobel test was further confirmed by MacKinnon, Lockwood, Hoffman, West, and Sheets’s (2002) observation that Sobel’s test is superior in terms of power and intuitive appeal when comparing 14 methods of assessing mediation effects.

Table 4.5 provides the summary of assessments and corresponding threshold values for measurement model assessments and structural model assessments in SEM-PLS model evaluation.

Table 4.5: Summary of SEM-PLS Model Evaluation

Measurements	Threshold values
Measurement Model Assessments	
1) Convergent Validity	
a) Individual item reliability	Item loading ≥ 0.70
b) Internal consistency reliability	
i) Composite reliability	Composite value ≥ 0.70
ii) Average variance extracted (AVE)	AVE ≥ 0.50
2) Discriminant Validity	
a) Construct level	$\sqrt{\text{AVE}} >$ correlation between the constructs
b) Item level	Item loadings of construct > all other cross-item loadings of the construct
Structural Model Assessments	
1) Explanatory power (R2) analysis - R2 ≥ 0.10	$R^2 \geq 0.10$
2) Path coefficients and significance (*t*-value) analysis	*t*-values ≥ 1.96 (at 0.05 significance)
3) Direct, indirect and total effect analysis	Evaluated using Sobel test

4.8 SUMMARY

The methods and procedures employed for executing the qualitative field study and the outcome of the field study were presented in this chapter. The design and structure of the questionnaire, the tests of reliability and validity of the measures, and the methods of data analysis were also discussed in this chapter. The next chapter presents the findings of the study and their analyses, in relation to the research problem and the proposed research model.

CHAPTER 5

DATA ANALYSIS AND RESULTS

The beginning of knowledge is the discovery of something we do not understand.

Frank Herbert (1920 – 1986)

5.1 INTRODUCTION

This chapter presents the qualitative and quantitative data analyses and reports the results. The first section presents the qualitative results. Section 4.6.3.3 describes the content analysis technique used to analyse the qualitative interview data. In this section the student interview results and the lecturer interview results are presented. The following section presents the quantitative data analysis for student and lecturer data. The analysis for each dataset consists of measurement model and structural model evaluations, and hypotheses testing.

5.2 QUALITATIVE DATA ANALYSIS RESULTS

5.2.1 Student Interview Results

This field study (qualitative data collection) aimed to confirm the relevance and appropriateness of the factors obtained from the literature and to further explore other factors (not identified through the literature review), that influence university student self-regulation of learning. This section presents the findings from the interview analysis. Table 5.1 lists the student respondent profiles.

Table 5.1: Profile of Student Respondents

Student ID	Year in Study	Enrolment Type	Gender
Student 1	Year 1 Semester 1	International Onshore Student	Female
Student 2	Year 1 Semester 2	Domestic Onshore Student	Male
Student 3	Year 1 Semester 1	Domestic Onshore Student	Female
Student 4	Year 2 Semester 1	Domestic Onshore Student	Female

Student 5	Year 2 Semester 2	Domestic Onshore Student	Female
Student 6	Year 2 Semester 1	Domestic Onshore Student	Female
Student 7	Year 3 Semester 2	International Onshore Student	Male
Student 8	Year 4 Semester 1	Domestic Onshore Student	Female
Student 9	Year 4 Semester 2	Domestic Onshore Student	Male

5.2.1.1 Academic Achievement, Career, Financial Security and Good Standard of Living

The field study revealed that almost all students recognise achieving good grades, securing career opportunities upon graduation, financial security, and a high standard of living as the main motivation for self-regulation of their university learning. For example, Student 4 said that *"For longer [sic] term, I want to be successful, make sure I have security, you know financially."*

Student 5 mentioned the importance of getting good grades in order to secure good career opportunities by saying that *"[I want] to get a good job…so I think especially in today's world is very competitive especially having to compete with [sic] wider community as well for the same job, so you have the pressure to have more knowledge and from that its make me want to learn more …"*

Student 9 agreed with Student 5 saying that *"I don't want to be that person without a job for over a year after I having (sic) my degree… having been working towards it and then do nothing, so for me it become quite important to get a job and to do that I want to be able to have the right marks so for me was about knowing getting certain amount of marks to work for the companies that I wanted to work for."*

Similarly Student 2 mentioned that *"I get motivation from wanting to a get a job after graduation ...and support a family... and [in general] I like to do well just in studies"*

On the other hand, Student 6 stated they were motivated by achieving good grades for personal satisfaction, saying *that "I think I have really strong need for achievement, if I don't get high marks, I don't know why but I can't stand it and also*

I am quite a competitive person, so if somebody else gets a better mark than me then it drives me crazy"

5.2.1.2 Academic Interest and Desire for Learning

The field study also revealed that a student's natural interest in their learning influences the way they self-regulate their learning. For example, Student 5 said that *"[I] [w]ant to further my knowledge ... and I think I have a bit of thirst for knowledge…I hear something and I want to learn a bit more about it if I don't understand something I learn more about it, so that if someone ask me in the future I can, if I can remember it, then I can pass the knowledge on."*

Similarly Student 9 stated that *"I am actually lucky because I enjoy what I am doing and at the same I realise I needed to do well so able to put the effort in and able to."*

Only Year 2 and Year 3 students mentioned interest in the course as an influencing factor for their self-regulation of learning. Having completed Year 1 studies, this might be attributed to 2nd and 3rd students feeling more confident in their learning and about the courses/units they choose. In contrast, Year 1 students might find the overall learning experience overwhelming, being fairly new to the university learning environment.

5.2.1.3 Prior Learning Experience

Prior learning experience contributes to the ways and level of a student's self-regulation, whether from school or from previous post-secondary learning. Students recounted their previous learning approaches and performance compared to their current progress and their ability to adapt their learning approaches for better performance. For example, Student 8 said that *"[When I came in first semester] I underestimated how… like I thought you know they would set homework…obviously they do but they don't really check it, so once you know they don't check it students start make the effort to do it and second year that when I understood you know that you have make effort because after my first semester I received 3 out 4 [unit] passes and ever since my 1st semester my grades are sort of gradually improved because I sort of understanding how to prepare myself now for each assessment and exams whatever [the 1st semester experience] tempt to improve and move on."*

5.2.1.4 Lecturers and Teaching Staff

The field study indicated that teaching staff involvement is important in the student learning process. It was evident from the participant descriptions that student perceptions about teaching staff commitment and approaches to teaching and learning tasks influences the self-regulation of their learning. For example, Student 1 emphasised that *"[t]he lecturer is very important. A good lecturer can really encourage me to do well in my assignment and to do well in my course. One of my tutors is really very experienced. He knows what to really think about and how to encourage you."*

Similarly Student 8 said that *"Finance was different because we didn't have any group assignments and I didn't have a friend in that unit so it was pretty hard. I didn't enjoy my lecturer. My tutor was semi-helpful but there was [sic] only two people in the tutorial, [and] because there was only two in class he didn't want to be there so he [tutor] wouldn't want to go through the questions in detail and he want us to get out of there sort of thing"*

It is evident that student thoughts, beliefs and feelings concerning the teaching staff characteristics affects how they invest effort, strive in their learning tasks, ask for help and use self-regulatory strategies of learning.

5.2.1.5 Peers and Family

Finally the field study showed that students acknowledge the role of family and peers in their learning. For example, Student 1 said *"[m]y parents, especially my mom encourage me to do my Masters and I asked her why and she told "maybe now you don't know but after few years, 5 or 10 years, what you learn you can feel that it is useful". She enforces me to do that (Masters)."* Student 1 further noted that *"[a] good classmate or a good friend can motivate you to learn. Sometimes if I am upset or don't know how to do that (an assignment or task), my friend can encourage you, maybe both of us don't know how to do it but the friend can give some ideas and we can research together."*

Similarly, Student 8 stated that "*[o]ne major factor is my parents being successful so you know I want to be as successful as they are, so I would strive for goal [that] in long term to be like them.*"

Acknowledging other participant views of family and peers, Student 5 said that "*People you surround yourself with because they [going to] give you motivation as well, as [our] family [and] friend.*"

Findings from the student interviews generally supported the relevance and appropriateness of the proposed factors (*academic interest, good grades, prior learning experience, lecturer support, peer and family support*) identified during the initial literature review. In addition to academic interest and good grades, students repeatedly reported *career* and a *successful future* as factors that impact their self-regulation of learning. These factors were included in this study's investigation for the student model. The corresponding literature review and hypothesis development for these factors was included in Chapter 3. The next section describes the findings from the lecturer interviews.

5.2.2 Lecturer Interview Results

The field study (qualitative data collection) with the lecturers aimed to confirm the relevance and appropriateness of the factors obtained from the literature. The field study probed additional factors not identified through the literature review that influence lecturers to promote and facilitate their students to self-regulate learning. This section presents the findings of the interview analysis. Table 5.2 lists the lecturer respondent profiles.

Table 5.2: Profile of Lecturer Interview Respondents

Participant ID	Teaching year	Gender	Years of teaching experience
Lecturer 1	Y2, Y3	Male	< 5 – 10 years
Lecturer 2	Y1, Y2	Male	< 5 years
Lecturer 3	Y2, Y3	Male	15 - 20 years
Lecturer 4	Y1	Female	15 – 20 years
Lecturer 5	Y2, Y3	Male	5 – 10 years

Lecturer 6	Y2, Y3	Male	> 20 years
Lecturer 7	Y3	Male	> 20 years

5.2.2.1 Time and Effort

The field study outcome indicated that all interviewed lecturers were generally in agreement that time and effort requirements were an issue in facilitating self-regulated learning in students. As noted by participants in the quotes below, planning, designing and facilitating students to self-regulate may take considerable time and effort on the part of lecturers. For example, Lecturer 6 noted that *"it takes effort to create these things, it take time, verbal time in the classroom, to communicate these things. So typically I would talk about these very early in the unit, maybe in the first session where we sort of give an overview of the unit, what's the unit is about but also how it's going to run. So sometime it is available in there [teaching materials] but maybe not a lot."*

Similarly, Lecturer 2 said that *"I suppose time is key factor because I am a bit of talker and I will take the entire lecture time or even go over and I am talking about the units and I can bring in all of my previous work experience, you know life experience…with little time for anything else so I can of find myself completely follow the content and this little time for anything else…so time certainly being one of factors that prevents me from … you know get interested in teaching students these skills."*

5.2.2.2 Lecturer Pedagogical Knowledge and Skills

The field study revealed that a lecturer's teaching experience affects their facilitating self-regulatory skills to students in the classroom. For example, Lecturer 6 said that *"As well there is sort of you own individual skill as a teacher to think about these different things, which kind of approaches are you aware of, what kind of things you heard about from other people, the time it takes to design all that and put it place in the classroom or in the unit outline or however it is you [planned] to communicate that. It doesn't sort of come for free."*

The statement above is akin to Woolley's (2011, p. 147) claim that "very few teachers are adequately trained to help students in becoming independent learners".

Often insufficient training or information about learning strategies deters lecturers from providing instruction in this area (Wehmeyer, Agran, and Hughes 2000; Woolley 2011).

5.2.2.3 Lecturer Perceptions of Students Learning

The field study explored the view that a lecturer's beliefs and perceptions about student motives and approaches to learning have a direct influence on whether the lecturer will facilitate SRL and the extent to which they do facilitate student SRL. For example, Lecturer 5 said that *"I suspect most of our students are not ready. The only reason they are here is because of the expectations of their peers, parents and family and even society; you are not going to get a job if you don't have a degree; 'okay I will go and do a degree and don't care what it is, give me something easy', so this is not about learning, they are not here to learn; they are here to get a career start, if learning kicks in that's fine. So this is difference between the provider and the recipient and that is misguided. I am misguided if I believe that my students are here to receive knowledge. They are not. They are here to ease their path into career."*

Similarly, Lecturer 2 said that *"I think students are lazy. I don't think students try as (sic) hard… I been here a long time and I see each year [each intake] students are getting lazier and they expect us to give them all the answer; they expect you to tell them what is due when and they expect you to plan for them and they expect to, you know, to put in steps to make it easier for them. I don't think it is necessary we teach them these skills. I think these [SRL skills] are really life skills"*

The above statements are consistent with the literature which reports that lecturer beliefs affect the uptake of innovations in teaching and learning and thus influence the integration and development of SRL practices (B.K. Hofer & Pintrich, 1997; Kramarski & Michalsky, 2009).

5.2.2.4 Curriculum Resources

The field study explored curriculum resources as one of the factors that influence the facilitation of SRL by lecturers. Lecturers acknowledged that the availability of appropriate resources can help SRL facilitation in their classroom, as indicated by

Lecturer 6 saying that *"[i]f facilities are made available to you can easily sort of copy and make use of it, for example, you may say a lecturer on time management, so he might have 5 or 20 slides on that if someone else already done that you can just use in your own, that's much easier that building up yourself."*

Similarly, Lecturer 2 said *"… but also I suppose like having a framework…that we can follow…you know this is what you need to do to get the students to be able to do this, this and this. If those kind of frameworks existed, well published and we knew about that stuff, certainly we would able to give them a go."*

5.2.2.5 Students Diversity

Lecturer 3 highlighted that the diverse nature of the cultural and educational backgrounds of students could possibly affect lecturer teaching approaches and indirectly the facilitation of SRL in students. Lecturer 3 expressed his concern about teaching diverse student groups by saying *"[t]he cohort 25 years ago are more homogenous culturally, by that I mean not only national culture but also educational culture, more homogenous so it was much easier perhaps to know who you dealing with and to relate to them, now because the cohorts drawn from so many different places, so many different levels of educational culture you don't have homogeneity and not only that, you don't even know, like, I don't know what a Chinese student goes through, I don't know what an Indian student goes through; so it's quite hard to maybe relate and I don't think they understand me either, so like educationally, so I don't think they have a like I mean for example, a lot of them would not relate to the thing when I say 'my supervisor said 'go off and do it'' just do it and I had to accept that, you know here now if a supervisor said go away, the student would probably would sue the supervisor and probably make a stack of money in the process, so it's so different."*

Findings from the interviews generally supported the relevance and appropriateness of proposed factors (*time and effort, pedagogical knowledge, lecturer's beliefs, and resources availability)* from the initial literature review. One of the respondents also identified an additional factor, *student diversity*, which might be important in influencing a lecturer's SRL facilitation in students. A further review of the literature based on the interview outcomes showed that the factors *recognition of teaching*

efforts in relation to *time and effort,* and *university policies* and *collegial support and influence* in relation to *resource availability* may also play a significant role in a lecturer's understanding and facilitation of the self-regulation of learning in students. *Recognition and reward, student diversity, university policies* and *collegial influence* were thus included in the lecturer model. The corresponding literature and hypothesis development for these factors were included in Chapter 3.

In sum, nine themes for student SRL and eight themes for lecturer SRL facilitation were identified through the qualitative data analysis of student interview results and lecturer interview results respectively.

Themes for factors influencing student self-regulation of learning:

1. *Mastery Goal Orientation*
2. *Performance Goal Orientation*
3. *Task Value*
4. *Self-Efficacy*
5. *Metacognitive Awareness*
6. *Prior Learning Experience*
7. *Teaching Staff Guidance and Support*
8. *Peer Influence and Collaboration*
9. *Family Influence*

Themes for factors influencing lecturer facilitation of student self-regulation of learning:

1. *Time*
2. *Reward and Recognition*
3. *Lecturers' Beliefs about SRL*
4. *Lecturers' Knowledge on SRL*
5. *Curriculum Design and Demands*
6. *University and Faculty Policies*
7. *Student Diversity (discovered during interview)*
8. *Collegial Influence*

This first section of this chapter discussed the student and lecturer interview results. Additional constructs were identified either via the interview or through a follow-up literature study. The student model and lecturer model were revised accordingly, by including the additional identified constructs in the respective models. Based on these revised models, the student and lecturer surveys were developed. The details of survey instrument development are presented in Section 4.6.4. The following section describes the quantitative data analysis techniques used to analyse data collected in this study.

5.3 QUANTITATIVE DATA ANALYSIS

This study mainly employed structural equation modelling for quantitative data analysis. Structural equation modelling (SEM) is a second generation statistical analytical tool. SEM analysis consists of a two-step procedure: the assessment of a measurement model followed by the assessment of a structural model. The measurement model involves assessment of the construct validity, convergent validity and discriminant validity of the reflective constructs. Convergent validity ensures that the items explain construct converge well by examining whether the items in each construct are highly correlated and reliable. Discriminant validity ensures that the reflective constructs are different from each other by estimating the average communalities, construct correlations and cross-loading matrix. The structural model estimates causation and relationships among dependent and independent constructs.

A combination of software was used, including MS Excel for data management. SPSS was used for data screening and cleansing and manipulation process. The descriptive statistics function in SPSS was used for the treatment of the data, checking and rechecking the reliability and validity of the measurements, and facilitating data analyses in various stages of the research. SmartPLS 2.0 (C. M. Ringle, S. Wende, & A. Will, 2005) software was used for the main part of the quantitative data.

A detailed discussion of the data analysis technique adopted in this study is given in detail in Section 4.7. The following sub-sections present the results of the student data analysis and lecturer data analysis.

5.4 RESULTS OF STUDENT MODEL DATA ANALYSIS

5.4.1 Demographic Profile of Student Participants

This section provides the demographic profile of the student participants in this study. Table 5.3 exhibit the respondent profiles. The respondents are classified according to their gender, age, course, year in course, study mode (full-time/part-time), and prior education level.

Table 5.3: Profile of Student Respondents (N = 175)

Characteristics	Item	Frequency	Percentage (%)
Gender	Male Female	100 75	57.1 42.9
Age	Under 18 18 - 21 22 - 25 26 - 30 31 - 40 41 - 50 51 or over	11 72 37 22 22 8 3	6.3 41.1 21.1 12.6 12.6 4.6 1.7
Study level	Undergraduate - Face-to-face Undergraduate - Online Postgraduate - Face-to-face Postgraduate - Online Other (Not mentioned)	125 9 37 3 1	71.4 5.1 21.1 1.7 0.6
Study major	Engineering Computing (Information Technology Computer science) Science and Mathematics Business Studies Health Sciences Humanities Other (Not Indicated)	51 47 (22+25) 26 19 20 10 2	29.1 26.9 (12.6+14.3) 14.9 10.9 11.4 5.7 1.1
Year in course/study	First Year Second Year Final Year (Third Year + Fourth Year) Other Missing	48 49 34 (25+9) 3 41	27.4 28.0 19.4 (14.3+5.1) 1.7 23.4
Study mode	Full-time Part-time	155 20	88.6 11.4
Education level	High/Secondary School Technical and Further Education (TAFE) Bachelor's Degree Master's Degree Others	102 20 35 8 10	58.3 11.4 20.0 4.6 5.7
Student type	Domestic Student (Australian born or Australian Permanent Resident) International Student (International Student Visa or equivalent)	135 40	77.1 22.9
Estimated academic performance	High Distinction (81 - 100) Distinction (71 - 80) Credit (61 - 70) Pass (50 - 60) Below Pass (< 50)	36 69 49 20 1	20.6 39.4 28.0 11.4 0.6
Working/Job	Not working Working - Full time Working - Part time Missing	81 13 80 1	46.3 7.4 45.7 0.6

5.4.2 Missing Value Analysis

A total of 198 student responses were received. Six responses had more than 10% missing values and were removed. Of the 192 remaining responses, 17 responses with a standard deviation less than 1.2 were removed. This suggests that the responses are not engaged. The remaining 175 responses had 12 cases with less than 5% missing values.

The SmartPLS programme requires that all missing values are replaced with a coded value prior to processing. As the number of usable responses was only 175, it was decided to retain all cases for analysis. Consequently, it was decided to substitute all missing items using the expectation maximisation (EM) approach in the SPSS v.21 statistical software. Based on the EM approach, the missing values were replaced by the estimates calculated by the EM algorithm. The EM approach is an iterative procedure, which uses the estimation of the means, the covariance matrix, and the correlation of quantitative variables with the missing value. The approach is generally considered superior to other substitution approaches, such as listwise, pairwise, and means substitution approaches (Pallant, 2007).

5.4.3 Evaluation of the measurement model

The measurement model assessment consists of convergent validity and discriminant validity. Convergent validity is evaluated through individual measurement item reliability and discriminant validity (Hair et al., 2011). The following sections present the assessment of the reliability and validity of the measurement items used to measure the constructs in the student measurement model.

5.4.3.1 Individual Item Reliability

The individual item reliability measures the loadings of items on its respective latent construct. The SmartPLS version 2 (Christian M. Ringle et al., 2005) output run provides the outer loading of each indicator for its corresponding latent construct. The *t*-values for each loading were then obtained using the bootstrap procedure in

SmartPLS. Table 5.4 reports the loadings of the indicators for all constructs along with their respective t-values and the significance level of the loadings.

Table 5.4: Loadings of Items in the Measurement Model

Construct	Items	PLS Loading	T Statistics	Significance Level
Academic Interest - Mastery Goal (ACAD)	ACAD2 <- ACAD	0.8908	40.4421	0.01
	ACAD3 <- ACAD	0.8552	24.2251	0.01
	ACAD5 <- ACAD	0.8774	37.0362	0.01
Employment Prospects (EMPY)	EMPY1 <- EMPY	0.7753	14.9381	0.01
	EMPY3 <- EMPY	0.8707	41.8313	0.01
	EMPY4 <- EMPY	0.6062	6.2858	0.01
	SFTR3 <- EMPY	0.7409	17.9517	0.01
Family Influence (FMLY)	FMLY2 <- FMLY	0.9002	2.4098	0.05
	FMLY3 <- FMLY	0.9422	2.6048	0.01
	FMLY4 <- FMLY	0.9604	2.7486	0.01
Good Grades (GRD)	GRD1 <- GRD	0.8855	36.6626	0.01
	GRD2 <- GRD	0.7989	21.4960	0.01
	GRD5 <- GRD	0.8900	33.1706	0.01
Metacognitive Knowledge Awareness (MCK)	MCK3 <- MCK	0.8594	39.4381	0.01
	MCK4 <- MCK	0.7982	24.6520	0.01
	MCK5 <- MCK	0.8847	37.2926	0.01
	MCK7 <- MCK	0.7151	13.9557	0.01
Peer Influence (PEER)	PEER1 <- PEER	0.8872	19.3099	0.01
	PEER2 <- PEER	0.9204	42.8106	0.01
	PEER3 <- PEER	0.9427	86.3105	0.01
	PEER4 <- PEER	0.8898	29.6287	0.01
Prior Learning Experience (PLE)	PLE1 <- PLE	0.8000	21.7287	0.01
	PLE2 <- PLE	0.7029	13.8849	0.01
	PLE3 <- PLE	0.8914	46.8820	0.01
	PLE4 <- PLE	0.8944	40.7261	0.01
Self-efficacy (SelfEfficacy)	SE3 <- SelfEfficacy	0.9118	55.8477	0.01
	SE4 <- SelfEfficacy	0.8857	33.0187	0.01
	SE5 <- SelfEfficacy	0.8951	43.7329	0.01
Successful Future (SFTR)	SFTR1 <- SFTR	0.8273	22.8039	0.01
	SFTR2 <- SFTR	0.7780	20.6515	0.01
	EMPY2 <- SFTR	0.6510	10.0095	0.01
	SFTR5 <- SFTR	0.7325	13.5837	0.01

Teaching Staff (TStaff)	TS2 <- TStaff	0.8793	37.3918	0.01
	TS3 <- TStaff	0.8975	34.4015	0.01
	TS4 <- TStaff	0.8605	39.4558	0.01
	TS5 <- TStaff	0.8595	25.3782	0.01
	TS6 <- TStaff	0.7915	17.3120	0.01
Task value (TaskValue)	TV3 <- TaskValue	0.9107	59.5640	0.01
	TV4 <- TaskValue	0.7856	17.5456	0.01
	TV5 <- TaskValue	0.7468	12.3338	0.01
	ACAD6 <- TaskValue	0.8338	35.5051	0.01
Goal setting and Planning (SRL_GSP)	SRL_GSP1 <- SRL_GSP	0.7920	24.1413	0.01
	SRL_GSP2 <- SRL_GSP	0.7905	23.6309	0.01
	SRL_GSP3 <- SRL_GSP	0.7984	21.7964	0.01
	SRL_GSP4 <- SRL_GSP	0.8429	30.4880	0.01
Learning Strategies (SRL_LS)	SRL_LS1 <- SRL_LS	0.7200	13.8527	0.01
	SRL_LS6 <- SRL_LS	0.7734	18.3378	0.01
	SRL_LS7 <- SRL_LS	0.7683	20.5247	0.01
	SRL_LS8 <- SRL_LS	0.7175	14.2134	0.01
Help Seeking (SRL_HelpSeek)	SRL_PL1 <- SRL_HelpSeek	0.7853	16.9376	0.01
	SRL_PL3 <- SRL_HelpSeek	0.7262	8.9686	0.01
	SRL_HS1 <- SRL_HelpSeek	0.7572	14.1906	0.01
	SRL_HS2 <- SRL_HelpSeek	0.7090	7.2881	0.01
	SRL_HS3 <- SRL_HelpSeek	0.7701	12.9173	0.01
Self-Evaluation (SRL_SelfEval)	SRL_SEV1 <- SRL_SelfEval	0.7141	10.7743	0.01
	SRL_SEV4 <- SRL_SelfEval	0.8431	32.4401	0.01
	SRL_SEV5 <- SRL_SelfEval	0.8321	23.9192	0.01
Self-Monitoring (SRL_SelfMon)	SRL_SM1 <- SRL_SelfMon	0.7508	16.5613	0.01
	SRL_SM2 <- SRL_SelfMon	0.7944	23.0788	0.01
	SRL_SM3 <- SRL_SelfMon	0.7830	18.6805	0.01
	SRL_SM4 <- SRL_SelfMon	0.8586	40.4130	0.01
	SRL_SM5 <- SRL_SelfMon	0.7288	14.0174	0.01
Time and Environment Management (SRL_TimeEnv)	SRL_TE1 <- SRL_TimeEnv	0.8489	35.8155	0.01
	SRL_TE2 <- SRL_TimeEnv	0.8304	26.6995	0.01
	SRL_TE3 <- SRL_TimeEnv	0.7897	16.2903	0.01

According to the statistical results in Table 5.4, the condition of the loading scores was met in this study. All indicators loaded higher than 0.7 on their respective latent constructs. The table also shows that all indicators loaded with significant *t-values* of above 2.58 (significance at $p < 0.01$), on their respective latent construct, which suggests that convergent validity was achieved. Further SFTR3, EMPY2 and ACAD6 have been reassigned to ensure that these indicators are loaded highly on its respective latent construct. Although the item loading for EMPY4 is 0.6, it has been

retained on the basis of its contribution to the content validity. Hair et al. (2011) have indicated that an item loading of 0.6 is acceptable in exploratory research.

5.4.3.2 Internal Consistency Reliability

Composite reliability is examined to measure internal consistency reliability (Hair et al. 2011). Composite reliability should be higher than 0.70. As shown in Table 5.5, the composite reliability values for all constructs were well above the cut-off value of 0.7, thus demonstrating high levels of internal consistency and reliability among all latent variables.

For comparison purposes, a Cronbach's Alpha is also provided. The values are above the minimum requirement of 0.7 (closer to 0.7 for Employer Prospects (EMPY)) for all constructs which suggests a good internal consistency (Fornell & Larcker, 1981; Nunnally & Bernstein, 1994). The reliability of all latent constructs was thus verified.

Table 5.5: Internal Consistency and Reliability, and Convergent Validity of the Constructs

Construct	Composite Reliability	AVE	Cronbach's Alpha
ACAD	0.9070	0.7649	0.8463
EMPY	0.8386	0.5689	0.7409
FMLY	0.9539	0.8735	0.9311
GRD	0.8940	0.7381	0.8214
MCK	0.8886	0.6675	0.8308
PEER	0.9508	0.8287	0.9324
PLE	0.8948	0.6822	0.8408
SFTR	0.8362	0.5625	0.7387
SRL_GSP	0.8813	0.6500	0.8202
SRL_HelpSeek	0.8653	0.5626	0.8236
SRL_LS	0.8331	0.5554	0.7330
SRL_SelfEval	0.8400	0.6377	0.7132
SRL_SelfMon	0.8885	0.6152	0.8428
SRL_TimeEnv	0.8632	0.6780	0.7636
SelfEfficacy	0.9256	0.8057	0.8794
TStaff	0.9332	0.7369	0.9130
TaskValue	0.8920	0.6749	0.8372
StudentSRL	0.9250	0.3506	0.9149

5.4.3.3 Convergent validity

Convergent validity is the extent to which the measurement items are positively correlated with other measurement items of the same construct (De Vaus, 2002). To check the convergent validity, each latent variable's average variance extracted (AVE) is evaluated. The AVE should be higher than 0.50. Again from Table 5.5, it is found that all AVE values are greater than the minimum threshold of 0.50, and thus the convergent validity of the measurement items is confirmed.

5.4.3.4 Discriminant validity

Discriminant validity measures the extent to which a particular construct does not correlate with other different constructs (De Vaus, 2002). Two measures are examined for the assessment of discriminant validity, the Fornell–Larcker criterion and cross loadings (Hair et al., 2011). The Fornell–Larcker criterion suggests that a latent construct shares more variance with its assigned indicators than with another latent construct in the structural model. In statistical terms, the square root of the AVE of each latent construct should be greater than the correlations between the latent constructs (Hair et al, 2011). The correlations between the latent constructs are obtained from the "Latent Variable Correlation" section of the SmartPLS default report. The square root for each AVE, which was obtained from the SmartPLS default report, was then manually calculated and written in bold on the diagonal of the correlation matrix of constructs (see Table 5.6).

Table 5.6 compares the square root of the AVE of all constructs with the correlations between all constructs. It can be seen that the square roots of AVE of all constructs were greater than the off-diagonal elements across the row and down the column. This finding suggests that the results are satisfactory and confirms the establishment of discriminant validity at the construct level. The requirement of the first assessment of discriminant validity was met.

The second assessment of discriminant validity is the analysis of the cross-loadings. Analysis of cross-loadings involves an examination of the loadings of the indicators with respect to the correlations of all constructs. The indicator loading, with its associated latent construct, should be higher than its loadings with all the remaining constructs (Hair et al. 2011).

An examination of the cross-loadings between constructs and indicators in Table 5.7 shows that all manifest variables loaded higher to their respective intended latent construct compared to other latent constructs. It can be seen in the table that the loading in each block was higher than any other block in the same rows and columns. The loading clearly separates each latent construct, as theorised in the conceptual level. The output of the cross-loadings thus confirmed that the requirements of the second assessment of discriminant validity were satisfied. By demonstrating evidence for both convergent and discriminant validity, it was thus confirmed that there was sufficient evidence for construct validity in this study.

Based on the outcomes of the validity and reliability of the measurement model, the measurement model analysis has shown the student model to be valid as outlined in the specified methodology. The next section presents the evaluation of the student structural model.

Table 5.6: Correlation Matrix of Constructs

Construct	AVE	ACAD	EMPY	FMLY	GRD	MCK	PEER	PLE	SFTR	SRL_ GSP	SRL_ Help Seek	SRL_LS	SRL_ SelfEval	SRL_ Self Mon	SRL_ Time Env	Self Efficacy	TStaff	Task Value
ACAD	0.765	**0.875**																
EMPY	0.569	0.367	**0.754**															
FMLY	0.873	0.024	0.437	**0.935**														
GRD	0.738	0.475	0.611	0.384	**0.859**													
MCK	0.667	0.341	0.313	0.183	0.285	**0.817**												
PEER	0.829	-0.018	0.177	0.399	0.096	0.295	**0.910**											
PLE	0.682	0.223	0.179	0.106	0.219	0.524	0.261	**0.826**										
SFTR	0.562	0.091	0.718	0.392	0.366	0.380	0.263	0.332	**0.750**									
SRL_GSP	0.650	0.261	0.085	-0.007	0.182	0.578	0.197	0.517	0.180	**0.806**								
SRL_HelpSeek	0.563	0.227	0.217	0.096	0.105	0.324	0.511	0.240	0.340	0.296	**0.750**							
SRL_LS	0.555	0.409	0.300	-0.033	0.292	0.533	0.147	0.453	0.352	0.595	0.414	**0.745**						
SRL_SelfEval	0.638	0.389	0.251	0.003	0.198	0.542	0.193	0.461	0.267	0.541	0.405	0.517	**0.799**					
SRL_SelfMon	0.615	0.417	0.284	0.072	0.284	0.618	0.213	0.459	0.339	0.579	0.376	0.616	0.716	**0.784**				
SRL_TimeEnv	0.678	0.300	0.142	-0.023	0.185	0.388	0.179	0.469	0.185	0.581	0.364	0.509	0.428	0.457	**0.823**			
SelfEfficacy	0.806	0.361	0.313	0.120	0.293	0.667	0.263	0.571	0.366	0.500	0.323	0.480	0.441	0.528	0.524	**0.898**		
TStaff	0.737	0.165	0.153	0.215	0.094	0.317	0.360	0.284	0.230	0.227	0.226	0.186	0.270	0.342	0.253	0.296	**0.858**	
TaskValue	0.675	0.706	0.398	0.055	0.444	0.361	-0.006	0.186	0.167	0.196	0.135	0.334	0.288	0.284	0.277	0.455	0.143	**0.822**

Table 5.7: Cross-Loading Matrix

	ACAD	EMPY	FMLY	GRD	MCK	PEER	PLE	Self Efficacy	SFTR	TStaff	Task Value	SRL_GSP	SRL_Help Seek	SRL_LS	SRL_Self Eval	SRL_Self Mon	SRL_Time Env
ACAD2	0.891	0.286	-0.034	0.360	0.332	-0.007	0.213	0.358	0.065	0.188	0.625	0.244	0.239	0.414	0.376	0.437	0.265
ACAD3	0.855	0.302	-0.001	0.358	0.267	-0.051	0.160	0.272	0.024	0.085	0.609	0.216	0.121	0.286	0.286	0.339	0.258
ACAD5	0.877	0.376	0.100	0.530	0.292	0.008	0.209	0.313	0.149	0.154	0.617	0.223	0.230	0.369	0.356	0.315	0.264
EMPY1	0.270	0.775	0.351	0.593	0.119	0.100	0.104	0.142	0.509	0.068	0.292	-0.004	0.114	0.164	0.082	0.113	0.145
EMPY3	0.281	0.871	0.367	0.548	0.263	0.156	0.132	0.257	0.579	0.150	0.295	0.063	0.136	0.220	0.181	0.269	0.076
EMPY4	0.478	0.606	0.220	0.364	0.367	0.103	0.153	0.404	0.338	0.083	0.458	0.210	0.229	0.400	0.338	0.331	0.196
SFTR3	0.135	0.741	0.361	0.319	0.233	0.170	0.161	0.189	0.704	0.155	0.204	0.028	0.198	0.171	0.200	0.173	0.037
FMLY2	0.059	0.484	0.900	0.378	0.151	0.360	0.048	0.094	0.400	0.180	0.109	-0.056	0.068	-0.008	-0.033	0.071	0.013
FMLY3	-0.023	0.424	0.942	0.339	0.166	0.378	0.140	0.132	0.409	0.212	-0.017	-0.013	0.072	-0.051	0.020	0.080	-0.021
FMLY4	0.040	0.369	0.960	0.371	0.187	0.381	0.094	0.109	0.325	0.206	0.076	0.021	0.113	-0.026	0.007	0.057	-0.038
GRD1	0.506	0.534	0.294	0.885	0.313	0.036	0.203	0.258	0.308	0.058	0.443	0.207	0.081	0.287	0.204	0.284	0.171
GRD2	0.254	0.504	0.404	0.799	0.146	0.122	0.146	0.220	0.366	0.104	0.239	0.114	0.077	0.180	0.113	0.195	0.129
GRD5	0.450	0.537	0.302	0.890	0.267	0.095	0.212	0.274	0.277	0.083	0.449	0.144	0.112	0.278	0.186	0.249	0.173
MCK3	0.270	0.222	0.109	0.248	0.859	0.171	0.417	0.567	0.334	0.209	0.291	0.494	0.235	0.449	0.405	0.501	0.326
MCK4	0.252	0.204	0.068	0.147	0.798	0.169	0.383	0.525	0.290	0.268	0.295	0.423	0.293	0.394	0.405	0.466	0.275
MCK5	0.325	0.326	0.226	0.334	0.885	0.282	0.507	0.572	0.356	0.253	0.339	0.495	0.249	0.483	0.548	0.605	0.318
MCK7	0.260	0.263	0.187	0.190	0.715	0.338	0.394	0.511	0.255	0.307	0.251	0.473	0.286	0.410	0.402	0.437	0.348
PEER1	-0.050	0.107	0.352	0.073	0.181	0.887	0.110	0.098	0.105	0.275	-0.051	0.114	0.432	0.036	0.081	0.117	0.050
PEER2	0.019	0.223	0.429	0.152	0.225	0.920	0.186	0.198	0.204	0.296	0.024	0.174	0.474	0.110	0.157	0.181	0.162
PEER3	0.021	0.159	0.376	0.103	0.354	0.943	0.287	0.310	0.253	0.328	0.030	0.222	0.487	0.174	0.197	0.229	0.208
PEER4	-0.069	0.142	0.303	0.024	0.269	0.890	0.307	0.284	0.336	0.388	-0.042	0.178	0.458	0.171	0.224	0.214	0.182

	ACAD	EMPY	FMLY	GRD	MCK	PEER	PLE	Self Efficacy	SFTR	TStaff	Task Value	SRL_GSP	SRL_ Help Seek	SRL_LS	SRL_ Self Eval	SRL_ Self Mon	SRL_ Time Env
PLE1	0.097	0.212	0.151	0.201	0.436	0.341	0.800	0.429	0.275	0.224	0.044	0.390	0.264	0.328	0.328	0.306	0.294
PLE2	0.270	0.096	0.014	0.154	0.435	0.057	0.703	0.431	0.207	0.143	0.240	0.413	0.158	0.375	0.379	0.407	0.345
PLE3	0.237	0.140	0.091	0.210	0.456	0.228	0.891	0.548	0.301	0.285	0.217	0.502	0.215	0.439	0.429	0.404	0.483
PLE4	0.117	0.150	0.097	0.155	0.399	0.242	0.894	0.461	0.308	0.275	0.095	0.386	0.157	0.338	0.377	0.390	0.404
SE3	0.321	0.299	0.113	0.303	0.549	0.238	0.474	0.912	0.315	0.241	0.427	0.453	0.273	0.383	0.395	0.446	0.501
SE4	0.302	0.250	0.158	0.216	0.621	0.243	0.543	0.886	0.392	0.264	0.343	0.481	0.337	0.413	0.388	0.488	0.482
SE5	0.347	0.294	0.056	0.270	0.623	0.228	0.517	0.895	0.280	0.290	0.453	0.413	0.260	0.491	0.405	0.485	0.428
SFTR1	-0.019	0.529	0.308	0.224	0.258	0.279	0.238	0.317	0.827	0.196	0.062	0.167	0.328	0.217	0.215	0.313	0.132
SFTR2	0.052	0.607	0.312	0.205	0.253	0.141	0.213	0.192	0.778	0.135	0.100	0.046	0.258	0.215	0.176	0.212	0.083
SFTR5	0.114	0.635	0.449	0.446	0.259	0.168	0.220	0.233	0.732	0.143	0.174	0.083	0.180	0.266	0.141	0.140	0.130
EMPY2	0.138	0.336	0.049	0.203	0.399	0.212	0.351	0.390	0.651	0.236	0.175	0.282	0.265	0.390	0.295	0.393	0.233
TS2	0.203	0.171	0.128	0.161	0.285	0.305	0.190	0.257	0.243	0.879	0.204	0.202	0.227	0.195	0.239	0.273	0.239
TS3	0.096	0.109	0.186	0.059	0.241	0.337	0.215	0.232	0.183	0.897	0.059	0.193	0.188	0.107	0.231	0.306	0.194
TS4	0.215	0.167	0.196	0.077	0.388	0.301	0.351	0.372	0.191	0.861	0.188	0.288	0.209	0.248	0.258	0.348	0.278
TS5	0.100	0.083	0.191	0.059	0.187	0.279	0.253	0.168	0.125	0.860	0.104	0.115	0.134	0.086	0.220	0.284	0.195
TS6	0.007	0.085	0.249	0.015	0.165	0.336	0.149	0.147	0.249	0.792	-0.026	0.092	0.195	0.083	0.185	0.218	0.126
TV3	0.630	0.371	0.040	0.393	0.269	-0.043	0.098	0.355	0.118	0.096	0.911	0.118	0.097	0.293	0.226	0.213	0.210
TV4	0.529	0.326	0.068	0.371	0.278	0.008	0.180	0.324	0.218	0.110	0.786	0.191	0.147	0.251	0.269	0.246	0.177
TV5	0.502	0.407	0.075	0.368	0.354	0.000	0.129	0.384	0.159	0.122	0.747	0.127	0.070	0.306	0.263	0.264	0.283
ACAD6	0.642	0.221	0.005	0.333	0.293	0.016	0.203	0.426	0.070	0.141	0.834	0.205	0.128	0.251	0.199	0.218	0.242

	ACAD	EMPY	FMLY	GRD	MCK	PEER	PLE	Self Efficacy	SFTR	TStaff	Task Value	SRL_GSP	SRL_Help Seek	SRL_LS	SRL_Self Eval	SRL_Self Mon	SRL_Time Env
SRL_GSP1	0.246	0.026	-0.005	0.084	0.423	0.142	0.356	0.322	0.088	0.158	0.184	0.792	0.272	0.537	0.449	0.454	0.386
SRL_GSP2	0.181	0.103	-0.056	0.169	0.465	0.123	0.403	0.488	0.163	0.244	0.207	0.790	0.224	0.458	0.374	0.509	0.575
SRL_GSP3	0.227	0.043	0.010	0.185	0.520	0.158	0.416	0.417	0.146	0.170	0.152	0.798	0.201	0.499	0.417	0.447	0.413
SRL_GSP4	0.189	0.102	0.029	0.150	0.457	0.212	0.491	0.385	0.182	0.159	0.089	0.843	0.256	0.427	0.504	0.457	0.494
SRL_HS1	0.303	0.187	0.047	0.131	0.379	0.226	0.310	0.439	0.316	0.241	0.273	0.376	0.757	0.491	0.447	0.473	0.430
SRL_HS2	0.015	0.203	0.141	0.067	0.105	0.536	0.036	0.048	0.268	0.136	-0.027	0.031	0.709	0.118	0.119	0.042	0.050
SRL_HS3	0.187	0.122	-0.002	0.067	0.130	0.315	0.136	0.114	0.155	0.057	0.086	0.200	0.770	0.271	0.266	0.152	0.299
SRL_PL1	0.108	0.090	0.071	-0.005	0.263	0.474	0.173	0.239	0.240	0.195	-0.010	0.227	0.785	0.307	0.285	0.299	0.244
SRL_PL3	0.067	0.260	0.184	0.126	0.176	0.600	0.073	0.137	0.289	0.160	0.011	0.048	0.726	0.121	0.215	0.193	0.104
SRL_LS1	0.413	0.321	0.056	0.289	0.404	0.100	0.279	0.473	0.242	0.200	0.357	0.431	0.292	0.720	0.340	0.480	0.390
SRL_LS6	0.303	0.274	0.001	0.288	0.434	0.150	0.376	0.374	0.326	0.134	0.249	0.430	0.341	0.773	0.375	0.439	0.448
SRL_LS7	0.200	0.188	-0.008	0.135	0.400	0.155	0.352	0.338	0.334	0.188	0.166	0.513	0.330	0.768	0.411	0.504	0.396
SRL_LS8	0.317	0.105	-0.159	0.159	0.348	0.023	0.341	0.239	0.129	0.019	0.230	0.390	0.265	0.718	0.417	0.406	0.272
SRL_SEV1	0.376	0.185	-0.083	0.151	0.392	0.062	0.306	0.342	0.166	0.262	0.246	0.291	0.329	0.455	0.714	0.529	0.257
SRL_SEV4	0.292	0.276	0.018	0.208	0.451	0.198	0.432	0.393	0.284	0.171	0.269	0.450	0.355	0.414	0.843	0.598	0.421
SRL_SEV5	0.276	0.137	0.060	0.114	0.453	0.189	0.360	0.323	0.182	0.222	0.178	0.538	0.289	0.379	0.832	0.586	0.337
SRL_SM1	0.331	0.211	0.090	0.254	0.558	0.111	0.365	0.400	0.214	0.213	0.264	0.501	0.230	0.472	0.506	0.751	0.383
SRL_SM2	0.376	0.285	0.142	0.288	0.550	0.258	0.405	0.447	0.308	0.260	0.286	0.599	0.319	0.481	0.631	0.794	0.351
SRL_SM3	0.302	0.281	0.062	0.269	0.370	0.107	0.319	0.392	0.300	0.266	0.213	0.297	0.284	0.477	0.469	0.783	0.340
SRL_SM4	0.314	0.154	-0.035	0.173	0.548	0.162	0.405	0.501	0.295	0.285	0.172	0.504	0.344	0.582	0.589	0.859	0.445
SRL_SM5	0.313	0.189	0.026	0.127	0.370	0.189	0.290	0.306	0.202	0.324	0.180	0.332	0.291	0.384	0.607	0.729	0.254
SRL_TE1	0.309	0.122	-0.047	0.183	0.305	0.136	0.419	0.433	0.116	0.175	0.278	0.532	0.310	0.463	0.401	0.392	0.849
SRL_TE2	0.222	0.103	-0.006	0.135	0.418	0.174	0.405	0.548	0.151	0.242	0.222	0.527	0.317	0.408	0.329	0.441	0.830
SRL_TE3	0.202	0.128	0.000	0.136	0.220	0.131	0.326	0.288	0.200	0.212	0.176	0.356	0.268	0.380	0.324	0.279	0.790

5.4.3.5 Validation of Second-Order Formative Constructs

The dependent variable in this model, *StudentSRL*, was modelled as a second-order composite variable of six first-order reflective constructs (see Figure 5.1), which are *Use of Learning Strategies (SRL_LS), Goal Setting and Planning (SRL_GSP), Self-Monitoring (SRL_SelfMon), Self-Evaluation (SRL_SelfEval), Time and Environment Management (SRL_TimeEnv)* and *Help Seeking (SRL_HelpSeek)*. As all the first-order constructs for *StudentSRL* were reflective, reliability, convergent validity and discriminant validity were duly justified before estimating the *StudentSRL* second-order composite variables (see Table 5.4, 5.5, 5.6 and 5.7).

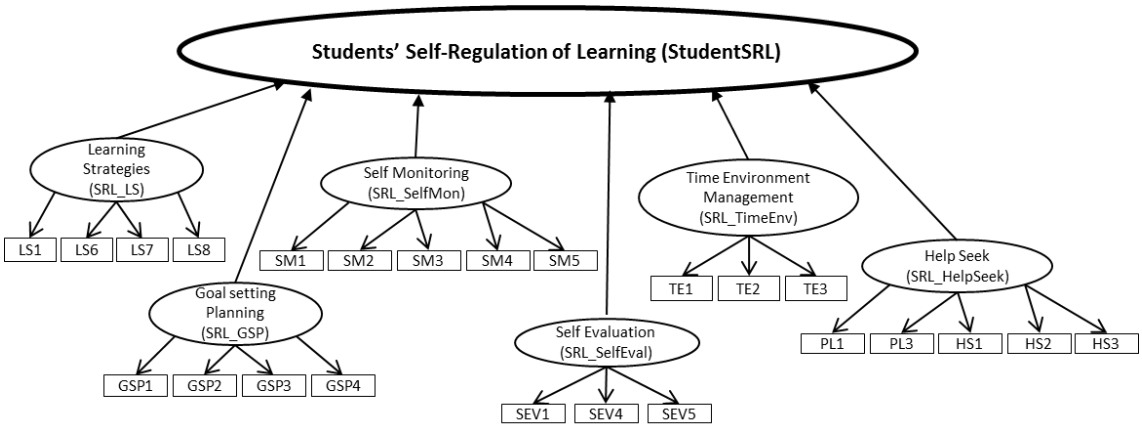

Figure 5.1: StudentSRL Second Order Construct Model

As shown in Table 5.8, the paths from *Use of Learning Strategies (SRL_LS), Goal Setting and Planning (SRL_GSP), Self-Monitoring (SRL_SelfMon), Self-Evaluation (SRL_SelfEval), Time and Environment Management (SRL_TimeEnv)* and *Help Seeking (SRL_HelpSeek)* were significant. The largest VIF value of the constructs was 2.558 which confirmed that multicollinearity was non-existent. The hierarchical conceptualisation of *StudentSRL* was thus valid for structural model estimation.

Table 5.8: Validity for Second-Order StudentSRL Construct

Construct	Components	Items	Weight	*t*-value	Tolerance	VIF
StudentSRL (second-order formative	Learning Strategies Use (SRL_LS)	4	0.212**	14.010	0.495	2.019
	Goal setting and planning (SRL_GSP)	4	0.248**	13.276	0.484	2.064

construct)	Self-monitoring (SRL_SelfMon)	5	0.313**	13.538	0.391	2.558
	Self-evaluation (SRL_SelfEval)	3	0.180**	13.961	0.445	2.246
	Time and environment management (SRL_TimeEnv)	3	0.169**	10.022	0.597	1.674
	Help seeking (SRL_HelpSeek)	5	0.175**	5.447	0.756	1.322

**$p < 0.01$; *VIF = variation inflation factor*

5.4.4 Evaluation of the Structural Model

The structural model comprises the hypothesised relationship between the latent constructs. The following analyses are performed to assess the student structural model:

i. Amount of variance explained or R squared (R^2) assessment
ii. Path coefficient and statistical significance assessment
iii. Direct, indirect, and total effects assessment

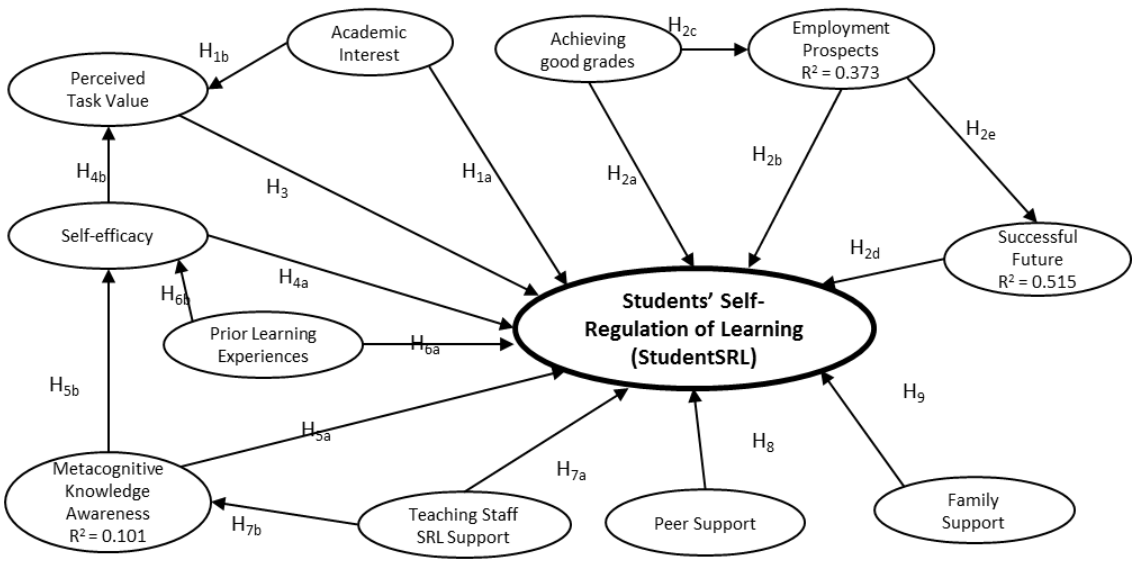

Figure 5.2: Student Structural Model Showing Hypotheses to be Tested

Figure 5.2 illustrates the relationships between the constructs and the hypotheses to be tested in the Student SRL model. The following sections describe the analyses in detail.

5.4.4.1 Explanatory Power of the Model

The structural model was first evaluated based on the predictive power of the model or explanatory power of the independent variables, which could be assessed by the R^2 value of the dependent constructs. The R^2 value suggests the amount of variance in dependent variables that is explained by the independent variables. The larger the R^2, the higher is the predictive ability of the model.

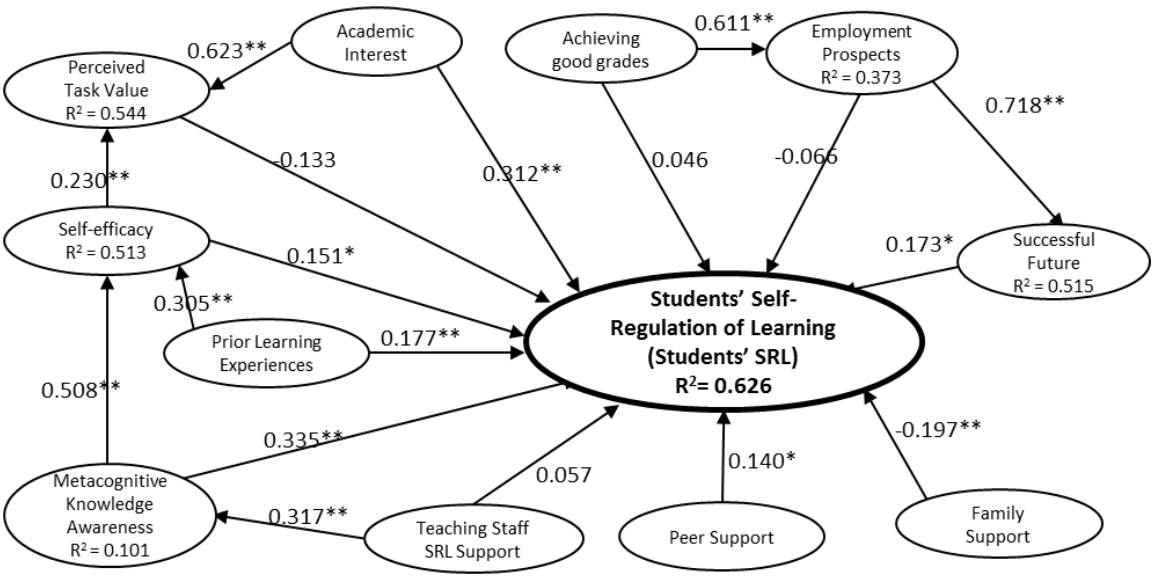

Figure 5.3: The Results of the Structural Model

The R^2 for each dependent construct can be found within each construct in the PLS output diagram. The results show (see Figure 5.3) that the 12 independent constructs explain 62.6% of the variance in student self-regulation of learning, which is the main dependent variable for the model. The R^2 value is considered substantial (Chin 1998, Cohen 1988). The R^2 also meets the recommended 0.10 cut-off for the latent construct to be judged adequate (Falk and Miller 1992).

Good Grades (GRD) explain 40.8% of the variance in the Employment Prospects (EMPY) and in turn, EMPY explain 30.9% of the variance in Successful Future (SFTR). 46.7% of variance in self-efficacy is explained by Prior Learning

Experience (PLE) and Metacognitive Knowledge (MCK). Finally, PLE, Perceived Task Value (TaskValue) and Peer (PEER) together explain 38.3% of variance in MCK. Using Chin's (1998) recommendations as a guideline, an R^2 of 0.67 is considered substantial, 0.33 as moderate, and 0.19 as weak. Based on the study findings, all the R^2 values appear to be between moderate and substantial, suggesting a good predictive capability of the model. The R^2 values in the model are summarised in Table 5.9.

Table 5.9: R^2 Values for Dependent Constructs

Dependent Construct	R Square
Students' Self-Regulation of Learning	0.626
Self-efficacy	0.512
Employment Prospects	0.373
Metacognitive Knowledge	0.101
Successful Future	0.515
TaskValue	0.544

The explanatory power (R^2) of the structural model was presented in this section. The next section discusses the path coefficients assessment to determine the relative strength of the effect of each independent construct on the dependent construct.

5.4.4.2 Path Coefficients Assessment

Following the explanatory power (R^2) assessment, this section examines the path coefficients and statistical significance values (*t-value*) of all paths. These values were extracted from the SmartPLS bootstrapping output file. Figure 5.3 illustrates the path coefficients for every path between the independent constructs and the dependent construct. The second order construct paths are not shown since they are not meant for prediction purposes but merely as a measurement for the second order construct. All path coefficients have positive values, supporting the directions of impact as postulated in the hypotheses except for task value and family. T-values were used to test the statistical significance of the hypotheses.

Table 5.10: Summary of Path Coefficients Assessment

Dependent and Independent Constructs	Path Coefficient	Observed T-statistics	Significance level
Students' Self-Regulation of Learning (R^2 = 0.626)			
ACAD -> StudentSRL	0.3118	4.0703	0.01
EMPY -> StudentSRL	-0.0659	0.8656	Not Significant
FMLY -> StudentSRL	-0.1968	3.0876	0.01
GRD -> StudentSRL	0.0462	0.6799	Not Significant
MCK -> StudentSRL	0.3352	4.5486	0.01
PEER -> StudentSRL	0.1403	2.3089	0.05
PLE -> StudentSRL	0.1769	2.9323	0.01
SFTR -> StudentSRL	0.1734	2.3077	0.05
SelfEfficacy -> StudentSRL	0.1511	2.0139	0.05
TStaff -> StudentSRL	0.0572	1.0552	Not Significant
TaskValue -> StudentSRL	-0.1325	1.7006	Not Significant
Task value (R^2 = 0.544)			
ACAD -> TaskValue	0.6227	12.1201	0.01
SelfEfficacy -> TaskValue	0.2302	4.3690	0.01
Self-efficacy (R^2 = 0.513)			
MCK -> SelfEfficacy	0.5077	7.7616	0.01
PLE -> SelfEfficacy	0.3050	4.4337	0.01
Metacognitive Knowledge (R^2 = 0.101)			
TStaff -> MCK	0.3171	4.1519	0.01
Successful Future (R^2 = 0.515)			
EMPY -> SFTR	0.7177	17.8025	0.01
Employment (R^2 = 0.373)			
GRD -> EMPY	0.6110	9.9861	0.01

ACAD = Academic Interest, GRD = Good Grades, EMPY = Employment Prospects, SFTR = Successful Future, TaskValue = Task Value, SelfEfficacy = Self-Efficacy, MCK = Metacognitive Awareness, PLE = Prior Learning Experience, TStaff = Teaching Staff Influence, FMLY = Family and Friends Influence, PEER = Peer Influence

The path coefficients assessment was presented in this section. The next section provides analysis of the direct, indirect, and total effects in the structural model.

5.4.4.3 Direct, Indirect and Total Effects Assessment

The structural model shows the effect of each independent variable on the dependent variable according to the conceptual research model. Each independent variable was modelled to have a direct effect on the Student SRL construct. In addition to the direct effects, or relationships as reported in Table 5.10, relationships may also be indirect in that the relationship between two variables in a model is mediated by one or more intervening variables.

Path coefficient analysis was used to calculate the indirect effects for each dependent construct (Chin 1998b). The indirect effects can be calculated by multiplying each path coefficient along an indirect route from an independent to the dependent construct. Chin (1998) suggests that only significant path coefficients need to be considered in the calculation. The significance of each indirect effect in the structural model of this study was tested using Sobel's test (Sobel 1982), in which the Z value was calculated as:

$$Z = \frac{ab}{\sqrt{a^2 S_b^2 + b^2 S_a^2}}$$

In this equation, a and b are the path coefficient values from variable *a* to the mediating variable, and from the mediating variable to variable *b*, and S_a and S_b are the standard error values for the path coefficients. These values were obtained from the SmartPLS bootstrap output. The null hypothesis, that the indirect effect is zero, is rejected when the Z value is greater than 1.96.

The total effects of an independent variable on a dependent variable were calculated as the sum of the direct and all the indirect effects that were found to be significant (Igbaria, Guimaraes, and Davis 1995). The direct, indirect and total effects between independent variables and the dependent variables in the structural model were calculated, based on the path coefficient values, and are presented in Table 5.11.

Table 5.11: The Direct, Indirect and Total Effects Assessment

Links	Direct	Indirect Links	Indirect	Total
ACAD -> StudentSRL	0.3118	ACAD - TaskValue - SRL	-0.0825	0.2292
EMPY -> StudentSRL	-0.0659	EMPY - SFTR - SRL	0.1245**	0.0586
GRD -> StudentSRL	0.0462	GRD->EMPY>SRL	-0.0402	0.0060
	0.0462	GRD>EMPY>SFTR>SRL	0.0760	0.1223
MCK -> StudentSRL	0.3352	MCK - Selfefficacy - SRL	0.0767**	0.4119
	0.3352	MCK - Selfefficacy - TaskValue - SRL	-0.0155	0.3197
PLE -> StudentSRL	0.1769	PLE - SelfEfficacy - SRL	0.0461	0.2230
	0.1769	PLE - SelfEfficacy - TaskValue - SRL	-0.0093	0.1676
SelfEfficacy -> StudentSRL	0.1511	SelfEfficacy - TaskValue - SRL	-0.0305	0.1206
TStaff -> StudentSRL	0.0572	Tstaff - MCK->SRL	0.1063**	0.1635
	0.0572	Tstaff - MCK - Selfefficacy - SRL	0.0243	0.0815
	0.0572	Tstaff - MCK - Selfefficacy - TaskValue - SRL	-0.0049	0.0523

**p < 0.05, *p < 0.01

As can be seen from Tables 5.10 and 5.11, *metacognitive awareness* not only has a direct effect on *StudentSRL* but it also have has an indirect effect on *Student SRL* via the *self-efficacy* construct, with a total effect of 0. 412 (Sobel test Z = 1.96).

Table 5.11 also shows that although the *teaching staff* construct does not yield significant direct effect from itself to the *StudentSRL* construct, it indirectly has an effect on *StudentSRL* via the *metacognitive awareness* construct with a total effect of 0.164 (Sobel test Z = 2.37).. Similarly, although *employment prospects* did not show any significant direct effect on the *StudentSRL* construct, *employment prospects* was observed to demonstrate a significantly low total effect of 0.0586 (Sobel test Z = 2.20) of the *StudentSRL* construct through the mediation of the *successful future* construct.

These findings reveal that even though *employment prospects* and *teaching staff* do not have significant effects on student SRL directly, they do have significant effects indirectly, which suggests that these two constructs are still important, in student opinion, in contributing to their ability to self-regulate their learning. It could be that these constructs are considered the means to achieve a goal, and not the goal itself. Further elaboration of the constructs of *employment prospects* and *teaching staff* is provided in Chapter 6.

Sections 5.4.1 through 5.4.4 presented the data analysis, which include analysis of missing values, descriptive analysis of constructs, evaluation of the measurement and structural models, and the direct, indirect, and total effects of the student data. The next section (5.4.5) presents the results of the hypotheses investigated in the student model as illustrated in Figure 5.3.

5.4.5 Hypotheses Testing for Student Model

Mastery goal orientation was hypothesised to have significant positive correlations with *task value (student perceptions of their learning tasks)* and *StudentSRL*. As depicted in Tables 5.10 (see also Figure 5.4), *mastery goal orientation* was found to have significant effects on *task value* (γ=0.623, τ= 12.120) and *StudentSRL* (γ=0.312, τ= 4.070). Hypotheses H1b and H1a were thus supported.

Good grades achievement was postulated to have a significant effect on *StudentSRL (H2a)* and *employment prospects (H2b)*. *Good grades achievement* did not have a significant direct effect on *StudentSRL* (γ=0.046, τ= 0.680) but it had a significant effect on *employment prospects* (γ=0.611, τ= 9.986). Hypothesis H2b was thus accepted, but Hypothesis H2a was rejected.

The result of the estimation model rejected the anticipated association between *employment prospects* and *StudentSRL* (γ= -0.066, τ= 0.866), while as postulated in Hypothesis H_{2d}, the study results supported the association between *student perceptions of employment prospects* and *their perception of successful future* (γ= 0.718, τ= 17.803). Hypothesis H2c was rejected while Hypothesis H2d was accepted. As postulated in Hypothesis H2e, the study results showed that student aspirations for their *successful future* significantly affected student self-regulation of learning (γ= 0.173, τ= 2.308). The relationship between *employment prospects* and *StudentSRL* postulated in Hypothesis H2e was accepted.

Hypothesis H3 anticipated a significant direct association with *task value* on *StudentSRL*, however, the model estimation result did not indicate significant association between *task value* and *StudentSRL* (γ= -0.133, τ= 1.701). Hypothesis H3 was rejected.

The hypothesised relationship between *self-efficacy* and *task value* and *StudentSRL* were postulated in Hypotheses H4b and H4a. *Self-efficacy* was found to have significant effect on *task value* (γ= 0.230, τ= 4.369) and *StudentSRL* (γ= 0.151, τ= 2.014). Hypotheses H4a and H4b were accepted.

The effects of *metacognitive awareness* on *StudentSRL* and *self-efficacy* were postulated in H5a and H5b respectively. The SEM results presented a significant association between *metacognitive awareness* and *StudentSRL* (γ= 0.335, τ= 4.549) as well as between *metacognitive awareness* and *self-efficacy* (γ= 0.508, τ= 7.762). Hypotheses H_{5a} and H_{5b} were accepted.

Prior learning experience was hypothesised to have significant correlations with *StudentSRL* and *self-efficacy*. The results depicted the significant effect of *prior learning experience* on *StudentSRL* (γ= 0.177, τ= 2.932) and *self-efficacy* (γ= 0.305, τ= 4.434). Thus Hypotheses H6a and H6b were supported.

Hypotheses H7a and H7b respectively postulated the effects of *teaching staff* on *StudentSRL* and on *metacognitive awareness*. The results indicated no significant effects of *teaching staff* on *StudentSRL* (γ= 0.057, τ= 1.055) but indicated strong significant effects on *metacognitive awareness* (γ= 0.317, τ= 4.152). Thus Hypothesis H7b was accepted while Hypothesis H7a was rejected.

As postulated in Hypothesis H8, the study results showed that *peers* had a significant effects on *StudentSRL (*γ= 0.140, τ= 2.309). The relationship between *peers* and *StudentSRL as* postulated in Hypothesis H8 was thus accepted.

Hypothesis H9 anticipated significant effects of *family* on *StudentSRL*. The study results also indicated a strong and significant association between *family* and *StudentSRL* γ= -0.197, τ= 3.088). Hypothesis H9 was accepted. The results of the hypotheses tests are summarised in Table 5.12 and also illustrated in Figure 5.3.

Table 5.12: Results of Hypotheses Tests

Hypotheses	Loading γ	t-value τ	Results
H1a: Students' mastery goal orientation has a significant direct influence on their self-regulation of learning.	0.312	4.070**	Supported
H1b: Students' mastery goal orientation influences how they perceive their learning tasks (task value).	0.623	12.120**	Supported
H2a: Students' desire to perform better than others (grades) has a significant direct influence on their self-regulation of learning.	0.046	0.680	Not Supported
H2b: Achievement of good academic level (grades) has a significant influence on students' future employment prospects.	0.611	9.986**	Supported
H2c: Students' concern about employment prospects upon graduation has a significant direct influence on their self-regulation of learning.	-0.066	0.866	Not Supported
H2d: Employment prospects have a significant influence on students' successful future (personal status, power, and value in society).	0.718	17.803**	Supported
H2e: Students' desire for successful future has a significant direct influence on their self-regulation of learning.	0.173	2.308*	Supported
H3: Students' perception of the importance and usefulness of a given task has a direct and significant influence on their self-regulation of learning.	-0.133	1.701	Not Supported
H4a: Self-efficacy has a direct and significant influence on students' self-regulation of learning.	0.151	2.014*	Supported
H4b: Self-efficacy has a direct and significant influence on students' task value perception.	0.230	4.369**	Supported
H5a: Metacognitive awareness has a direct and significant influence on students' self-regulation of learning.	0.335	4.549**	Supported

H5b: Metacognitive awareness has a direct and significant influence on students' self-efficacy.	0.508	7.762**	Supported
H6a: Prior learning experience has a direct and significant influence on students' self-regulation of learning.	0.177	2.932**	Supported
H6b: Prior learning experience has a significant influence on students' self-efficacy.	0.305	4.434**	Supported
H7a: Teaching staff has a direct and significant influence on students' self-regulation of learning.	0.057	1.055	Not Supported
H7b: Teaching staff has a direct and significant influence on students' metacognitive awareness.	0.317	4.152**	Supported
H8: Peer influence has a direct and significant influence on students' self-regulation of learning at university.	0.140	2.309*	Supported
H9: Family influence has a direct and significant influence on students' self-regulation of learning at university.	-0.197	3.088**	Supported

*** $p < 0.01$, *$p < 0.05$*

5.5 RESULTS OF LECTURER MODEL DATA ANALYSIS

5.5.1 Demographic Profile of Lecturer Participants

This section provides the demographic profile of the participants in this study. Table 5.13 shows the respondent profiles. The respondents are classified according to their gender, number of teaching years, teaching disciplines, teaching level, position, academic role, and employment status.

Table 5.13: Profile of Lecturer Respondents (N = 139)

Characteristics	Item	Frequency	Percentage (%)
Gender	Male	88	63.3
	Female	46	33.1
	Missing responses	5	3.6
Number of teaching years	0 - 5 years	19	13.7
	6 – 10 years	24	17.3
	11 - 20 years	35	25.2
	21 – 30 years	35	25.2
	More than 30 years	22	15.8
	Missing responses	4	2.9
Main teaching discipline	Engineering	48	34.5
	Computing (Information Technology, Computer science)	30	21.6
	Science and Mathematics	48	34.5
	Other (Not Indicated)	8	5.8
	Missing responses	5	3.6
Teaching level can be teaching > 1 level	Undergraduate - Face-to-face	126	90.6
	Undergraduate - Online	28	20.1
	Postgraduate - Face-to-face	80	57.6
	Postgraduate - Online	12	8.6
	Other - Please specify:	4	2.9
	Missing responses	3	2.2
Position/Title	Professor or equivalent	18	12.9
	Associate Professor or equivalent	29	20.9
	Senior Lecturer or equivalent	38	27.3
	Lecturer or equivalent	42	30.2
	Associate Lecturer or equivalent	3	2.2
	Other (Casual academic/ Tutor)	4	2.9
	Missing responses	5	3.6
Employment Status	Full time	118	84.9
	Fractional Full-time	9	6.5
	Sessional/Casual	8	5.8
	Missing responses	4	2.9

Role can have > 1 role	Teaching role	112	80.6
	Research role	99	71.2
	Leadership role	38	27.3
	Administrative role	26	18.7
	Other	11	7.9
	Missing responses	3	2.2

5.5.2 Missing value analysis

A total of 157 lecturer responses were received. 18 responses had more than 10% missing values, and were thus removed. The usable responses were reduced to 139. The SmartPLS programme requires that all missing values are replaced with a coded value prior to processing. As the number of usable responses was only 139, it was decided to retain all cases for analysis. As per the student data analysis in Section 5.3, all missing items were substituted by estimates using the expectation maximisation (EM) approach in the SPSS v.21 statistical software. Based on the EM approach, the missing values were replaced by the estimates calculated by the EM algorithm.

5.5.3 Evaluation of the Measurement Model

This section presents the assessment of the reliability and validity of the measurement items used to measure the constructs in the lecturer measurement model. The assessment of measurement and structural models follows the same set of assessments as for the student model as presented in Sections 5.4.3 to 5.4.5.

5.5.3.1 Individual Item Reliability

The individual item reliability measures the loadings of items on their respective latent construct. Table 5.14 reports the loadings of the indicators for all constructs along with their respective *t*-values and the significance level of the loadings.

Table 5.14: Loadings of Items in the Measurement Model

Construct	Items	PLS Loading	T Statistics	Significance Level
Lecturers' facilitation of SRL (DV)	DV_1 <- LecFacilitationSRL	0.8156	20.4594	0.01
	DV_2 <- LecFacilitationSRL	0.7902	12.8460	0.01
	DV_3 <- LecFacilitationSRL	0.8444	25.9067	0.01
	DV_4 <- LecFacilitationSRL	0.7382	11.7104	0.01

Lecturers' Beliefs	LecBelief4 <- LecturersBelief	0.8651	21.1756	0.01
	LecBelief5 <- LecturersBelief	0.7511	11.7820	0.01
	LecBelief6 <- LecturersBelief	0.8191	18.3197	0.01
	SRLBeliefs1 <- LecturersBelief	0.8785	45.7482	0.01
Lecturers' SRL Knowledge	LecKnw1R <- LecSRLKnow	0.6333	9.2182	0.01
	LecKnw2R <- LecSRLKnow	0.7526	15.0461	0.01
	LecKnw4R <- LecSRLKnow	0.7809	19.1548	0.01
	Resrcs1R <- LecSRLKnow	0.8136	15.4520	0.01
Peer Influence	Peer1 <- PeerInf	0.8693	16.8131	0.01
	Peer2 <- PeerInf	0.8637	15.1047	0.01
	Policies6 <- PeerInf	0.7295	6.7628	0.01
UniversityPolicies	Policies1R <- Policies	0.8072	17.4446	0.01
	Policies3R <- Policies	0.8811	43.7783	0.01
	Policies5R <- Policies	0.7383	11.6634	0.01
Curriculum	Resrcs4R <- Curriculum	0.7032	9.5216	0.01
	Resrcs5R <- Curriculum	0.8112	17.6846	0.01
	Policies2R <- Curriculum	0.8496	20.3422	0.01
StudentDiversity	StudDiv2 <- StudDiversity	0.8793	9.4453	0.01
	StudDiv3 <- StudDiversity	0.8871	11.4942	0.01
	StudDiv5 <- StudDiversity	0.8742	11.1335	0.01
RewardRecognition	rwd2 <- Reward	0.9184	32.8883	0.01
	rwd4 <- Reward	0.9236	30.1444	0.01
Time	time1R <- Time	0.9755	4.2767	0.01
	time3R <- Time	0.6748	2.7376	0.01
	Resrcs3R <- Time	0.6888	2.6007	0.01

According to the statistical results in Table 5.14, overall, the condition of the loading scores was met in this study. As recommended by the literature (see section 5.4.3.1) all indicators are loaded higher than 0.6 for their respective constructs (Hair et al., 2011; Nunnally & Bernstein, 1994). Further SRLBeliefs1, Resrc1R, Policies6 and Resrc3R have been reassigned to ensure that these indicators are loaded highly on its respective latent construct. Although some of the constructs had a small number of manifest items, each of the constructs contained at least two indicators even after discarding the items with low loadings; the final model thus conformed to the criterion suggested by Kline (2010) and Rahim, Antonioni, and Psenicka (2001), wherein there should be a minimum of two items in a construct. All indicators also loaded with significant *t-values* of above 2.58 (significance at $p < 0.01$), on their respective latent variable, which suggests that convergent validity was achieved.

5.5.3.2 Internal Consistency Reliability

Internal consistency is measured by calculating composite reliability (CR) (Fornell and Larcker 1981). Constructs with a coefficient value of 0.70 or more in the estimates of composite reliability were accepted as reliable for further analysis (as suggested by Hair et al. 2011). As shown in Table 5.15, all constructs met this criterion. The composite reliability values for all constructs were well above the cut-off value of 0.7, thus demonstrating high levels of internal consistency reliability among all latent variables. For comparison purposes, a Cronbach's Alpha is also provided. The values are above the minimum requirement of 0.6 for all constructs which suggests a good internal consistency (Fornell and Larcker 1981; Nunnally 1978). The reliability of all latent constructs was thus verified.

Table 5.15: Internal Consistency Reliability and Convergent Validity of the Constructs

	Composite Reliability	AVE	Cronbach's Alpha
Curriculum	0.8324	0.6248	0.6970
LecFacilitationSRL	0.8750	0.6369	0.8088
LecSRLKnow	0.8346	0.5598	0.7339
LecturersBelief	0.8982	0.6888	0.8489
PeerInf	0.8626	0.6780	0.7628
Policies	0.8515	0.6576	0.7401
Reward	0.9179	0.8482	0.8211
StudDiversity	0.9117	0.7748	0.8579
Time	0.8303	0.6271	0.7394

5.5.3.3 Convergent Validity

Convergent validity is the extent to which the measurement items (indicators) are positively correlated with other measurement items of the same construct (De Vaus 2002). See Section 5.4.3.3 for an in-depth explanation. As shown in Table 5.15, all constructs have AVE values greater than the minimum threshold of 0.50, thus the convergent validity of the constructs is confirmed.

5.5.3.4 Discriminant Validity

As described in Section 5.4.3.4, discriminant validity measures the extent to which a particular construct does not correlate with other constructs (De Vaus 2002). The

Fornell–Larcker criterion and cross loadings are examined for discriminant validity (Hair et al. 2011). See Section 5.4.3.4 for an in-depth explanation of the Fornell–Larcker criterion for assessment (Fornell and Larcker 1981).

The AVE is obtained from the SmartPLS default report. The square root for each AVE was then manually calculated and written in bold on the diagonal of the table. The correlation between the latent constructs was then copied from the Latent Variable Correlation section of the SmartPLS default report and are placed in the lower left triangle of the table (see Table 5.16). Table 5.16 compares the square root of AVE of all constructs with the correlations between all constructs. It can be seen that the square roots of AVE of all constructs were greater than the off-diagonal elements across the row and down the column. This finding suggests that the results are satisfactory and confirms the establishment of discriminant validity at the construct level. Thus the requirement of the first assessment of discriminant validity was met.

The second assessment in discriminant validity is the analysis of the cross-loadings. An examination of the cross-loadings between constructs and indicators in Table 5.17 shows that all manifest variables loaded higher for their respective intended latent construct compared to other latent constructs. It can be seen in the table that the loading in each block was higher than any other block in the same rows and columns. The loading clearly separates each latent construct as theorised on the conceptual level. The output of the cross-loadings thus confirmed that the requirements of the second assessment of discriminant validity were satisfied. By demonstrating evidence for both convergent and discriminant validity, it was thus confirmed that there was sufficient evidence for construct validity in this study.

As the validity and reliability of the measurement model were tested satisfactorily, the quality of the structural model analysis is deemed to be sound. The next section presents an evaluation of the structural model for the lecturer model in this study.

Table 5.16: Correlation Matrix of Constructs

Constructs	AVE	SQRT(AVE)	Curriculum	LecFacilitation SRL	LecSRLKnow	Lecturers Belief	PeerInf	Policies	Reward	StudDiversity	Time
Curriculum	0.6248	**0.7904**	**0.7904**								
LecFacilitationSRL	0.6369	**0.7980**	0.1033	**0.7980**							
LecSRLKnow	0.5598	**0.7482**	0.4890	0.1481	**0.7482**						
LecturersBelief	0.6888	**0.8299**	-0.1296	0.4819	0.0686	**0.8299**					
PeerInf	0.6780	**0.8234**	0.2741	0.2824	0.1991	0.2449	**0.8234**				
Policies	0.6576	**0.8109**	0.6979	0.0921	0.6773	-0.0133	0.3378	**0.8109**			
Reward	0.8482	**0.9210**	0.1670	0.3835	0.3725	0.3006	0.4156	0.3479	**0.9210**		
StudDiversity	0.7748	**0.8802**	-0.2960	0.2840	-0.3106	0.3674	0.1364	-0.3130	-0.0175	**0.8802**	
Time	0.6271	**0.7919**	0.2716	0.1731	0.3184	0.0299	0.1600	0.4740	0.2007	-0.3116	**0.7919**

Table 5.17: Cross-Loadings Matrix

	LecFacilitationSRL	LecturersBelief	LecSRLKnow	PeerInf	Policies	Curriculum	StudDiversity	Reward	Time
DV_1	0.8156	0.3648	0.0645	0.2688	0.0487	0.0762	0.2207	0.2983	0.1386
DV_2	0.7902	0.3571	0.1852	0.1947	0.1265	0.1444	0.2438	0.2600	0.1244
DV_3	0.8444	0.4068	0.0883	0.1276	0.0573	0.0182	0.2346	0.3176	0.1625
DV_4	0.7382	0.4035	0.1340	0.3039	0.0627	0.0920	0.2068	0.3415	0.1258
LecBelief4	0.3385	0.8651	0.0491	0.1472	-0.0713	-0.1462	0.2727	0.1832	-0.0393
LecBelief5	0.3564	0.7511	0.0575	0.1031	-0.0206	-0.1762	0.3054	0.3309	0.0071
LecBelief6	0.4118	0.8191	0.0547	0.2209	-0.0448	-0.1281	0.2972	0.2184	-0.0132
SRLBeliefs1	0.4692	0.8785	0.0644	0.3055	0.0695	-0.0100	0.3362	0.2642	0.1182
LecKnw1R	0.3179	0.2641	0.6333	0.1784	0.4094	0.3289	0.0089	0.2408	0.2499
LecKnw2R	0.0755	-0.0415	0.7526	0.0417	0.5119	0.4404	-0.3841	0.3187	0.2443
LecKnw4R	0.0044	0.0071	0.7809	0.2400	0.5865	0.3504	-0.2291	0.2777	0.1696
Resrcs1R	0.0761	-0.0004	0.8136	0.1281	0.5016	0.3421	-0.3046	0.2744	0.2992
Peer1	0.2733	0.2758	0.1671	0.8693	0.2472	0.1835	0.1557	0.3555	0.1788
Peer2	0.2259	0.2100	0.1159	0.8637	0.2347	0.2135	0.1324	0.3186	0.1467
Policies6	0.1870	0.0887	0.2218	0.7295	0.3832	0.3080	0.0276	0.3603	0.0483
Policies1R	0.1015	0.0249	0.6662	0.2478	0.8072	0.5248	-0.2013	0.1889	0.3128
Policies3R	0.0795	0.0177	0.5634	0.3571	0.8811	0.6673	-0.2464	0.3310	0.3645
Policies5R	0.0333	-0.0995	0.3845	0.1994	0.7383	0.4941	-0.3420	0.3472	0.5195
Resrcs4R	0.1865	-0.0817	0.2637	0.2486	0.4710	0.7032	-0.1638	0.1982	0.2308
Resrcs5R	0.0793	-0.0946	0.3808	0.1683	0.5461	0.8112	-0.1878	0.0712	0.2156
Policies2R	0.0012	-0.1269	0.4935	0.2365	0.6265	0.8496	-0.3332	0.1348	0.2032

	LecFacilitationSRL	LecturersBelief	LecSRLKnow	PeerInf	Policies	Curriculum	StudDiversity	Reward	Time
StudDiv2	0.1878	0.3512	-0.2846	0.1617	-0.3393	-0.2975	0.8793	0.0013	-0.3668
StudDiv3	0.2449	0.3282	-0.2612	0.0911	-0.2687	-0.2406	0.8871	0.0050	-0.2897
StudDiv5	0.2937	0.3013	-0.2761	0.1174	-0.2400	-0.2532	0.8742	-0.0430	-0.2020
rwd2	0.3475	0.2250	0.3401	0.3962	0.3455	0.1407	-0.0692	0.9184	0.2285
rwd4	0.3587	0.3272	0.3460	0.3697	0.2961	0.1665	0.0353	0.9236	0.1426
time1R	0.2024	0.0567	0.3097	0.2006	0.4936	0.2814	-0.2403	0.2555	0.9755
time3R	0.0477	-0.0223	0.1431	0.0240	0.1613	0.0293	-0.1677	-0.0186	0.6748
Resrcs3R	0.0527	-0.0467	0.2875	0.0151	0.3504	0.2633	-0.4977	0.0485	0.6888

5.5.4 Evaluation of the Structural Model

Figure 5.4 illustrates the structural model that comprises the hypothesised relationship between the latent constructs in the lecturer model. The following analyses are performed to assess the lecturer's structural model:

i. Amount of variance explained or R squared (R^2) assessment
ii. Path coefficient and statistical significance assessment
iii. Direct, indirect, and total effects assessment

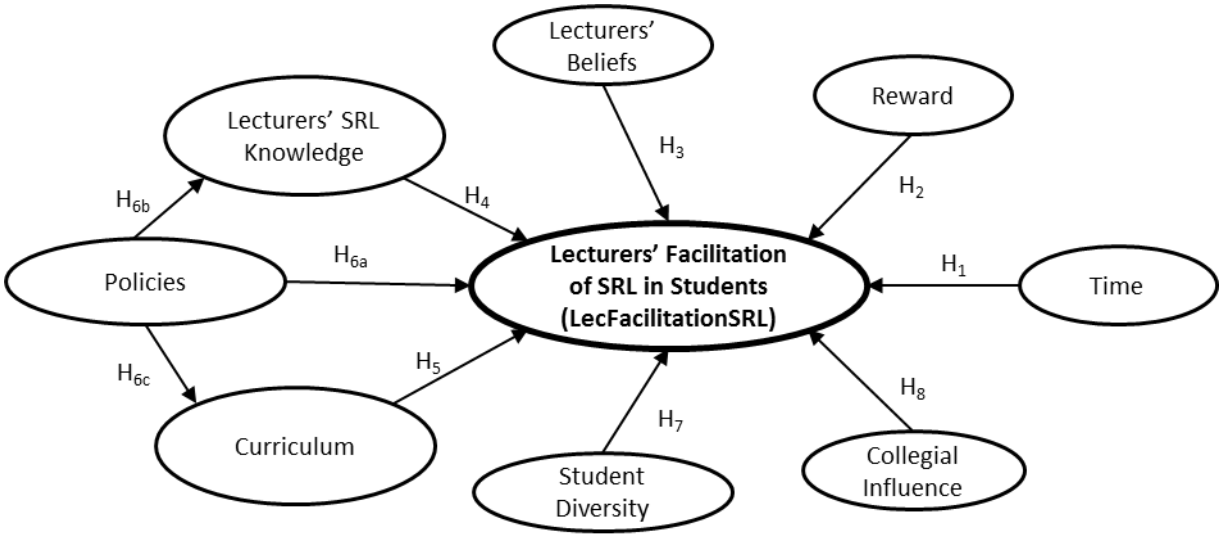

Figure 5.4: Lecturer's Structural Model Showing Hypotheses to be Tested

Figure 5.4 illustrates the relationships between the constructs and the hypotheses to be tested in the Lecturer SRL model. The following sections describe the analyses in detail.

5.5.4.1 Explanatory Power of the Model

The structural model was first evaluated based on the predictive power of the model or explanatory power of the independent constructs, which could be assessed by the R^2 value of the dependent constructs. The R^2 value suggests the amount of variance in dependent variables that is explained by the independent constructs. The greater is R^2, the higher is the predictive ability of the model.

The R^2 for each dependent construct can be found within each construct in the PLS output diagram. The results show that the eight independent constructs explain 38.4% of the variance in the lecturer facilitation of self-regulation of learning, which

is the main dependent construct of the model. The R^2 also meets the recommended 0.10 cut-off for the latent construct to be judged adequate (Falk & Miller, 1992).

Policies explain 48.7% and 45.9% of the variance in the *Curriculum* and *LecSRLKnow* respectively. The R^2 values in the model are summarised in Table 5.18.

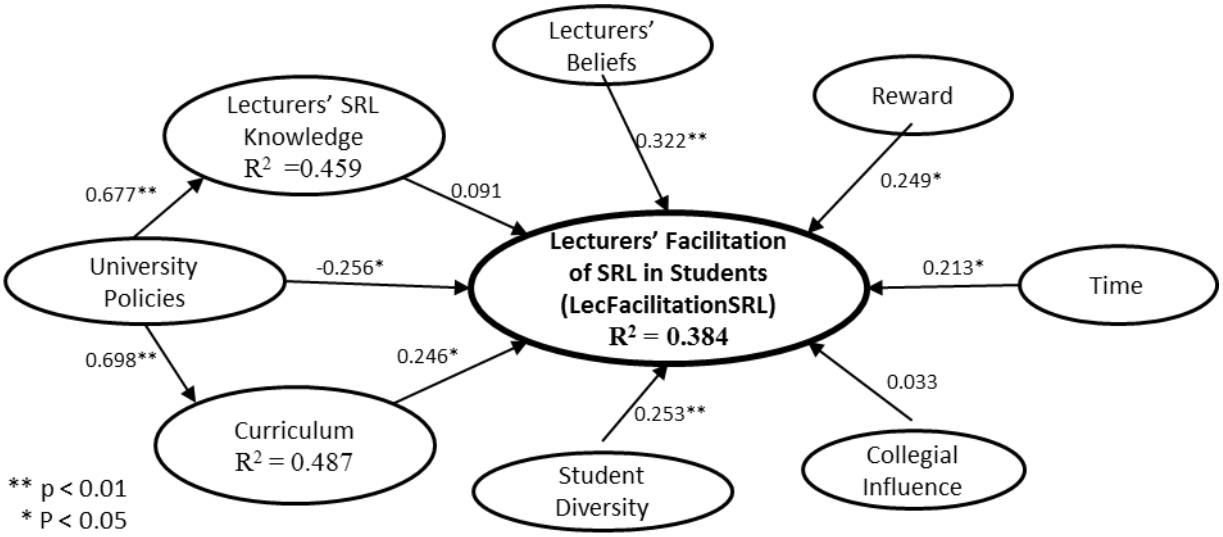

Figure 5.5: The Results of the Lecturer Structural Model

Table 5.18: R^2 Values for Dependent Constructs

Dependent Construct	R^2
Lecturers' facilitation of SRL	0.384
Curriculum	0.487
Lecturers' SRL knowledge	0.459

The explanatory power (R^2) of the structural model was presented in this section. The next section discusses the path coefficients assessment used to determine the relative strength of the effect of each independent construct on the dependent construct.

5.5.4.2 Path Coefficients Assessment

Following the explanatory power (R^2) assessment, this section examines the path coefficients and statistical significance values (*t-value*) of all the paths. These values were extracted from the SmartPLS bootstrapping output file. Figure 5.5 illustrates the path coefficients for every path between the independent constructs and the

dependent construct. The second order construct paths are not shown since they are not meant for prediction purposes but merely as a measurement for the second order construct. All path coefficients show positive values supporting the impact directions as postulated in the hypotheses, except for the *policies* construct. T-values were used to test the statistical significance of the hypotheses.

Table 5.19: Summary of Path Coefficients Assessment

Dependent and Independent Constructs	Path Coefficient	T- statistics	Significance level
LecFacilitationSRL (R^2 = 0.3837)			
Curriculum -> LecFacilitationSRL	0.2460	2.3497	0.05
LecSRLKnow -> LecFacilitationSRL	0.0906	0.7644	Not Significant
LecturersBelief -> LecFacilitationSRL	0.3221	3.5610	0.01
PeerInf -> LecFacilitationSRL	0.0325	0.3325	Not Significant
Policies -> LecFacilitationSRL	-0.2561	1.9957	0.05
Reward -> LecFacilitationSRL	0.2491	2.4565	0.05
StudDiversity -> LecFacilitationSRL	0.2526	3.0531	0.01
Time -> LecFacilitationSRL	0.2127	2.1437	0.05
Curriculum (R^2 = 0.4871)			
Policies -> Curriculum	0.6979	14.3705	0.01
LecSRLKnow (R^2= 0.4587)			
Policies -> LecSRLKnow	0.6773	13.7873	0.01

The path coefficients assessment was presented in this section. The next section provides an analysis of the direct, indirect, and total effects in the structural model.

5.5.4.3 Direct, Indirect and Total Effects Assessment

As explained in Section 5.4.4.3 the direct, indirect and total effects between independent constructs and the dependent constructs in the structural model were calculated, based on the path coefficient values, and are presented in Table 5.20.

Table 5.20: The Direct, Indirect and Total Effects Assessment

Links	Direct	Indirect Links	Indirect	Total
Curriculum -> LecFacilitationSRL	0.2460			
LecSRLKnow -> LecFacilitationSRL	0.0906			
Policies -> Curriculum	0.6979			
Policies -> LecFacilitationSRL	-0.2561			
Policies -> LecSRLKnow	0.6773			
Policies -> LecFacilitationSRL	-0.2561	Policies -> Curriculum -> LecFacilitationSRL	0.1717*	-0.0844
Policies -> LecFacilitationSRL	-0.2561	Policies -> LecSRLKnow -> LecFacilitationSRL	0.0614	-0.1947

**p < 0.1, *p < 0.05

As can be seen from Table 5.20, the *policies* construct has a very low (0.08) indirect effect on the *LecFacilitationSRL* construct through mediation of the *curriculum* construct. This total low effect is mainly due to the negative impact of the *policies* construct on the *LecFacilitationSRL* construct, and this negative impact is explained in Chapter 6.

5.5.5 Hypotheses Testing for Lecturer Model

As shown in Table 5.19, the results demonstrated the significant effect of *time* on *lecturer facilitation of SRL* ($\gamma = 0.213$, $\tau = 2.144$). Hypothesis H1 is thus supported.

Hypothesis H2 was developed to examine the effect of *reward and recognition* on *lecturer facilitation of SRL*. The results of the structural model demonstrated the significant effect of *reward and recognition* on *lecturer facilitation of SRL* ($\gamma = 0.249$, $\tau = 2.457$), Hypothesis H2 was accepted.

Hypothesis H3 postulates the effect of lecturer's beliefs on lecturer facilitation of SRL. The model estimates showed a strong and significant effect of lecturer's beliefs on lecturer facilitation of SRL ($\gamma = 0.322$, $\tau = 0.561$). Hypothesis H3 was accepted.

The effects of lecturer's SRL knowledge on the lecturer facilitation of SRL is postulated in Hypothesis H4. The effects of lecturer's SRL knowledge on lecturer facilitation of SRL ($\gamma = 0.091$, $\tau = 0.764$) was not found to be significant. Hypothesis H4 was not supported.

As proposed in Hypothesis H5, the results showed that *curriculum* had a significant effect on lecturer facilitation of SRL ($\gamma = 0.246$, $\tau = 2.350$). The relationship between curriculum and lecturer facilitation of SRL as proposed in Hypothesis H5 was thus accepted.

Hypotheses H6a, H6b and H6c respectively postulated the effects of *policies* on lecturer facilitation of SRL, lecturer SRL knowledge and curriculum. The model estimates showed a significant association between policies and lecturer facilitation of SRL ($\gamma = -0.256$, $\tau = 01.996$), policies and lecturer SRL knowledge ($\gamma = 0.677$, $\tau = 0.13.787$), and policies and curriculum ($\gamma = 0.698$, $\tau = 14.371$). Hypotheses H6a, H6b and H6c were accepted.

Hypothesis H7 anticipated a significant effect of student diversity on lecturer facilitation of SRL. The structural model estimation indicated a strong association between *student diversity* on lecturer facilitation of SRL ($\gamma = 0.253$, $\tau = 3.053$). Hypothesis H7 was accepted.

Hypothesis H8 postulated the effects of *collegial influence* on lecturer facilitation of SRL. The results indicated that a *collegial influence* was not significantly associated with lecturer facilitation of SRL ($\gamma = 0.033$, $\tau = 0.333$). Thus Hypothesis H8 was not supported. The results of the hypotheses tests are summarised in Table 5.23 and also illustrated in Figure 5.5.

Table 5.23: Results of Hypotheses Tests

Hypotheses	Loading γ	t-value τ	Results
H1: Workload (time constraint) has a significant influence on teaching staff's facilitation of student self-regulated learning.	0.213	2.144*	Supported
H2: Reward and recognition has a significant influence on teaching staff's facilitation of student self-regulated learning.	0.249	2.457*	Supported
H3: Teaching staff beliefs have significant influence on teaching staff's facilitation of student self-regulated learning.	0.322	3.561**	Supported
H4: Teaching staff's knowledge of fostering self-regulated learning has significant influence on teaching staff's facilitation of student self-regulated learning.	0.091	0.764	Not Supported
H5: Curriculum design and demands have significant influence on teaching staff's facilitation of student self-regulated learning.	0.246	2.350*	Supported
H6a: University policies have significant influence on teaching staff's facilitation of student self-regulated learning.	-0.256	1.996*	Supported
H6b: University policies have significant influence on teaching staff's knowledge on fostering self-regulated learning.	0.677	13.787**	Supported
H6c: University policies have significant influence on curriculum design.	0.698	14.371**	Supported
H7: Student diversity has significant influence on teaching staff's facilitation of student self-regulated learning.	0.253	3.053**	Supported
H8: Teaching staff's perception of collegial commitment to student learning has a significant influence on their facilitation of student self-regulated learning.	0.033	0.333	Not Supported

*** $p < 0.01$, *$p < 0.05$*

5.6 SUMMARY

This chapter presented the results of the quantitative analysis of a survey conducted in Australian universities to study the (1) factors that affect the self-regulation of learning by engineering, computing and science students, and (2) factors that affect engineering, computing and science lecturers in the facilitation of self-regulated learning in their students. The study employed PLS-based structural equation modelling (SEM) with a data set of 175 students and 139 lecturers from 30 Australian universities. The exploratory nature of the study and the nature of the latent variables under study (reflective and formative) justified the use of the PLS technique as the main analytical tool. The analysis of both student and lecturer data commenced with a presentation of demographic profiles and missing value analysis, followed by an assessment of measurement models and structural model estimations.

The measurement model was assessed by estimating the convergent validity and discriminant validity of the constructs. The convergent validity of the reflective indicators was examined through item loadings, and the weights of the items and absence of multicollinearity were the criteria used for the formative indicators. Composite reliability and AVE were also computed to test convergent validity. The study used 0.6, 0.7 and 0.5 as threshold levels (cut-off values) for the item loadings, composite reliability and AVE respectively. The study examined the square root of AVE and inter-construct correlations for construct level discriminant validity, and the item cross-loading matrix for item level discriminant validity of the study constructs.

The size and significance of the paths between each pair of constructs in the model were examined through path coefficients (γ) and critical ratio (t-statistic), and the explanatory power of the set of independent variables for each dependent variable was examined by R^2 in the structural model. In addition to the direct effects, the paths in the structural model were also evaluated for indirect effects between independent and dependent variables. The *student structural model* explained 62.6% of variance in *student's self-regulation of learning* (StudentSRL - dependent construct) and *lecturer structural model* explained 38.4% of variance in *lecturer's facilitation of SRL* (LecFacilitationSRL - dependent construct). The results of the

statistical analysis and the research models are discussed in the next chapter, Chapter 6 (Discussion).

CHAPTER 6

DISCUSSION AND INTERPRETATION

We now accept the fact that learning is a lifelong process of keeping abreast of change. And the most pressing task is to teach people how to learn.

Peter Drucker (1909- 2005)

6.1 INTRODUCTION

This chapter presents a discussion of the results and interpretation of the quantitative data analysis for the student data and lecturer data. The premise of the data analysis was developed by anticipating the structural relationships between dependent (endogenous) and independent (exogenous) constructs for both student model and lecturer model. The estimated results, by applying PLS-based structural equation modelling (SEM), showed the degree and magnitude of the relationships between the constructs under study in both models. The discussion of the results and their interpretations was performed based on the anticipated hypotheses and statistical estimations. The hypotheses of the research and study results were given in Chapters 3 and 5 respectively. This chapter discusses the results in light of the respective hypotheses.

6.2 HYPOTHESES RELATED TO STUDENT SELF-REGULATION OF LEARNING MODEL

The statistical results of this study as presented in Chapter 5 have confirmed that student goal orientation, self-efficacy, metacognitive knowledge awareness, prior learning experience, peer influence and family expectations affect the self-regulation learning perceptions of the surveyed students at varying levels. The explicative power of these factors regarding the extent of student self-regulation in university learning was found to be strong (R^2 = 0.62). This suggests that university policy makers, academic managers, curriculum developers, and teaching academics should

focus on the factors identified in order to enhance student SRL in their learning. The sub-sections below discuss the effect of each of the factors in the study.

6.2.1 Hypotheses H1a and H1b: Mastery Goal Orientation

The structural model estimation revealed a significant positive association between *student mastery goal orientation* and their self-regulation of learning (path coefficient = 0.312, $p < 0.01$). This finding is consistent with the literature which suggested that a student's curiosity and interest in acquiring knowledge naturally leads to better self-regulation of learning (Ames, 1992; Ames & Archer, 1988; Diseth, 2011; Paul R. Pintrich, 1999, 2000b; Wigfield & Cambria, 2010b; C. A. Wolters & Rosenthal, 2000; Akane Zusho & Edwards, 2011). This finding can be related to ICT and engineering students as ICT and engineering courses are deemed to be demanding and challenging, and without some interest in the chosen field, a student may struggle to cope with the rigorous curriculum they study in the course.

This outcome may play a significant role in designing mastery oriented SRL interventions at universities and in fostering lifelong learning skills. This may be particularly true for first-year students, who need help to fully embrace the challenges of university learning (in contrast to their high school learning style) and to empower them to accurately assess task characteristics and demands; have the required knowledge of the task, domain, and/or strategies; and the skills to complete the task (Akane Zusho & Edwards, 2011). This result suggests that if students adopt self-improvement and learning as their goal, then they will be much more likely to continue to engage in various cognitive and metacognitive activities in order to improve their learning and comprehension. Naturally, adoption of mastery goal orientation drive students to spontaneously engage in self-regulated learning than students adopting performance goal orientation.

The results of the study also indicate that mastery goal orientation has a strong positive (path coefficient = 0.623, $p < 0.01$) influence on a student's perception of their task value (Hypothesis H_{1b}). This finding is consistent with prior studies on goal orientation, which reported that students adopting a mastery goal orientation reported high task value (Paul R. Pintrich, 2000a; Vansteenkiste, Lens, & Deci, 2006;

Wigfield & Cambria, 2010b; Akane Zusho & Edwards, 2011). Goal orientation refers to the reason why a student participates in a task, and task value refers to the student's evaluation of how important, useful, and interesting the task is (Paul R. Pintrich, 1999; Paul R Pintrich et al., 1993). Previous studies (Cordova & Lepper, 1996; Hidi & Renninger, 2006) have suggested that teaching staff emphasising the relevance of the learning materials and learning tasks can enhance student motivation for learning. Knowing the meaning or relevance of the activity for themselves can be a source of motivation, especially for students with low interest in their learning tasks.

It is logical that providing students with the rationale for the learning tasks will help them understand the value of the learning tasks for themselves. This can inspire student interest in the learning tasks and thus make them more inclined and willing to put forth more effort and time to engage in these tasks. This result suggests that if teaching staff help students to see the long-term relevance of a course to themselves, in terms of intrinsic goals such as community contribution, health, personal growth, and affiliation, students are likely to be more engaged with learning activities and be better prepared to demonstrate their competence. This finding confirms that student perception of learning tasks, as driven by their interest, is an important antecedent for their regulation of cognitive and self-regulatory strategies.

In general students enrol on a course to master knowledge and skills in a field. Thus if students perceive learning tasks contribute to their knowledge and skills, they will likely view the learning tasks more favourably and will put in the extra effort and time for their completion. This suggests that if teaching staff were to help students see the long-term relevance of their learning, particularly in terms of intrinsic goals such as community contribution, health, personal growth, and affiliation, then they are more likely to become engaged with learning activities. In turn, this will lead to lifelong learning as they self-regulate to perform better, and demonstrate their competence.

6.2.2 Hypotheses H2a and H2b: Performance Goal Orientation - Good Grades

The statistical estimation did not reveal any significant association between *good grades* (path coefficient = 0.046) and *student use of self-regulative strategies in learning*, which thus rejected Hypothesis H2a. This result, in part, is not completely surprising given the conflicting results reported in the literature regarding the relationship between the student goal to achieve better grades and their self-regulation of learning. Some previous studies have noted that performance goal orientation often leads to negative outcomes such as surface learning, low persistence after failure and negative effects. Other studies have revealed that performance goal orientation can lead to positive outcomes, including academic achievement (Harackiewicz et al., 2002; Paul R. Pintrich, 2000a, 2000b; Akane Zusho & Edwards, 2011).

In the case of this study, the engineering, computing and science students used self-regulatory strategies in their learning. This could be because, as indicated by Hypotheses H1a and H1b, personal interest in their course and their perceptions of the importance and usefulness of the learning activities may have taken precedence in motivating them to naturally self-regulate their learning rather than merely achieving good grades.

The structural model estimation showed that the achievement of good grades strongly impacts student concerns for employment prospects (path coefficient = 0.611, $p < 0.01$), as per Hypothesis H2b. This could be due to the reality that a student's level of academic achievement in their tertiary learning has a significant influence on the kind of job they can obtain later on.

This suggests that in order for students to succeed they not only have to learn and improve their skills, they also have to perform better than their fellow students to ensure that they are at the forefront of the future employers list. In other words, as noted by Darnon, Dompnier, Delmas, Pulfrey, and Butera (2009 p. 120), "success at university not only explicitly requires learning (the educational function) but also, implicitly, requires getting better grades than others (the selection function)".

These findings imply that the desire to achieve good grades alone does not motivate engineering, ICT and science students to self-regulate their learning. Their desire to be at the forefront of the employment market must also impact their adoption of self-regulatory strategies.

6.2.3 Hypotheses H2c, H2d and H2e: Employment and Successful Future

Employment prospect was anticipated to have a significant direct influence of *student self-regulation of learning* (Hypothesis H2c), however, the structural model results did not find the anticipated association between *employment prospects* and *student SRL* (path coefficient = -0.066). This suggests that students do not consciously self-regulate their learning solely to secure employment prospects upon graduation.

As posited by Hypothesis H2d, however, the structural model estimation revealed that student perception of *employment prospects* strongly influences student perceptions of achieving a *successful future* (path coefficient = 0.718, $p < 0.01$). Based on the outcome of H2c and H2d, it can inferred that merely securing employment opportunities does not affect student self-regulated learning, but the indirect effect of securing a successful future through good employment prospects influences them to self-regulate their learning.

In line with the discussion of employment prospects, successful future and SRL, the structural model estimation revealed a significant positive association between student *aspiration for a successful future* and *their self-regulation of learning* (path coefficient = 0.173, $p < 0.05$). This outcome is logical because the academic level achieved by a student has a significant influence on the kind of job they can secure upon graduation. The kind of job a student secures not only determines the amount of money they make but also affects the kind of work experience and skills they acquire. This further impacts their future career progression as well as income progression.

Based on the collective outcomes of H2a, H2b, H2c, H2d and H2e, it can therefore be concluded that good grades signify a level of academic achievement at university and significantly influence a student's career options. It should also be noted that

good grades also, to some extent, give employers the impression that a student is able to work proactively and self-manage their job, as well as they managed their studies. Further landing a desired job also adds to career progression and thus income progress. The achievement of career and income progression eventually affects personal status, power and value in society.

6.2.4 Hypothesis H3: Task Value

Hypotheses H3 proposed that student perceptions of the importance and usefulness of a given task have a direct and significant influence on student self-regulation of learning, however, the structural model estimation suggested a non-significant relationship between *task value* (path coefficient = -0.133) and *student SRL*. The result was rather surprising and does conflict with the findings of previous studies. Past studies have established that task value *is* a strong predictor of student self-regulation of learning (Artino, 2008a; Lawanto et al., 2014; Matusovich et al., 2010; Velayutham et al., 2012). In prior studies, researchers have revealed that students who perceive that their learning tasks are important, useful and interesting are more inclined to show interest in their learning activities, engage and sustain effort in academic tasks and adopt adaptive learning strategies in their learning. This suggests that the value and importance of a learning task may influence a student to complete the task but may not contribute to the overall calibration of their regulation of their university learning.

This insignificant relationship could be caused by the measurement items' wording of the *task value* construct. The measurement items for the *TaskValue* construct are as follows (refer to Section 4.6.4.1).

TV3	*The knowledge and skills I'm learning are very interesting.*
TV4	*The activities in the unit/course are very stimulating to my knowledge.*
TV5	*I believe I will use the knowledge and skills that I learn at some point in the future.*
ACAD6	*I like the subject matter that I am learning.*

The surveyed students may have interpreted items as measuring the value of the overall course experience instead of relating to a particular learning unit or activity.

The opposite result was achieved in Hypothesis H1b, which indicated that a student's natural interest in their learning domain has a strong influence (path coefficient = 0.623, $p < 0.01$) on their perception of task value. Thus it could be concluded that a student's natural interest in their study area contributes to their self-regulation initiative more than just their perceived value of the learning activities.

6.2.5 Hypotheses H4a and H4b: Self-Efficacy

As posted in Hypothesis H4a, student self-efficacy was found to be a significant predictor for student self-regulation of learning. The structural model estimation revealed a significant positive association between *student self-efficacy* and their *self-regulation of learning* (path coefficient = 0.151, $p < 0.05$). This finding is consistent with the literature (Britner & Pajares, 2006; P. Chen & Zimmerman, 2007; Diseth, 2011; Hutchison, Follman, Sumpter, & Bodner, 2006). Student self-efficacy influences their choice and use of learning strategies and their persistence when faced with difficult situation during learning. The results of this study confirmed that student self-efficacy improves their confidence and consequently influences their motivation to self-regulate their learning.

It was anticipated that student *self-efficacy* would have a significant influence on student perception of *task value* (path coefficient = 0.203, $p < 0.01$), Hypothesis H4b. The structural model estimation also showed a strong significant association between student *self-efficacy* and their perception of *task value* (path coefficient = 0.203, $p < 0.01$) (Hypothesis H4b). This finding is consistent with previous studies (Artino, 2008a; Bong, 2001; Liaw, 2008; Yukselturk & Bulut, 2009), which suggested that students who believed that they could complete the learning tasks were more likely to find their learning interesting, important and useful, and subsequently will invest more effort and time in their learning. In turn their accomplishment of learning tasks will feed back into their self-efficacy, and the cycle goes on.

These results suggest that students who believe that they have the skills required to tackle their university learning, and are confident that they can complete the learning tasks in their respective courses, would naturally find their learning activities

interesting, important and useful and subsequently influence their satisfaction with their course and learning. These findings corroborate Torkzadeh, Chang, and Demirhan's (2006) assertion that self-efficacy development may be influenced by student perceptions of the connection between course content and student future careers, given that students show greater interest in courses that they believe will help them in the workplace. As noted by van Dinther, Dochy, and Segers (2011), it is crucial for higher education institutions to pay attention to and invest efforts in the development of student self-efficacy by helping their students to develop the required knowledge, skills and competencies.

6.2.6 Hypotheses H5a and H5b: Metacognitive Awareness

The structural model estimation showed a significant association between *student metacognitive awareness* (path coefficient = 0.335, $p<0.01$) and their *self-regulation of learning* as hypothesised in H5a. The result indicated that overall *metacognitive awareness* was an important predictor of *student SRL,* which was consistent with the findings of previous studies (Askell-Williams et al., 2012; Bakracevic Vukman & Licardo, 2009; Efklides, 2008, 2011; Feryal, 2009; Young & Fry, 2008).

This result confirms that awareness of the knowledge and skills that one possesses impacts learning self-regulation, along with an awareness of the personal resources required to address the demands of particular learning activities. This is particularly important in engineering, computing and science courses, as these students are often faced with classroom and laboratory situations that require them to apply problem solving skills in new and innovative ways. These students not only need to be equipped with general learning strategies but also need to acquire learning approaches specifically to tackle learning problems in their domain, such as design problems in engineering or programming problems in computer science.

The structural estimation also showed a strong association between *metacognitive awareness* (path coefficient = 0.508, $p<0.01$) and student *self-efficacy* (Hypothesis H5b). When students acquire the capacity to evaluate and control their cognitive activities and make use of the resources available in the task and social environment to achieve their learning goals, they become more confident in their learning

abilities, improving their self-efficacy. It is clear that a student's metacognitive capability influences the growth and decline of their learning efficacy.

Consequently, the findings of Hypotheses H5a and H5b corroborate previous studies (Lawanto, 2010; Volet, 1991) reporting that metacognitive strategies should be taught as discipline-relevant strategies. Guided instruction for promoting the development of relevant cognitive skills within a particular discipline will improve student metacognitive skills particularly as novices expand and acquire cognitive and metacognitive strategies relevant to tackling learning activities in their course.

6.2.7 Hypotheses H6a and H6b: Prior Learning Experience

Prior learning experience (path coefficient = 0.177, $p<0.01$) showed a positive influence on student self-regulation of learning (Hypothesis H6a). This finding corroborates numerous other studies about student prior learning experience and their academic performance (Hailikari et al., 2007; McKenzie et al., 2004; Thompson & Zamboanga, 2004; Trigwell et al., 2012). This finding thus validates the role of prior learning experience in influencing student use of learning strategies, investment of learning effort and subsequently their academic performance. This finding also suggests that tapping into a student's prior knowledge, and specifically in the case of engineering, computing and science students, their domain-specific prior knowledge, can impact how well these students can comprehend and learn new information in their field of study.

Prior learning experience also had a positive impact on student self-efficacy (Hypothesis H6b). This finding is significant (path coefficient = 0.305, $p<0.01$) and supports previous research studies (McKenzie et al., 2004; Frank Pajares & Miller, 1994; Phan, 2011) that also emphasise that prior learning experience influences student self-efficacy as a contributing antecedent to student SRL.

Based on the above findings, a triadic reciprocity can be established between prior learning experience, self-efficacy and the use of SRL strategies in student learning. For example, prior learning experience may serve as the basis for a student's initial self-efficacy beliefs about their tertiary learning, which forms their initial strategies

in their learning engagement. The experience they gained from their learning engagement will then feed into strengthening their self-efficacy and thus improving the self-regulation of their learning strategies. As implied by Phan (2011); and Urdan (2004), this ongoing relationship has important practical implications for academic managers, programme developers and teaching academics, pertaining to the structure and design of curriculum. The policies and instructional practices incorporated into teaching practices, which emphasise mastery of skills, may over time encourage and cultivate a strong sense of self-beliefs and a preference for life-long learning amongst the students.

6.2.8 Hypotheses H7a and H7b: Teaching Staff

Hypothesis H7a proposed that teaching staff instructions have a significant influence on student' self-regulation of learning, however, the structural model estimation did not show a significant association between *teaching staff instructions* (path coefficient = 0.057) and *student SRL*. This outcome is contrary to the findings of previous studies, that suggest a significant association between teaching staff providing SRL instructions and student development of self-regulation of learning.

This suggests that teaching staff efforts to encourage students to plan, monitor and evaluate their learning does not influence students to regulate their learning on their own accord. In other words, students do not believe that it leads to internalised self-regulation of their learning. This outcome could be attributed to the external regulation of student learning where the monitoring and regulation of learning activities are driven by the teaching staff instead of a student's own inclination. For example, teaching staff may provide guidelines about how a particular activity will be assessed or what specific information should be included in a report, to encourage students to monitor and evaluate their work according to the guidelines before submission. Subsequently, due to the design and demands of their syllabus and an often demanding teaching load, staff may have implicitly instructed students to adopt self-regulation learning strategies, but may not be able to devote sufficient time to follow up and help students to internalise SRL habits.

Teaching staff can impart the knowledge and skills of self-regulated learning practices to students but these practices will not be completely embraced by students until they are able to adopt and measure the impact of self-regulated learning practices themselves. Again the responsibility falls on teaching staff to provide the means for students to practice and measure the impact of new knowledge and skills. In that respect, teaching staff beliefs, attitudes, knowledge and skills in providing SRL instruction to students should be taken into consideration as well. The teaching beliefs, attitudes and knowledge of teaching academics about self-regulated learning are discussed in detail in Section 6.3 in this chapter.

The non-significant result between *teaching staff instructions* and *student SRL* could also be due to the characteristics of the group of respondents. The first and second year undergraduate students form the majority (76.5%) of the surveyed students. As such the students may not have possessed the maturity to recognise the implicit teaching of self-regulated learning strategies by their teaching staff. The mature-aged students and postgraduate students may view the regulation of their learning as their responsibility, since they purposefully made the commitment to pursue their education at this stage of their life. Mature-aged students and postgraduate students are also more capable of prioritising, organising and planning their time and responsibilities as they gain these skills from their life and work experiences. As such the mature-aged and postgraduate students may not entirely rely on teaching staff for their learning.

The results showed a strong association between *teaching staff instructions* (path coefficient = 0.317, $p < 0.01$) and *student metacognitive awareness*. This result supports previous studies (Kane et al., 2014; Özsoy, 2011; Schraw & Gutierrez, 2015) claiming that teaching staff play an important role in providing metacognitive strategy instructions to students. Lecturers explaining and guiding students in self-regulatory strategies help students become aware of these strategies in their learning. Student awareness of metacognitive knowledge will enable them to realise their strengths and weaknesses in their learning skills, thus providing them with an opportunity to improve their learning skills. Developing metacognitive awareness amongst students will indirectly internalise student self-regulation of learning practices.

The awareness of metacognitive knowledge and subsequent efforts to improve their metacognitive skills indirectly enables students to self-regulate their learning. This is supported by the finding of the structural model estimation that *teaching staff instructions* show a significant indirect effect (path coefficient = 0.106, $p < 0.01$) on *student SRL* through its significant intermediate effect on *metacognitive instructions* (TStaff -> MCK -> SRL).

Previous studies have indicated that students who are aware of metacognitive knowledge will and can better regulate their metacognition (Sperling et al., 2004). Although the findings do not indicate that teaching staff instructions have a direct influence on student SRL, SRL instructions, specifically metacognitive instructions, can create student awareness of the learning approach and therefore may nudge them in the direction of self-regulation of their learning. It is thus essential to incorporate metacognitive strategy instruction in the curriculum so as to internalise metacognitive knowledge in students. It should also be kept in mind that the process of internalisation of metacognitive skills in students cannot be accomplished within a semester or a year. It may progress from explicit teaching in their first year of learning to implicit teaching or practice opportunities to ingrain these strategies in students during their subsequent years of formal learning. Consequently, by the end of their course, graduates should be able to succinctly identify what they know and do not know about a task, and thus be better equipped to respond to changing task demands and adjust their cognitive resources accordingly.

6.2.9 Hypothesis H8: Peer influence

As hypothesised in H_8, the structural model estimation showed significant association between peer influence (path coefficient = 0.140, $p < 0.05$) and student self-regulation of learning. This finding is in line with previous studies that noted peer collaboration and support as essential elements in student adjustment and the regulation of student learning (Jones et al., 2008; Manion & Alexander, 1997; Rodriguez et al., 2003).

Peer collaboration is important in student learning processes as students need to develop their repository of learning strategies in their respective learning domains, alongside general learning strategies. Peer collaboration makes way for rich metacognitive experiences since students are more comfortable making their thinking visible to their peers, which often contributes to deeper insights into, and adaptation of, their own metacognition, including their metacognitive knowledge (Hara, Bonk, & Angeli, 2000; Hurme, Palonen, & Järvelä, 2006). Peer collaboration generally requires an acknowledgment of the diversity of student abilities. Different students interact with the learning materials and tasks at differing levels and in different ways, such as selecting, filtering, summarising, organising, creating, presenting, reviewing, and responding to feedback. Collaboration among students not only helps them to accomplish tasks but also enables them to learn from each other in terms of knowledge and learning techniques (Hamer et al., 2008).

A student's engagement in social interaction can contribute to their self-esteem, particularly if they perceive that their contributions are valued. Social engagement enables students to take control of learning as a community of learners and prepares them to be less dependent on their teaching staff. This has the capacity to move them toward the goal of being independent learners (Hamer et al., 2008). At this point, it is evident that teaching staff play a significant role in providing the environment for student collaborative learning and guiding students accordingly at different stages in a course, despite the non-significant outcome of Hypothesis 7a. In sum, as indicated by the results, peer influence and collaboration are essential elements in developing student self-regulation of learning.

6.2.10 Hypothesis H9: Family Influence

The results of the structural equation model estimation showed a significant association between family expectations (path coefficient = -0.197, $p < 0.01$) and student SRL. This finding is consistent with previous studies (E. Gonida et al., 2007; E. N. Gonida et al., 2014; Grolnick & Ryan, 1989; James, Krause, & Jennings, 2010; Krause, Hartley, James, & McInnis, 2005) which revealed that the expectations of parents or family play a significant role in student learning.

The overall effect of family was negative, which means that parental and family expectation may negatively impact students learning at university. This result can be related to the James et al. (2010) finding that students, particularity science students, feel significantly pressured by their parents' financial commitment to send them to university, and that family financial pressure may distract their focus on their learning.

The study measured the impact of student perception of their family's expectations and their self-regulation of learning. The results of the study suggest that students perceive pleasing their family as important, however if a student is focused on the notion of pleasing their family with their academic achievement, they may invest minimal effort and time to achieve the desired result. As a result the student may not concentrate on improving their overall regulation of learning.

Another point worth noting is that university students are young adults who want to be independent in making decisions in their life. As such, although students value and count on family support when necessary, they may not perceive family control and expectations as an important element in their university life. Friedlander, Reid, Cribbie, and Shupak (2007) noted that though parental or family is not perceived as an important support tool for university students, the impact of family support in students university adjustment and learning should not be overlooked. As such, although students may not welcome their family's direct involvement in their university learning, they will transition and adjust to university life and university learning with more ease knowing family support is always available.

6.3 HYPOTHESES RELATED LECTURER FACILITATION OF STUDENT SELF-REGULATION OF LEARNING MODEL

The structural model estimation for the lecturer model (as presented in Chapter 5) revealed that *time constraints, reward and recognition,* curricu*lum design and demands, teaching academics' beliefs, university policies* and *student diversity* affects the facilitation of SRL by the surveyed teaching academics for their students. This finding suggests that university policy makers and academic managers should focus on the identified factors in order to provide support to teaching academics in SRL facilitation in their teaching. The sub-section below discusses the effects of the factors in the study, in light the findings of prior studies.

6.3.1 Hypothesis H1: Workload (Time Constraints)

The structural model estimation revealed a significant association between *time availability* (path coefficient = 0.213, $p < 0.05$) and *lecturer facilitation of SRL* in students. This finding is in line with previous studies, which emphasised that time constraints were factors promoting and fostering SRL in students (Deborah L Butler & Schnellert, 2012; Lau, 2013; Mattern & Bauer, 2014). The finding suggests that staff lack the time to engage with, and contribute to, efforts to foster SRL in their students. This finding mirrors those of several other recent Australian studies (Coates et al., 2009; Devlin, 2013) which claimed that one major factor inhibiting efforts to improve teaching and learning in Australian universities is high staff workloads.

This finding also corroborates Norton et al. (2013) report that heavy teaching workloads constrain teacher development in Australia. When stretched with heavy teaching workloads and too much time spent on administrative and accountability tasks, lecturers have less time for important teaching tasks such as investing additional time and effort in providing opportunities for students to self-regulate their learning (Deborah L Butler & Schnellert, 2012; Lau, 2013; Mattern & Bauer, 2014; Norton et al., 2013). This finding is also congruent with the work of Devlin (2013) who found that a major factor inhibiting efforts to improve teaching and learning is high staff workload, and the consequent lack of time to engage with, and contribute to, teaching and learning enhancement efforts.

This suggests that university managers and policy makers should take into consideration the workload of lecturers while expecting them to place the utmost importance on the development of student knowledge and learning skills in the higher education (Mattern & Bauer, 2014) environment. As Smeal et al. (2012) put it, "If leaders in Australian universities wish to enhance teaching and learning, fresh thinking, policy and planning is needed around academic and professional staff roles and workload allocation" (p. 5) (cited in Devlin, 2013). The results of the study confirm that time constraints are an important influencing factor determining the extent to which lecturers are able to foster and facilitate SRL in their students.

6.3.2 Hypothesis H2: Reward and Recognition

The structural model estimation revealed that *reward and recognition* (path coefficient = 0.249, $p<0.05$) have a significant influence on *lecturer facilitation of SRL* in students. The results indicated *reward and recognition* as an important predictor of the extent to which lecturers facilitate SRL in their teaching, which was consistent with the findings of previous studies (Bexley et al., 2011; Devlin, 2013; Kreber, 2002).

Rewards and recognition are essential for the excellence of teaching, whether it is for excellence in teaching or the scholarship of teaching (Bexley et al., 2011; Chalmers, 2011; Devlin, 2013; Kreber, 2002). The integration and facilitation of SRL instructions in teaching is no small feat. Such efforts and achievement in developing and implementing SRL-based instruction in classrooms should be lauded and recognised accordingly. Devlin (2013 p. 242) asserted that "the design and implementation of appropriate reward and recognition mechanisms, and ensuring there are career pathways for those committed to teaching and learning, are important components in the successful leadership of teaching and learning enhancement" Devlin's argument suggests that academics whose efforts are valued and rewarded will be motivated. As such institutions that support high-quality teaching, and reward good teaching through promotion, are more likely to improve student learning (Chalmers, 2008; Devlin, 2013).

This finding validates the view that if there is an appropriate reward and recognition for engagement in, and contributions to, teaching and learning enhancement efforts in place, teaching staff will be encouraged to promote and foster SRL in students. In short, academic staff who are valued and rewarded for positive teaching outcomes will be motivated to continually pursue excellence in teaching and learning in addition to being an expert in their discipline. University managers and policy makers who thus support high-quality teaching, and reward good teaching through promotion, are more likely to improve student learning.

6.3.3 Hypothesis H3: Lecturer Beliefs

The structural model estimation showed a significant association between *lecturer beliefs about SRL* (path coefficient = 0.322, $p<0.01$) and *lecturer facilitation of SRL* in students, as hypothesised in H3. This result confirms that lecturer beliefs about fostering self-regulated learning influences the promotion and integration of SRL in their teaching instructions. This also implies that in general, the surveyed lecturers viewed the element of nurturing SRL in students positively.

This finding is consistent with previous studies (Entwistle, 2005; Kember, 1997; Kember & Kwan, 2000; Parpala & Lindblom-Ylänne, 2007; Prosser, Trigwell, & Taylor, 1994; Samuelowicz & Bain, 2001) that asserted that lecturer beliefs affect their teaching and learning approaches and practices; and this point could be extended to lecturer facilitation of SRL in their students. From this finding it can be inferred that supporting teaching academics in reflecting on their own teaching and learning beliefs and scrutinising their relationship with student learning can be an important lever for creating more awareness about critical changes or improvements that could be adapted within their teaching and learning environments. However, as Postareff et al. (2007) noted, any adaptation or changes to the current teaching beliefs and approaches of teaching academics can't be expected to be of short duration. Postareff and colleagues (2007, p.569) pointed out that "shorter training courses do not have a positive effect on teaching, but the training needs to be more constant in order to be effective". Guskey (2002) emphasised that changes in beliefs and attitudes to teaching are largely influenced by evidence of improvement or positive change in the student learning. It should be remembered that providing professional

development programmes alone will not help teaching academics to readily accept and sustainability implement new teaching practices. Professional development programmes should be followed by observation and the necessary support to ensure that the implementation of the teaching academic's new knowledge and skills makes a difference to their professional practice and to evaluate the benefits or the impact of the professional development activity on the students (Guskey, 2014).

In sum, although teaching academics have a positive view of fostering SRL, the process of adapting their current teaching strategies to facilitate SRL may materialise slowly. It also needs to be noted that the enthusiasm of teaching academics to foster SRL in students should be accompanied by knowledge about supporting and facilitating SRL in their classroom. As discussed in Section 3.5.1.4, sufficient training or information about SRL encourages teaching academics to provide instructions on or to facilitate SRL. Accordingly, academic managers and teaching and learning managers can play a positive role by consistently providing guidance and support for teaching academics to adapt their teaching and learning views, beliefs and approaches for the effective facilitation of SRL strategies in their classrooms.

6.3.4 Hypothesis H4: Lecturer Knowledge about Self-Regulated Learning

Numerous studies have demonstrated that lecturers need an extensive repertoire of skills and knowledge about effective learning strategies and how to teach learning-to-learn and problem solving strategies and skills, in order for their successful facilitation of SRL in classrooms (Dignath-van Ewijk & van der Werf, 2012; Perry et al., 2008; Teekens, 2003; Woolley, 2011; Zohar, 2004, 2006; Zohar & Schwartzer, 2005). However, there is insufficient evidence from the surveyed lecturers to indicate a similar effect of the influence of lecturer knowledge and skills in fostering SRL in their students. SRL knowledge and skills were found to have no significant effect on the extent of lecturer facilitation of SRL in their students (Hypotheses H4), based on the results of this study.

SRL knowledge in this study context was used to determine whether the lecturers were familiar with the SRL concept or have been instructed in SRL teaching. The

inference of this finding is that the mere understanding and knowledge of SRL facilitation is not adequate for lecturers to effectively facilitate SRL in their students. The finding could also be attributed to the fact that, in general, teaching academics improve in their teaching approaches or learn from their mistakes through reflection on teaching approaches or experience gained over the years. According to Guskey's (2002) model, teaching academic experiences of the successful implementation of new teaching approaches leads to changes in their attitudes and beliefs. As such, prior experiences affect how teaching academics approach their current teaching practices and their facilitation of student learning more than their understanding of the SRL concepts alone.

Postareff and colleagues (2008; 2008) noted that a lack of pedagogical knowledge, especially amongst novice university lecturers who are still developing classroom problem solving skills, can be the result of limited teaching experience which can affect the lecturer facilitation of SRL in students. As such, although the results show an insignificant impact of SRL knowledge on lecturer SRL facilitation, providing for an understanding and knowledge of SRL teaching will greatly help novice university teaching academics.

Academic managers and/or teaching and learning managers could take note that providing existing and new teaching academics courses on teaching facilitation alone is not going to ensure that these teaching academics are going put into practice what they have learned. As noted by Guskey (2002), professional development programmes alone will not elicit changes in attitudes and beliefs in teaching academics. Guskey (2002) emphasised that significant change in academic teaching attitudes and beliefs only occurs after new teaching practices are implemented, and teaching academics observed improvements in student learning. That experience of successful implementation shapes the attitudes and beliefs of teaching academics.

Where the implementation of self-regulated learning skills are concerned, teaching academics may not be practicing what they have learned from these professional development courses, perhaps because (1) the teaching staff may not know how to implement what they have learned in their class or adapt it to their teaching units; (2) a lack of follow-up from respective support groups (for example, staff from the

teaching and learning department) which provided the courses on student learning facilitation, so as to ensure the teaching academics are on the correct track, or determine whether they need help if encountering difficulties while implementing such strategies in their teaching, or to support the teaching academic to adapt or incorporate new approaches in their teaching activities; (3) teaching staff may lack the time; and (4) they might not perceive this effort as valuable in their teaching approach as they have no data from their own experience to determine whether it will be effective. It should be noted that SRL facilitation in students does not directly rest on the shoulders of teaching academics alone, but also on the teaching and learning managers and academic managers who are equally responsible for ensuring that the facilitation of SRL is done effectively.

This finding suggests that it is not sufficient just to provide knowledge of SRL facilitation alone, but that it is crucial to help teaching academics to develop an effective way of integrating SRL into their teaching, which would have to start by creating awareness of direct and indirect ways fostering self-regulation of learning and to follow-up and support teaching academics in their SRL facilitation of students.

6.3.5 Hypothesis H5: Curriculum Design and Demands

As postulated in Hypothesis H5, *curriculum design and demands* was found to have a direct influence (path coefficient = 0.246, $p < 0.05$) on *lecturer facilitation of SRL* in students. This finding confirms that the inclusion of instruction to facilitate and/or strategies to assess student SRL skills in the curriculum influence a lecturer's incorporation of SRL instructions in their teachings. Curriculums should be designed to support and foster student self-regulation of learning as well as to impart domain knowledge.

Faculty and curriculum developers can design and structure courses in ways that promote self-regulation (Barbara K. Hofer & Yu, 2003; Osman & Hannafin, 1992). Ley and Young (2001) have suggested four principles for embedding support in instructions to facilitate the self-regulation of learning in students: (1) guiding learners to prepare and structure an effective learning environment, (2) organising

instruction and activities to facilitate cognitive and metacognitive processes, (3) using instructional goals and feedback to present student monitoring opportunities, and (4) providing learners with continuous evaluation information and occasions to self-evaluate.

Basic learning skills may be incorporated into the curriculum as per graduate attribute requirements, however, these skills can be easily marginalised in disciplinary debate (Boud & Falchikov, 2005) and thus it is essential to embed SRL strategy instruction into the curriculum, although variations in student learning needs should be taken into consideration. As lecturers are somewhat constrained by the curriculum or syllabi in their teaching, strategically incorporating SRL instructions and assessment strategies into the curriculum will formally integrate it into degree programmes. As such, this finding suggests that the incorporation of SRL instructions into the curriculum is likely to influence the lecturer facilitation of SRL in the classroom.

6.3.6 Hypotheses H6a, H6b, H6c: Policies

The university and faculty policy was found to have a significant (path coefficient = -0.256, $p < 0.05$) impact on the lecturer facilitation of SRL in students. This suggests that policies and management practices greatly affect the promotion of SRL in university environments. This finding is consistent with those in previous studies about the important role of management and policy makers in fostering SRL in teaching and learning in university (Hudson, 2013; Perry et al., 2008; Prosser & Trigwell, 1997; Ramsden et al., 2007). The overall effect of *policies* was negative, which meant that the current policies in practices are not favourable for the incorporation and facilitation of SRL skills in students, in that the teaching staff may not perceive the current policies as directly helping to provide support and guidance for the effective facilitation of SRL skill in their teaching.

From these findings we can infer that the management and leadership practices of academic managers and policy makers critically impact the shaping of the academic environment to promote and foster SRL in a university learning environment. In turn, the support provided in an academic environment for the promotion of SRL

influences academic perceptions of fostering SRL and thus motivating them to incorporate SRL strategies in their teaching practices, and teaching quality in an academic intuition. In order for the promotion and integration of SRL in teaching and learning to be adequately supported, it is necessary for both resourcing and funding to be in place, as well as academic management involvement in championing it.

This finding is also consistent with Devlin's (2013) suggestions that high-level support within an institution is required to embed and sustain good teaching and learning practices in the current Australian context. Devlin (2013) further mentioned that "effective support was found to include both senior executive championing of teaching and learning enhancement, and institutional investment in the form of funding and the resourcing of positions and initiatives, allocated as part of the university's planning and budget cycle." Failure to provide adequate support, such as guidelines and procedures, will lead to the perception of difficulties associated with integrating SRL strategies, and consequently impede their acceptance, promotion and development in teaching and learning. The outcome of hypothesis H6a validates the important role of academic managers and policy makers in promoting SRL in university teaching and learning environments.

The structural model estimation also showed that university and faculty policies have a strong influence (path coefficient = 0.677, $p < 0.01$) on lecturer acquisition of SRL knowledge (Hypotheses H6b), which confirms that appropriate SRL frameworks and guidelines will help lecturer understanding of SRL and providing for SRL skills in students. Previous studies have confirmed this finding by indicating that lecturer SRL practices can be developed through their participation in programmes that provide opportunities to attain SRL for themselves, helping teachers design tasks and interact with students in ways that encourage SRL (Kramarski & Michalsky, 2009; Monique, 1997; Perry et al., 2006; Randi & Corno, 2000).

As pointed out by Perry et al. (2008) and Borko and Putnam (1998), providing opportunities for lecturers to come together as a community of teaching and learning professionals will help them to identify goals for themselves and their students, design and implement activities that address those goals, and monitor and evaluate their progress toward the attainment of their goals, all with the guided and sustained

support of teaching and researching academics. In short, appropriate SRL frameworks, guidelines and community of practices will help lecturers to develop their own self-regulation as they teach and model SRL for their students.

The structural model estimation also revealed that university and faculty policies exhibit the strong influence (path coefficient = 0.698, $p < 0.01$) on the design and management of curriculum and resources (Hypotheses H6c). This finding asserts that appropriate policies and SRL frameworks coupled with systematic principles and guidelines will facilitate the design of curriculum to include SRL strategies that in turn will influence the teaching and learning practices of the lecturers in an academic environment.

This finding is consistent with that of Perry and colleagues, who developed a framework to guide teachers in interacting with students in ways that encourage SRL, and support teachers to design and implement instruction in SRL that is tailored to their unique teaching and learning contexts (Perry et al., 2008; Perry et al., 2006; Perry & VandeKamp, 2000; Randi & Corno, 2000).

Devlin (2013) stressed that effective teaching and learning in the current Australian context will be successful if the strategic priorities of universities include excellence in teaching and learning, and supporting and facilitating the success of student learning. Devlin's argument is in tandem with this study's findings that the efforts to integrate and nurture SRL in teaching and learning will be better materialised when institutional strategic priorities and policies includes supporting and facilitating implementation of SRL practices in teaching and learning environment. Such efforts to successfully implement, facilitate and support SRL practices in the curriculum call for the cooperation of teaching and learning leaders, educational resources development staff, as well as managers and staff involved in teaching and learning at various levels throughout the organisation.

The inference of the findings from Hypotheses H6a, H6b and H6c is that a university's direction, priorities and policies can indirectly impact lecturer facilitation of student SRL through curriculum and resource management and lecturers awareness and knowledge of SRL. It is thus crucial that academic managers

and policy makers invest time and effort in developing and implementing appropriate frameworks and guidelines for the promotion and integration of SRL in their teaching and learning environment.

6.3.7 Hypothesis H7: Student Diversity

The structural model estimation yielded sufficient evidence to support the proposed Hypothesis H7, that student diversity significantly impacts lecturer facilitation of self-regulated learning skills in their classrooms (path coefficient = 0.253, $p < 0.01$). This result agrees with previous studies (Otten, 2003; Teekens, 2003) that culturally diverse populations of students place expectations on lecturers to expand their repertoire of teaching methods to meet the different needs of a diverse student population in the classroom.

Hurtado (1996) noted that "institutions interested in improving student learning outcomes are devoting greater attention to helping and motivating faculty and teaching assistants develop a repertoire of instructional methods that foster respect for cultural differences and address variant learning styles." Hurtado's observation calls for the flexible adaptation of various teaching approaches and the integration of different types of learning activities and assignments to enable students to apply the different skills they have acquired from their previous educational experiences while providing opportunities for them to acquire learning skills to cope in the intercultural teaching and learning environments.

Accordingly, Otten (2003) suggests that diversity-sensitive curriculums can help students to learn to bridge cultural differences on campus and later in the workplace by equipping them with the knowledge of diversity and global cultural traditions, as well as challenging students to think in more complex ways about identity and history, and avoid cultural stereotyping.

Instead of viewing diversity as posing challenges to lecturers in catering for students with different educational backgrounds, student diversity should be viewed as means to a new knowledge paradigm and mindsets, and precise knowledge about student

diversity and how it might be put into practice in the teaching domain should be sought (J. Ryan, 2011).

6.3.8 Hypothesis H8: Collegial Influence

The structural model estimation did not reveal any significant association between lecturer perceptions of collegial commitment to student learning and lecturer facilitation of SRL in students, which thus rejected Hypothesis H8. This result could possibly indicate that there is lack of awareness about SRL initiatives to promote and integrate SRL strategies in the curriculum within the faculty and in the institution.

The institution's and/or faculty's investment in the form of initiatives, resources and support will influence teaching academic perceptions and attitudes to implementing SRL in their teaching and learning practices. A lack of adequate support and resources may lead to the perception of difficulties integrating SRL practices in teaching instructions and consequently impede their acceptance, promotion and development in teaching and learning.

As pointed out by Ramsden and colleagues (2007), positive perceptions of collegial commitment, and the leadership and management of teaching and learning in a particular academic environment have a strong influence on the perception that student learning is indeed valued and there is recognition and support for high quality teaching in the teaching and learning environment. This positive perception in turn will direct lecturers to focus on both teaching excellence and discipline knowledge expertise.

The result of hypothesis H8 infers that securing the positive perception of teaching academics about the institution's commitment to valuing and supporting quality teaching and student learning may positively affect teaching and learning beliefs and academic teaching approaches. It is thus evident that the leadership and management activities of policy makers and academic managers play an important role in initiating and supporting teaching academics in the facilitation of self-regulated learning skills in students.

6.4 LIMITATIONS OF THE STUDY

Despite its substantial contributions and implications, the study is not without its constraints. The researcher had to rely on the teaching staff to extend the invitation to their students. Since participation in the survey was entirely voluntary, surveying students entirely depended on whether or not teaching staff forwarded the survey invitation to their students. This seems to be a major constraint in getting more student responses and to some extent impacts the extent to which the sample is representativeness of the broader population. Since, the target populations were students and teaching staff in ICT, engineering and science faculties, careful interpretation should be exercised in the interpreting or extending the outcome of this study to other disciplines or areas of study.

This study adopted the survey methodology approach, which utilises the self-reporting questionnaire. Self-reporting survey are often susceptible to misinterpretation of one or more questions and is also known to be less reliable since there is no evidence whether the respondents are revealing the entire truth or otherwise especially when the information sought is complex or awkward. Also the participants may perceive questionnaires to be long and thus may have just selected the answers randomly to complete the survey quickly. Although anonymous, the implicit influence of confirming to social desirability also could have affected the participants' responses to the questionnaires. For example participants might have felt pressured to express more positive feelings about SRL than they actually did or they express based on what they believe as an ideal instead of answering what their current believe and practice. Nonetheless, social desirability may have influenced findings and must be considered when drawing any conclusions from the data collected in this study.

Due to the constraint in the design and length of the questionnaire, some variables investigated in this study may be superficially assessed. For example, the family construct in this study was mainly concerned with family's support and influence in general, whereas the family construct could also be investigated the influence of parents' educational background, siblings education achievement and family's socio-economic background.

Although the study meets the minimum sample size requirement for SEM-PLS analysis, the majority of the survey participants were undergraduate students. As such careful interpretation should be exercised in the interpreting or extending the outcome of this study to more specific student population such as postgraduate research students and mature-aged students.

6.5 SUMMARY

This chapter has provided a discussion of the structural equation modelling (SEM) estimates presented in Chapter 6. The findings have been interpreted in light of the hypotheses. This chapter began with a discussion of the factors that affect student self-regulation of learning. This was followed by a discussion of the factors that affect lecturer facilitation of self-regulated learning skills in students.

Having discussed the results of the data analysis presented in Chapter 5 of this thesis, the next chapter provides the conclusions to the research questions developed in the study, the study's limitations, the implications for both research and practice, and the opportunities for future research.

CHAPTER 7

CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

To improve is to change; to be perfect is to change often

Winston Churchill (1874 – 1965)

7.1 INTRODUCTION

This chapter presents the outcomes and conclusions arising from this research, and its contribution to the self-regulation of learning in higher education. Limitations of the study and potential for future research are also discussed.

7.2 RECAPITULATION

This research study investigated factors that affect the development of the self-regulation of learning in university students. The factors were investigated from student as well as teaching staff perspectives. University education requires students to be proactive, self-disciplined and actively engaged in their learning. University students are expected to independently plan, monitor, and assess their learning while maintaining high motivation for academic learning, however, the literature has pointed out that many students enrolling in their first year at university lack basic self-regulatory skills, and demonstrate difficulties such as in the ability to set academic goals and failure to identify appropriate learning strategies (Busato et al., 1998; P.R. Pintrich & Zusho, 2002).

Higher education institutions have developed a list of graduate attributes so as to ensure university graduates are equipped with the required knowledge, skills and attributes for employment and lifelong learning. Typically graduate attributes include communication skills, interpersonal skills, and problem-solving skills, mastery of disciplinary knowledge, awareness and respect for others, critical/analytical thinking,

ethical behaviour, lifelong learning, creative thinking and professional skills. Self-regulation of learning and behaviour skills underpin most graduate attribute skill sets. Providing opportunities and facilitating self-regulated learning behaviours in students will thus influence their knowledge, attitudes, values and practices in work and society.

Realising the importance of self-regulation of learning skills in university students and graduates, the main aim of this research was to study the surrounding factors that directly and indirectly impact the relationship between students and teaching staff in developing self-regulated learning attributes in students. This study investigated perspectives of both university students and teaching staff. Discussion in the literature was found to be solely focused on or limited to student self-regulation of learning or academic staff facilitation of student self-regulation of learning. As students and teaching staff are stakeholders who communicate with each other in a teaching and learning environment, the discussion about the promotion and development of self-regulated learning in university teaching and learning environments must take into account the elements that affect the students as well as the teaching staff. More specifically, factors influencing student acquisition and practice of SRL skills in their learning; as well as the factors that affect the teaching staff in facilitating SRL behaviour in their students, need to be examined when implementing initiatives aimed at developing self-regulated learning behaviour among students. To the researcher's knowledge there are no studies investigating the responsibilities and involvement of students as well as teaching staff simultaneously, in explaining the promotion and the implementation of self-regulated learning practices in higher education institutions. As such, this study gives a more complete picture by considering the responsibility of both stakeholders, students and teaching staff, in developing self-regulated learning in students.

Re-visiting the Research Questions

Factors influencing university student self-regulation of learning were examined, as were the factors influencing the facilitation of student SRL behaviour by academic teaching staff. This study addressed the following main research question:

What factors promote the development of self-regulated learning in higher education?

As the promotion and development of SRL in a university teaching and learning environment involves both students and lecturers, this study examined the following research questions:

1. What factors influence the self-regulation of learning in university students?
2. How and to what extent do the identified factors influence the self-regulation of learning in university students?
3. What factors influence university teaching staff in their facilitation of students' self-regulation of learning?
4. How and to what extent do the identified factors influence university teaching staff in their facilitation of students' self-regulation of learning?

The factors that influence university student self-regulation of learning and lecturer facilitation of SRL skills in students were identified through a synthesis of the extant literature. The synthesis and the formulation of hypotheses were described in Chapter 3. Based on the synthesis of the literature nine themes were identified for students and eight themes for lecturers, as listed below:

Table 7.1: Themes Identified through Literature Review and Preliminary Interview Sessions

Factors influencing Students' SRL	**Factors influencing lecturers' facilitation of SRL**
10. Mastery Goal Orientation	9. Time
11. Performance Goal Orientation	10. Reward and Recognition
12. Task Value	11. Lecturers' Beliefs about SRL
13. Self-Efficacy	12. Lecturers' Knowledge on SRL
14. Metacognitive Awareness	13. Curriculum Design and Demands
15. Prior Learning Experience	14. University and Faculty Policies
16. Teaching Staff Guidance and Support	15. Student Diversity (discovered during interview)
17. Peer Influence and Collaboration	16. Collegial Influence
18. Family Influence	

The interview sessions identified other themes that contributed to answering the research questions. Under the theme of *performance goal orientation*, students

particularly stated *good grades, employability prospects* and *successful future* as motivating factors in completing their university education. Lecturers pointed out that student diversity in the Australian educational context poses challenges in catering for the varying needs of students.

The testing of hypotheses formulated in the study contributes to answering the minor research questions in this study. The details of the hypotheses testing are provided in Chapter 5 (Data Analysis and Results). Figure 7.1 illustrates the effects of the identified factors on student self-regulated learning.

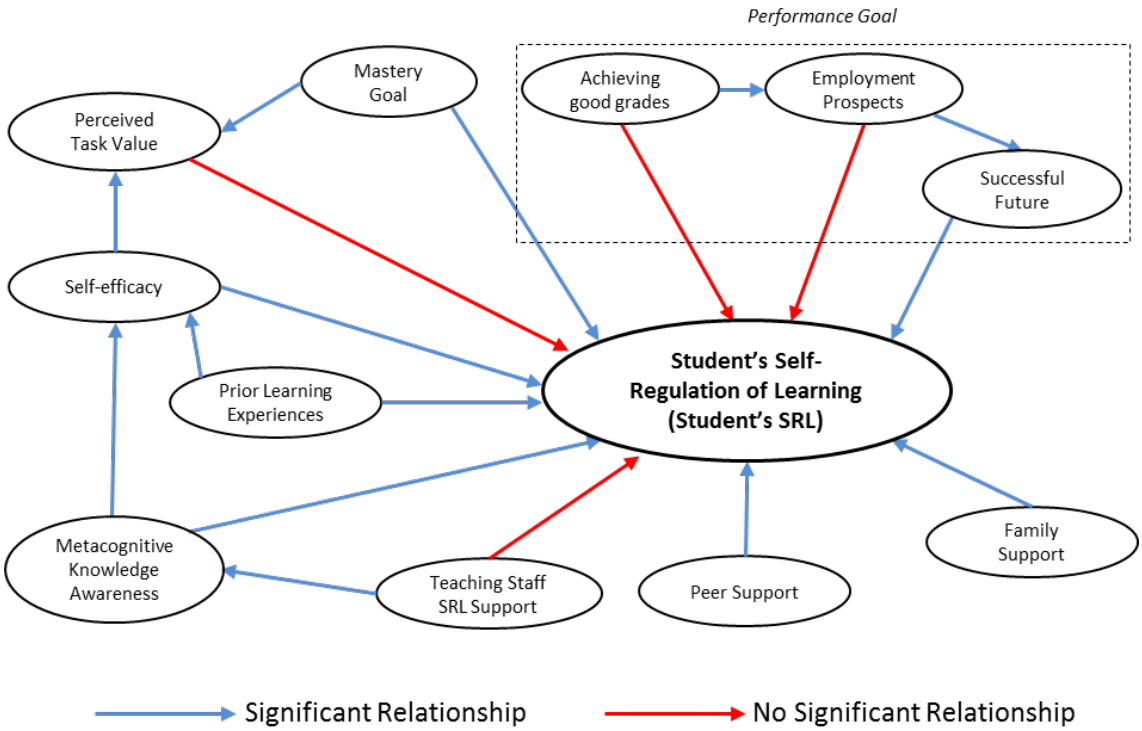

Figure 7.1: Summary of the Effects of the Identified Factors on Student SRL

Based on the results of this study, *mastery goal orientation, employment prospects, self-efficacy, metacognitive awareness prior learning experience, peer influence and family* influence were identified as having significant effects on university student self-regulation of learning. Analysis of the direct, indirect, and total effects in Chapter 5, reveals that although employment prospects and teaching staff do not have a significant direct effect on student SRL, they do have a significant effect indirectly, which implies that these two constructs are still important in affecting student self-regulation of learning. Finally, the results of the study indicated that good grades and task value did not have any significant direct or indirect effect on

student perceptions regarding self-regulation of learning. A possible explanation was that the insignificant effect of good grades could be attributed to the view that students regard good grades as a means to achieve an ultimate goal such as securing good employment, and not a goal to achieve by itself. As discussed in Chapter 6, the misinterpretation of the measurement items for the task value construct may have contributed to the observed insignificant result.

Similarly Figure 7.2 illustrates the effects of the identified factors on lecturer facilitation of self-regulated learning skills in students.

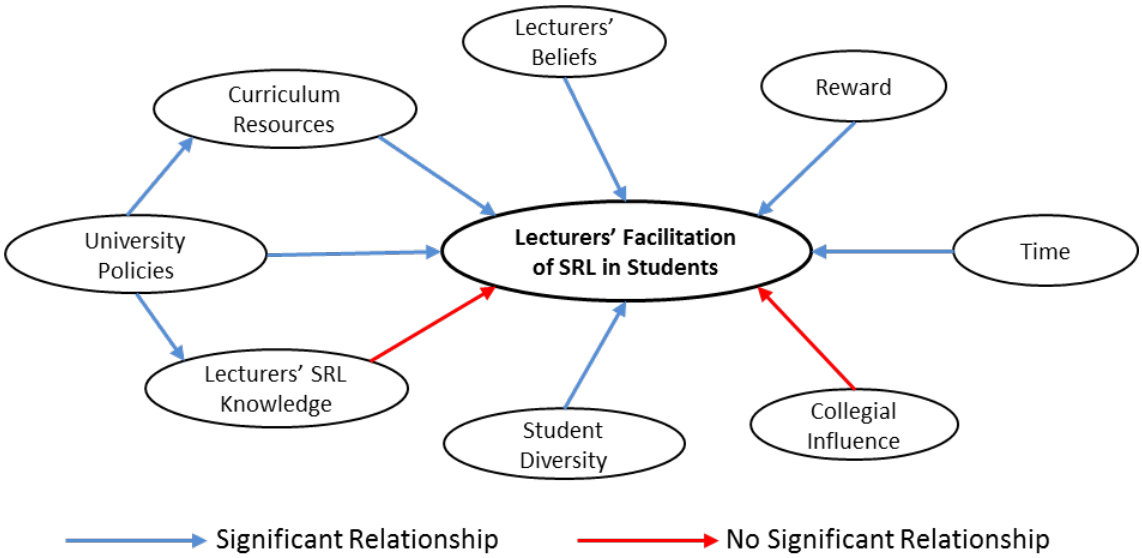

Figure 7.2: Summary of the Effects of the Identified Factors on Lecturer Facilitation of SRL

The results of the lecturer structural model estimation indicated that *time, reward and recognition, lecturer's beliefs, curriculum deign and demands, policies* and *student diversity* have a significant impact on lecturer facilitation of SRL skills in students. As noted in Chapter 6, the negative impact of policies could imply that the current policies in practice are not favourable for the incorporation and facilitation of SRL skills in students, in that the teaching staff may not perceive the current policies as a direct help in providing support and guidance for the effective facilitation of SRL skills in their teaching. The results of this study also revealed that policies through the curriculum have an indirect impact on lecturer incorporation of SRL skills in their teaching activities. Lecturer SRL knowledge suggests no significant impact of

lecturer facilitation of SRL in students. As discussed in Chapter 6, this could imply that mere understanding and knowledge of SRL facilitation is not adequate for lecturers to effectively facilitate SRL in their students, but it is crucial in helping teaching academics to develop effective ways for integrating SRL into their teaching and learning activities.

7.3 Outcome of the Study and Recommendations

The outcome of the student model and the lecturer model can be conceptualised as in Figure 7.3.

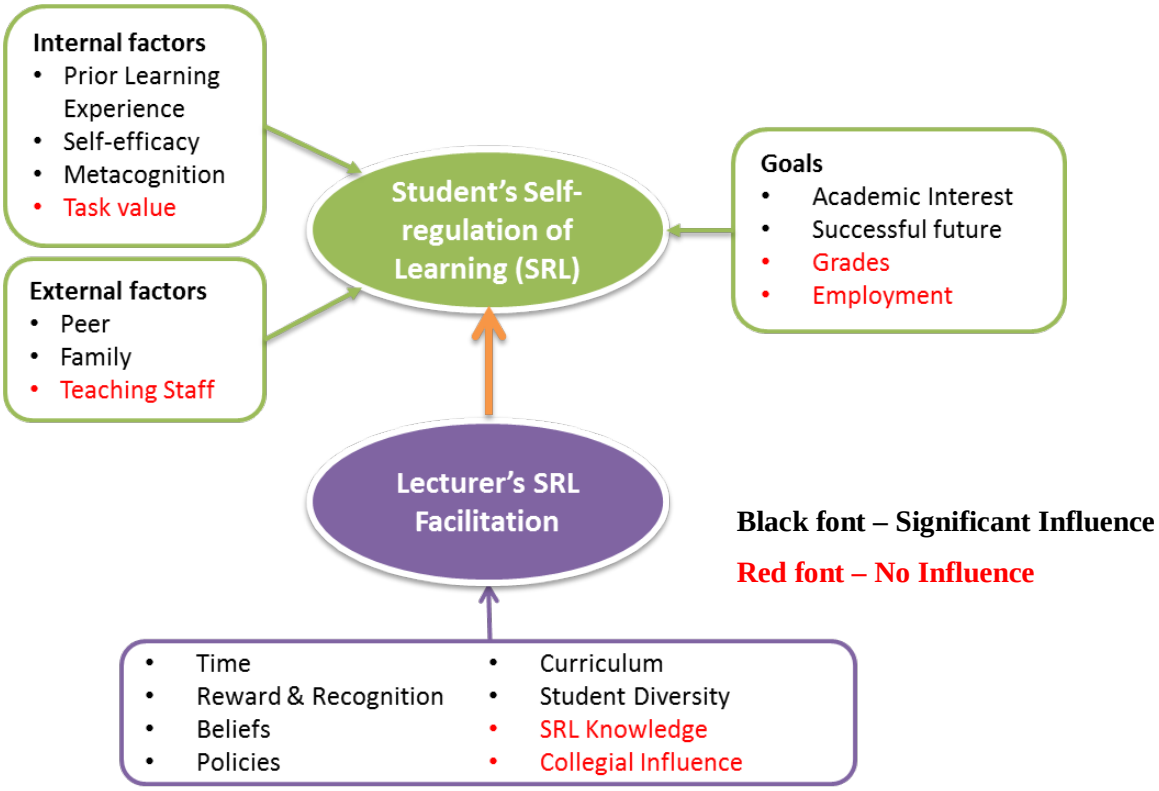

Figure 7.3: Conceptualisation of Student Model and Lecturer Model

The outcomes that contribute to a student's self-regulated learning behaviour in their university education can be classified into three groups: goals, internal factors and external factors. These are depicted in the student model as shown in Figure 7.3. This classification is consistent with Social cognitive theory which notes that self-regulated learning is influenced by personal, environmental and behavioural events in reciprocal fashion (Bandura, 1986; Wade, 1989).

A student's personal goals establish the main motivation for their enrolment into university education. The two main goals students thrive for in their university education are their genuine academic interest and securing a successful future within the context of work, home/family and society. Although grades and employment prospects were seen to be non-significant in contributing to student motivation for learning, the reality is that these two elements form the intermediate path between a student's university education and a successful future. Typically, grades are impacted by a student's ability to manage time, workload and priorities, which include those associated with learning, socialising with friends, and honouring family commitments and obligations. To some extent, this also reflects on a graduate's ability to handle and manage tasks on the job, which also have similar external pressures on performance. Consequently the type and level of job can ensure a good income, which can help to sustain a comfortable life with work, family and society. A good job then will ensure a good salary and thus a good future. So in essence, grades and employment do have an indirect (if not direct) impact on building a successful future.

Having the will or goals alone does not help students to self-regulate their learning, however. A student also needs to have the knowledge and skills to self-regulate their learning. Where then does a student gain their SRL skills? People are taught and learn to self-regulate from birth. Initially children are taught to regulate their sleeping behaviour, eating, walking and such basic behaviours. Later, in primary and secondary education, students learn and are taught to regulate, literacy skills, numeracy skills, handwriting skills and behaviour as well as cognition and metacognition monitoring skills. By the time a student reaches university, they have an accumulated repository of self-regulation skills, also shaped by environmental factors. A student's prior learning experiences and metacognition knowledge

naturally contributes to their self-efficacy in confidently pursuing university learning. A student's prior learning experiences serve as the basis for their initial self-efficacy beliefs about their tertiary learning which forms their initial learning skills in their learning engagement. This relationship between prior learning experience, self-efficacy and student use of SRL skills in learning can be established as a triadic reciprocity. The experience, knowledge and skills they gain from their new learning engagement (university learning) will feed into strengthening their self-efficacy and then support their ongoing self-regulation of learning.

As such, the outcome of this study recommends that

1. Students need to identify and continually evaluate their learning goals to help them organise their learning strategies throughout the learning process, so as to improve their academic performance throughout their study.

2. Teaching staff should provide opportunities and/or conditions for the continuous development of SRL by university students through the development and implementation of SRL strategies in teaching instructions, the modelling of and scaffolding for SRL skills, and peer collaboration strategies.

As indicated by the outcome of this study, teaching staff have significant influence on student metacognitive awareness, and in turn student metacognitive knowledge and prior knowledge feed into their learning self-efficacy (refer to discussion in Section 6.2). As such teaching staff should seek to provide opportunities and/or conditions for student SRL development by appropriately structuring learning activities, particularly for first year undergraduates who may require more explicit support and structure from teaching staff. For instance, teaching staff can facilitate student self-monitoring skills via reflective prompting; goal setting and self-evaluation skills via detailed syllabus, assignment instructions, and grading rubrics; and facilitate their progression toward task completion via intermediate assignment deadlines (Ley & Young, 2001; Liu, Bonk, Magjuka, Lee, & Su, 2005). These instructional strategies will likely encourage and help students, especially students with less-developed SRL beliefs and behaviours, to better regulate their own learning activities, and in addition discourage their use of maladaptive academic behaviours, such as procrastination (Artino, 2008b).

Task value, however, was not perceived as a contributing factor to student self-regulation of learning. In this case the students may be prompted to complete the learning tasks based on its value and impact on their grades or future employment, however the learning tasks may not contribute to the overall calibration of their regulation of university learning. This situation unwittingly could have been contributed to by higher education stakeholders, such as employers and curriculum developers, and the rise of "assessment culture" where student attention has been skewed towards marks alone rather than acquiring the ability to learn skills.

As emphasised by social cognitive theory a student's accumulated repository of self-regulation behaviour and skills is largely shaped by their environmental factors, namely, family, friends, school teachers and the community they grow up in. Naturally, parents and siblings establish a person's beliefs, values, and basic self-regulation behaviours. This is further shaped by the school education system, friends and community over time. It is widely acknowledged that teachers form the pillars of student learning in any education system; however, in this study teaching staff are not seen as a contributing element to student self-regulation of learning. This unique paradox paves the way to ponder the role and responsibilities of educators in tertiary learning. More importantly how do students perceive the role of tertiary educators - teacher, lecturer, facilitator, leader or instructor? This question could stem from student perceptions that university teaching academics, and especially, academics in the technical disciplines such as engineering and computer science, are the experts in their disciplines. As such, students largely see these technical academics as (and also indirectly expects them to be) the transmitters of the discipline knowledge and skills. In that respect, students in technical disciplines are willing to, and may often, overlook the lack of finesse in method of delivering teaching content.

The outcome of this study recommends that:

1. Teaching staff should make students aware of the cognitive and metacognition dimensions involved in their learning goals, learning tasks and learning strategies.

2. Teaching staff should help, especially first year and second year students, in recognising the importance of a particular learning activity, task, and the overall course by explaining the significance of the course and the learning activities in the student's academic and professional career

3. Teaching staff, especially academics in the technical disciplines, must incorporate SRL strategies in their teaching approaches which encourage and guide students to exercise their SRL skills with regard to environment structuring, task strategies, time management, help seeking, and self-evaluation. This practice will also prompt students to improve their level of success in the course

This research acknowledges that a lack of finesse in teaching methods cannot be attributed completely to teaching staff apathy regarding their teaching approaches. As illustrated in Figure 7.3, factors such as *time, reward and recognition, lecturer beliefs, curriculum design and demands, policies* and *student diversity* significantly contribute to teaching staff ability and willingness to revise their teaching approaches and methods.

While teaching staff are perceived as the main players in facilitating self-regulated learning skills in students, their lack of necessary knowledge and skills, as well as lack of confidence in implementing pedagogies that develop SRL skills in the context of their teaching discipline, must not be overlooked. It is important not to overlook teaching staff beliefs, which significantly impact their engagement in development and implementing SRL skills in the curriculum and in their teaching and learning activities. In general, teaching staff hold beliefs about their role, specifically what the goals of the curriculum are and how best to achieve them. Teaching staff may hold significantly differing beliefs and views about the importance of self-regulated learning skills, the task of integrating and assessing these skills, and their roles and responsibilities in relation to these tasks.

Engaging teaching staff in initiatives aimed at integrating SRL skills in the curriculum may prompt them to consider the beliefs they hold about facilitating such skills and their roles and responsibilities in the task. This may require that teaching staff change their perception and/or belief about teaching and learning in their discipline. This change of belief or perception may not have an easy welcome.

Before implementing initiatives to integrate SRL skills in the curriculum, teaching staff perceptions of the value of SRL skills and the need to integrate them into their curriculum need to be addressed. As De la Harpe and Radloff (2006) noted, some

staff may place higher value on discipline knowledge than student learning skills and perceive their primary role as teaching discipline content. Some staff may need support in teaching SRL skills and to make the necessary changes in their curriculum. De la Harpe and Radloff (2006) further noted that "disciplinary differences including variation amongst 'hard' and 'soft' disciplines to the degree to which the development of 'generic' skills is accepted as a legitimate part of the curriculum, must be acknowledged and respected".

Prior to the implementation of SRL skills in the curriculum, it is imperative to identify and make explicit compelling internal and external reasons for embedding those skills into the curriculum. The aims, approach to and outcomes of such initiatives should be widely communicated to all stakeholders involved, namely faculty heads and academics managers and teaching staff. At the same time support for changing beliefs should be provided as closely as possible to where curriculum changes are required. Such support may come from within or be external to the discipline. Support needs to be respectful of the language, conventions and ways of knowing of the discipline (De la Harpe & Radloff, 2006). As evidence of improvement and positive change will lead on to change of beliefs (Guskey, 2002), implementing short term projects for SRL implementation and celebrating the success that recognise achievement of small steps will contribute towards project goals.

With respect to the outcome of this study, which suggests that policies and curriculum have a significant influence on teaching staff's SRL facilitation, this study recommends that:

1. The academic managers and curriculum developers should engage with teaching staff in developing or implementing policies, initiatives related to curriculum change and development.

2. Policies at the university level as well as at the faculty level must clearly articulate the processes and procedures for incorporating SRL in teaching and learning activities, curricula, providing learning environment and institutional support for both students and teaching staff in engaging in SRL activities.

7.4 CONTRIBUTIONS OF THE RESEARCH

7.4.1 Theoretical Implications

This study was initiated to examine the factors influencing the promotion and development of self-regulation of learning in university students. Both student and lecturer viewpoints were surveyed to examine the promotion and development of self-regulation of learning in university teaching and learning environments.

This study constructed a conceptual framework based on Bandura's Social Cognitive Theory of Self-Regulation (Bandura, 1986, 1991) and Zimmerman's Self-Regulated Learning Theory (Zimmerman, 2000, 2002). The conceptual framework was used to evaluate the factors that influence two major stakeholders: students and the teaching staff. Both are directly involved with each other in the teaching and learning environment in any higher education institution. Two related theoretical models were developed from the conceptual framework to investigate the effect of student and lecturer beliefs regarding the implementation and practice of SRL in higher education. The initial theoretical models developed through reviewing the existing literature underwent a screening process using qualitative interview sessions and pilot survey testing to fine-tune and contextualise the research model. The interviews and pilot study suggested that some adjustments to the model were needed, which had been primarily developed from extant literature. These adjustments involved changes to the interrelationships between some constructs, the omission of some variables and also the inclusion of some new variables and measurement items. This screening process yielded an integrated research model that facilitated a comprehensive study of factors influencing the promotion and development of SRL in Australian university teaching and learning environments.

The student model predicts that the development of student SRL skills is affected by their goals, internal factors such as self-efficacy and external factors such as teaching staff. As teaching staff are the main contact point with students, the lecturer model predicts that factors internal to teaching staff, such as belief, knowledge, and external factors such as policies, affects the extent to which the development and promotion of SRL will be realised in teaching and learning environments. This prediction was validated through analysis of the survey data. By including the factors affecting

students as well as the teaching staff, the theoretical model is unique in addressing the factors influencing the promotion and development of self-regulation of learning. This extends to the ultimate aim of higher education, that is the cultivation of a life-long learning culture among students in higher education.

The student model measures student self-regulated learning skills as a higher-order construct comprising six manifest variables:

1. *Learning strategies*
2. *Goal setting and planning*
3. *Self-monitoring*
4. *Self-evaluation*
5. *Time and environment management*
6. *Help seeking*

The student model classified the identified factors into three different groups:

1. Motivating goals which include:
    a. *Academic interest – Mastery Goals*
    b. *Good grades*
    c. *Employment prospects*
    d. *Successful future*
2. Internal factors comprising:
    a. Prior learning experience
    b. Self-efficacy
    c. Metacognitive awareness
    d. *Task value*
3. External factors encompass:
    a. Peer support and influence
    b. *Family support and influence*
    c. *Teaching staff support and guidance*

The lecturer model identified the following factors as significantly affecting the lecturer facilitation of SRL skills in students:

1. *Time*
2. *Reward and recognition*

3. *Lecturers' teaching and learning beliefs*
4. *Student diversity*
5. *Curriculum design and demands*
6. *University policies*

Although the literature identified lecturer knowledge of SRL instructions and collegial commitment as important factors in facilitating SRL skills in students, the lecturer structural model did not signify *SRL knowledge* and *collegial influence* as influencing factors in this study.

The theoretical contribution of this study is the proposed new conceptual framework used to develop two theoretical models to investigate the effect of student and teaching staff beliefs regarding the practices and implementations of SRL in higher education. The development of the integrated model facilitated the comprehensive study of factors influencing the promotion and development of SRL in students at Australian universities. The integrated model allows the creation of new knowledge into the effects of the identified factors on student SRL and teaching staff's facilitation of SRL.

7.4.2 Practical Implications

Undeniably SRL skills form an important part of integrating life-long learning, and thus the self-regulation of learning deserves the attention of educators, researchers, students, and policy makers. Although universities may recognise and emphasise SRL skills as part of cultivating a life-long learning culture, academic managers need to look into how well the practices of SRL are absorbed into the curriculum design, and how well teaching academics are equipped with knowledge and experience in facilitating SRL instruction for their students. Faculty academic managers thus have a crucial responsibility in identifying ways to encourage and support teaching academics within the faculty to be aware of self-regulated learning and in providing avenues for them to equip themselves with knowledge, skills and experience for guiding their students in self-regulating their learning.

Another element in the effective implementation of self-regulation of learning in an academic environment is the collegial camaraderie in the teaching and learning environment. The outcome for collegial commitment in this study illustrates an apparent lack of collegial comradeship among teaching academics when it comes to incorporating SRL into their teaching practices. Again this lack of collegial commitment can be attributed to the lack of awareness and avenues to seek support and guidance. As Ramsden et al. (2007) noted, the development of collegial commitment is vital to student learning and the practices of academic managers, particularly the faculty heads, are crucial to the development of a collegial commitment in a faculty. A quintessential solution would be the establishment of a community of practices that not only develop awareness but also pave the way to a sharing of knowledge, skills and experience relating student learning and SRL facilitation amongst the academics in the faculty. The goal of academic managers and teaching and learning support leaders, then, should be to create the conditions and/or provide support that makes this possible. For example, faculty managers could safeguard the staff from any ramifications resulting from implementing new teaching practices, such as student evaluation reports or a drop in overall student grades for that particular semester. Similarly, faculty managers may encourage staff who show an interest in implementing SRL practices in their teaching and learning activities by engaging with teaching and learning support staff in implementing the staff's new teaching approaches or activities. Faculty managers and teaching and learning leaders need to recognise and share the efforts and the success of the staff who undertake such initiatives in incorporating SRL in their teaching and learning with the faculty members. This may encourage other faculty members to join in this effort of incorporating SRL practices in their teaching activities and thus indirectly pave way for the establishment of a community of practices for SRL promoting and development within the faculty.

While providing avenues for professional development, guidance, and support, academic leaders must also be mindful that it is impractical to expect immediate changes in the current approaches of teaching academics. Changes in the beliefs and teaching practices of teaching academics can only be anticipated after the implementation of new teaching innovations and practices, and when teaching academics have seen improvements in student learning (Guskey 2002). Guskey

(2002) further emphasised that any adaptation to academic teaching approaches can only gradually occur with continued follow-up, support, and pressure following the initial training or implementation of new teaching practices.

Although a student's internal motivation, efficacy and goals play an important role in their self-regulation of learning, the influence of external factors on their motivation cannot be denied, and thus the adaptation in their behaviour. The literature has demonstrated that student motivation and metacognitive awareness and skills are shaped by their learning experiences, and obviously the learning experience come from their educators and the learning environment. This experience feeds into their efficacy and motivation and thus shapes how, and the extent to which students are willing take ownership of self-regulating their learning.

Although the ultimate goal is for students to self-regulate their learning, the idea of 'self' in self-regulation starts with external/other regulation and co-regulation from teachers and peers, as they provide the modelling of, and scaffolding for, regulatory behaviours, easing students from other-regulation to co-regulation and finally to self-regulation of learning. These arguments imply that students need lecturers to guide and support their self-regulation of learning and in turn teaching staff need guidance and support which includes reward, recognition and safeguards from the university academic leaders and management in the process of equipping themselves with the necessary pedagogical knowledge and skills to provide such instructions to students. Thus it can be seen as cyclic loop of academic management, teaching academics and students.

It is clear that lecturers are seen as the significant force in moving students towards SRL. Without firm support from the academic leadership and management, the teaching staff will not able to withstand the harsh demands of teaching, learning and research that will eventually will take a toll on their time and effort. The ongoing revision of current teaching and learning needs by academic leaders and managers thus needs to be evaluated and adapted according to the current teaching and learning needs.

For education leaders and university policy makers, the outcomes of this research study can be a foundation for establishing guidelines and resources for promoting and integrating self-regulated learning instructions in teaching and learning. In analysing the data collected, it is very evident that the support and management decisions of education leaders and managers and the institutional change projects they establish are crucial for a successful implementation of self-regulated learning (SRL) in teaching and learning. Outcomes from this study reveal that the teaching and learning initiatives and projects and management practices in a university shape the perceptions, beliefs and teaching practices of the academics in the university's teaching and learning environment. The university's policies influence curriculum design, as well as the teaching and research demands in a faculty. Thus the onus is on the university management and policy makers to ensure the effective implementation of SRL instructions in the curriculum.

Similarly, university managers and academics should connect with high school and primary school teachers in communicating the skills needed at university education levels, and to promote the best possible means to implement these skills in the teaching activities at schools. University academics should be encouraged to participate in collaborative sessions on learning and sharing ideas about ways to impart SRL skills in students. This strategy may help teachers, especially high school teachers, to gain the understanding and experience needed to impart new skills and ideas to their students, whilst also sharing such knowledge and experience with their peers. Together university academics and school teachers can smooth the transition of high school students into tertiary learning environments and help them embark on their tertiary education more confidently.

7.5 FUTURE RESEARCH DIRECTIONS

The findings, implications and limitations of the current study have provided new directions for future research in investigating the practices and the implementation of self-regulated learning in higher education in Australia.

As indicated in the discussion of limitations in this research (Section 6.4), the majority of the student sample consisted of undergraduate students. Postgraduate students are usually mature-aged students with more life experience than their undergraduate counterparts. With this in mind, this researcher recommends that postgraduate students are included in future research in this subject area to further explore the development of self-regulated learning in university students. Much could be learnt from a study into how postgraduate coursework and postgraduate research students practice self-regulation of learning; especially as postgraduate students are known to have work and family commitments.

Findings from this study were based on the responses from surveyed ICT, engineering and science students and lecturers. Extending the study to students and lecturers in other study areas in other universities, as well as vocational education, may give an insight into how SRL is perceived and practised by different segments in tertiary education.

It has been established in this study that self-regulated learning is the basis for achieving life-long learning. As such, investigating the implementation of the graduate capabilities in the curriculum may provide an insight into the extent to which SRL is implemented in the university teaching and learning environment. Further investigation into how well the current graduate outcomes incorporate SRL skills and also contribute to the development of student self-regulation of learning as part of cultivating the life-long learning culture would be of value to our overall knowledge of student learning in higher education. This not only involves investigating the student practices of goal setting, planning, self-monitoring and their use of metacognition but also the extent to which students recognise and seek the necessary avenues for help or assistance and peer support in their learning. In addition the investigation should also include the extent to which the teaching curriculum and the teaching staff enable the cultivation of SRL skills in students.

In this thesis the relationship between teaching staff's facilitation of SRL and student self-regulation of learning is conceptualised in Figure 7.3. Empirical study to investigate the extent to which teaching staff facilitation of self-regulated learning strategies impacts university student self-regulation of learning could inform the

practical elements of incorporating SRL in curricula, and teaching and learning instructions.

Another intriguing area for research could be investigating how teaching academics self-regulate their own learning in order to continually gain disciplinary and pedagogical knowledge. Academic evolutions of pedagogical knowledge, specifically in facilitating SRL skills in students, should be given closer scrutiny for the successful cultivation of self-regulation learning culture in students.

7.6 CONCLUSION

This study sought to identify factors that influence the self-regulation of learning in university students, and the factors that influence university teaching academics' facilitation of self-regulated learning skills in students. The study predicted the strong and significant effects of *mastery goal orientation, employment prospects, self-efficacy, metacognitive awareness prior learning experience, peer* and *family influence* on university student self-regulation of learning. The outcomes of this study indicate that students do not perceive *teaching academics* as team players in their understanding and practice of SRL. This suggests that university academic managers and teaching and learning leaders should examine the role of teaching academics in their institution and the possible challenges or constraints these teaching academics encounter in providing the necessary instructions to support student learning in addition to imparting domain knowledge, in general, as well as domain specific teaching and learning environments.

This research study also suggests that *time, reward and recognition, lecturer's beliefs, curriculum deign and demands, policies* and *student diversity* have strong and significant effects on the facilitation by teaching academics of self-regulated learning skills in students. While *policies* are predicted to have a significant effect, it is also perceived that they can negatively impact academic teaching and learning. This may call for further scrutiny of how university teaching and learning policies complement and support the teaching demands and challenges faced by academics. Although *collegial influence* was perceived to be non-significant by the surveyed

teaching staff, collegial collaboration and support should be emphasised for the better collaboration of academics in improving overall teaching and learning experiences.

This study has provided a lens through which to reflect on and evaluate the current policies and practices to cultivate the self-regulation of learning in Australian university teaching and learning environments. Outcomes call on academic managers at various levels, including top management, teaching and learning departments and faculty heads, to consider their role in establishing policies and practices likely to lead to self-regulation in learning. They must be mindful that SRL is a long-term and ongoing project. More importantly, *self-regulation of learning is not a goal to be achieved; instead it is habit to be inculcated.*

To improve is to change.
To be perfect is to change often.
To change often is to self-regulate.
– *adapted from Winston Churchill*

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APPENDIX A: STUDENT'S INTERVIEW REQUEST EMAIL

Interview Request Email (Student)

Dear <Student>,

I am a PhD research student and my supervisor is Dr Ashley Aitken in the School of Information Systems here at Curtin University. Your name was suggested by a staff member from the School to receive an invitation to participate in an interview for my research.

I am investigating the factors that motivate university students in their learning and the different approaches students take to do well in their studies at university. Taking part in this research will contribute valuable information to help improve teaching and learning for university students.

I'd like to assure you that taking part in this research will not affect your grades or your studies at Curtin in any way (although it may give you some extra tips and hints on studying). I also have ethics approval from the University to conduct this interview (Approval number: IS_12_33).

Are you available to meet on <day> at <time> at the <venue>? Otherwise please suggest a convenient day and time.

If you have any questions please email me at rohini.balapumi@postgrad.curtin.edu.au.

I thank you for helping and look forward to chatting with you.

Kind regards,
Rohini Balapumi
PhD Candidate
School of Information Systems
Curtin University
Perth, Western Australia.

APPENDIX B: STUDENT'S INFORMATION SHEET AND INTERVIEW GUIDE

Information and Consent Form for Interview (Student)

This study is being conducted by Rohini balapumi, a PhD candidate at the School of Information Systems, Curtin University, Australia. The purpose of this study is to investigate the relationship between the various factors that influence students' understanding and use of self-regulated learning strategies in ICT (which includes Information Systems (IS), Information Technology (IT), Computer Science (CS) and Software Engineering (SE) majors) courses in Australian Universities.

You can help in this study by consenting to participate in a preliminary interview. It is anticipated that the time to complete the interview will be no more than 60 minutes. Contained in the interview are questions about your practices and strategies you use for your learning in your IS units.

With your permission, the interview shall be recorded to assist with transcription of your responses. No questions of a personal nature will be asked and no personal identifying data of yourself as the participant of identifying data of the organisation to which you are affiliated to will be made in the research report and publications emanating from it. You are free to withdraw consent and to discontinue participation in the interview at any time.

This research is being overseen and guided by Dr. Ashley Aitken, as the research supervisor and has been approved by the Curtin University Human Research Ethics Committee (Approval ID: IS_12_33). If needed, verification of approval can be obtained by writing to the Curtin University Human Research ethics Committee c/o, Office of Research and Development, Curtin University, GPO Box U1987, Perth 6845 or telephone +618 9266 9223 or email hrec@curtin.edu.au.

Your cooperation and generosity in participating in this study is highly valued and appreciated.

Thank you,

Rohini Balapumi

I, the participant have read and understood the information contained in this 'Information and Consent form' and have had all questions pertaining to this study answered to my satisfaction. I hereby agree to participate in this study realising that I may withdraw at any time. I also agree that information and research data gathered for this will be used in the analysis of factors that influence students' understanding and use of self-regulated learning strategies in ICT (which includes Information Systems (IS), Information Technology (IT), Computer Science (CS) and Software Engineering (SE) majors) courses in Australian Universities, and will be used in aggregate statistics. No personal identifying data of myself as the participant or identifying data of the institution to which I am affiliated to will be made in the research report.

_____ *Date:* _____

Participant's Name:

_____ *Date:* _____

Researcher: Rohini Balapumi

Interview Guide for Students

Objective: To explore the factors that influence student's understanding and use of Self-Regulated Learning (SRL) strategies in their learning.

Introduction to Concepts

What is Self-Regulated Learning (SRL)?
Self-regulated learning is learning in which students manage their thoughts, motivation and behaviours for successful learning. It is an iterative process of forethought (planning and goal setting), performance (monitor and control) and self-reflection (self-evaluation and self-judgement). This iterative process applies to students' cognition, metacognition, behaviour, motivation and environment (context) during their learning process to achieve their academic goals.

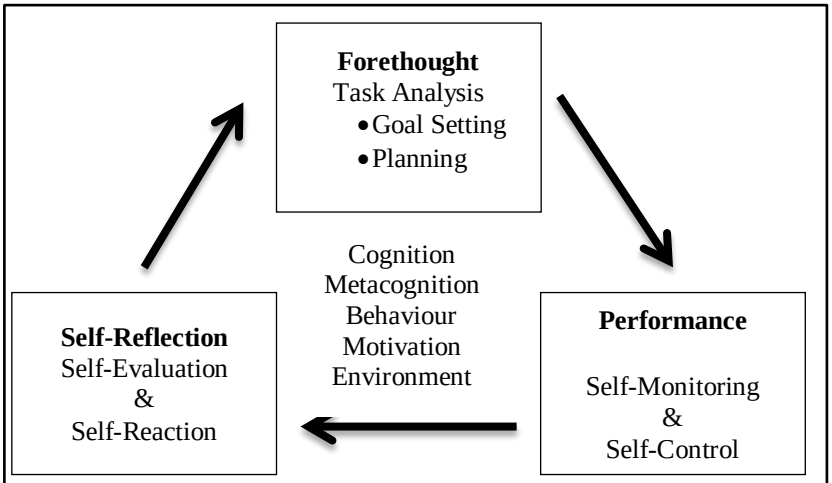

Figure 1: Iterative model of Self-Regulated Learning

(Adapted from Zimmerman 2002, Pintrich 2004)

Some examples of self-regulated learning strategies

1. *Goal-setting* - refers to setting appropriate learning goals
2. *Planning* – strategically plan on methods and approaches to achieve the learning goals
3. *Execution/implementation of plans* – implementing the strategies/approaches as planned
4. *Self-Monitoring* - Monitoring the methods/approaches and progress and adapting as necessary while executing the learning strategies
5. *Self-Evaluation* - Assessing the success of the implemented methods/approaches to achieve the learning goals
6. *Seeking Information* – initiation of effort to seek further information, beyond the materials provided while undertaking or completing a task.
7. *Seeking Help/assistance* – seeking help/assistance from peers/teachers/adults when faced with problems, while undertaking or completing a task.
8. *Time and Environment Management* - structuring time and physical and social learning environments to make it suitable and compatible to achieve the learning goals

General
Q1.1. Prior to this interview, were you aware or heard of self-regulation of learning (or independent learning, self-directed learning)? (*Explain if necessary*)

Academic Interest and Achieving Good Grades
Q2.1: What motives you to pursue this university education?

Task Value
Q3.1: In your opinion how important are the knowledge and skills you learn for your future?
Q3.2: Are the learning activities in your units useful (relevant) for your future learning?
Q3.3: Do your teaching and learning materials teach/demonstrate/outlines techniques on how you can or should do to learn the particular lesson or work out a problem?

Self-efficacy
Q4.1: Do you feel confident managing your studies at university?
Q4.2: What (factors) influence/affects your confidence in your learning at university?

Prior Learning Experience
Q5.1: Do you use the same learning methods/techniques for your learning now as you did in high school?
Q5.2: Why? / What (factors) influence/caused you change or retain your learning techniques at university level?

Metacognitive Knowledge
Q6.1: Do you have any particular methods/techniques to study? E.g.: taking notes, concept maps, summarizing etc.
Q6.1.1: What (factors) influence you to study in this way?
Q6.2: Have you attended any courses on study skills, e.g.: time management, exam techniques, reading skills?
Q6.2.1: What prompted you to attend these courses?
Q6.3: Do you set personal goals for learning? / Did you set any goals/target to achieve this semester?
Q6.3.1: What influences you to set such a target/goal?

Teaching Academic's Support
Q7.1: Does (or How often) your lecturer or tutors discuss techniques you can best learn?
Q7.2: Does (or How often) your lecturer or tutors discuss about how you can manage your studies at university?

Peer and Family Support
Q8.1: Do (and How do) you collaborate with you classmates in your learning?
Q8.2: Do you seek your family's (sibling, parents, relatives) assistance in your university learning, when necessary?

General

Q9.1: In your opinion what factors are most important in helping you to self-regulate your learning at university?

APPENDIX C: LECTURER'S INTERVIEW REQUEST EMAIL

Interview Request Email (Lecturer)

Dear <Lecturer>,

My name is Rohini Balapumi and, as you may already know, I am a PhD candidate with Dr Ashley Aitken and Dr Tomayess Issa within the School of Information Systems.

Previously Ashley emailed you to request assistance with obtaining access to students for my research. Now I am writing to ask if you could also be available for an interview.

As you may recall I am exploring the factors that influence the students use of SRL strategies in their learning at university, to inform the construction of a following survey of such factors.

The purpose of my study is to investigate the relationship between the various factors that influence students' understanding and use of self-regulated learning strategies in ICT courses in Australian universities.

I have obtained the necessary ethics approval from the University to conduct this interview (see attachment).

Are you available to meet during the week of 3rd December 2012 or 10th December 2012? Please feel free to suggest a convenient day and time.

Thank you.

Kind regards,
Rohini Balapumi
PhD Candidate
School of Information Systems
Curtin University
Perth, Western Australia.

APPENDIX D: LECTURER'S INFORMATION SHEET AND INTERVIEW GUIDE

Information and Consent Form for the Interview (LECTURER)

This study is being conducted by Rohini balapumi, A PhD candidate at the School of Information Systems, Curtin University, Australia. The purpose of this study is to investigate the relationship between the various factors that influence students' understanding and use of self-regulated learning strategies in ICT (which includes Information Systems (IS), Information Technology (IT), Computer Science (CS) and Software Engineering (SE) majors) courses in Australian Universities.

You can help in this study by consenting to participate in a preliminary interview. It is anticipated that the time to complete the interview will be no more than 60 minutes. Contained in the interview are questions about your current practices and strategies you use in teaching your IS units.

With your permission, the interview shall be recorded to assist with transcription of your responses. No questions of a personal nature will be asked and no personal identifying data of yourself as the participant of identifying data of the organisation to which you are affiliated to will be made in the research report and publications emanating from it. You are free to withdraw consent and to discontinue participation in the interview at any time.

This research is being overseen and guided by Dr. Ashley Aitken, as the research supervisor and has been approved by the Curtin University human Research Ethics Committee (Approval ID: IS_12_34). If needed, verification of approval can be obtained by writing to the Curtin University Human Research ethics Committee c/o, Office of research and development, curtin University, GPO Box U1987, Perth 6845 or telephone +618 9266 2784 or email hrec@curtin.edu.au.

Your cooperation and generosity in participating in this study is highly valued and appreciated.

Thank you,

Rohini Balapumi

I, the participant have read and understood the information contained in this 'Information and Consent form' and have had all questions pertaining to this study answered to my satisfaction. I hereby agree to participate in this study realising that I may withdraw at any time. I also agree that information and research data gathered for this will be used in the analysis of factors that influence students' understanding and use of self-regulated learning strategies in ICT (which includes Information Systems (IS), Information Technology (IT), Computer Science (CS) and Software Engineering (SE) majors) courses in Australian Universities, and will be used in aggregate statistics. No personal identifying data of myself as the participant or identifying data of the institution to which I am affiliated to will be made in the research report.

_____ *Date:* _____

Participant or authorised representative

_____ *Date:* _____

Researcher: Rohini Balapumi

Interview Guide for Lecturers

Introduction to Concepts

What is SRL?
Self-regulated learning is learning in which students manage their thoughts, motivation and behaviours for successful learning.
It is an iterative process of forethought (planning and goal setting), performance (monitor and control) and self-reflection (self-evaluation and self-judgement) of cognition, metacognition, behaviour, motivation and environment (context) during their learning process to achieve their academic goals.

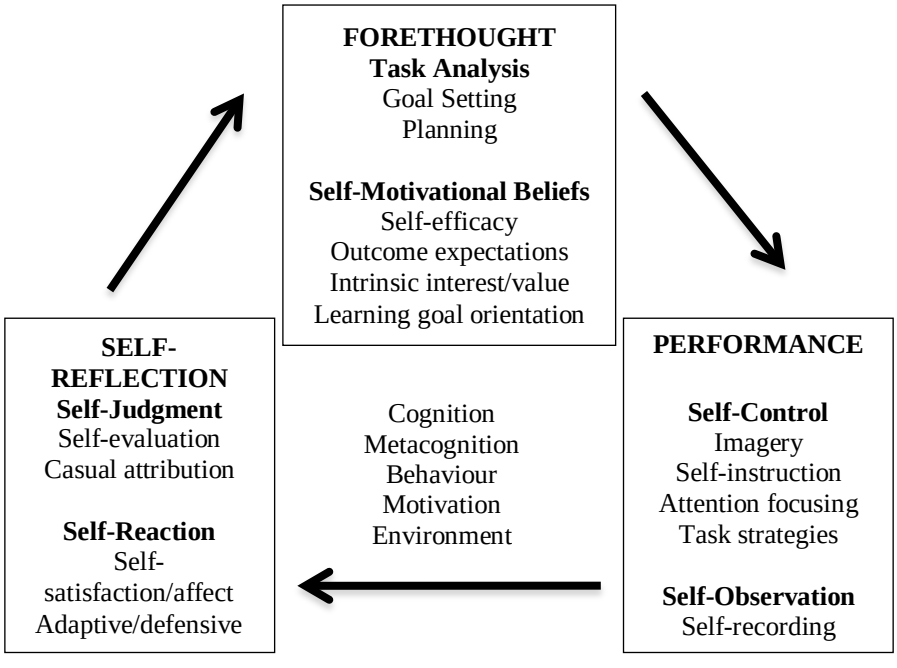

Figure 1: Iterative model of Self-Regulated Learning *(Zimmerman 2002)*

1. Explicit SRL instruction involves instruction of how to do SRL by the lecturers, including direct explanation, modelling, and guided practice in the application of the strategies
2. Implicit SRL instruction involves modelling, and guided practice in the application of how to do SRL with assumption that students will naturally pick up on the purpose of the strategies and begin to use them independently (Duffy, 2002).

A. Inclusion of SRL instructions in teaching and learning (T&L) materials
SRL strategies instructions in T&L materials include providing guided instructions to students in the application of a particular approach to self-regulate their learning activities/tasks.
B. Lecturer's facilitation of SRL in their verbal instructions (separate from T&L materials)
Verbal instructions of SRL strategies include direct explanation of strategies, discussing what the strategy is, how it works and when to use the strategy and why it works. This involves modelling, and guided practice in the application of the strategies

Some examples of SRL instructions:

1. Guiding students or provide some means to **self-evaluate** their work before and after submission.
2. Guide or inform students on where and how they could **seek help** in case they face difficulties in their studies or even in a particular topic.

3. Guide students them how to **seek information** from other sources such as Internet and library when undertaking an assignment or learning a topic.

What are SRL Strategies and SRL Skills?
SRL Strategies

Self-regulation learning strategies are approaches used by students to control and manage their progress on their learning tasks. This includes managing their cognitive, motivational, emotional and environmental factors that influence their learning.

(Wade, 1989 p. 329) defined self-regulated learning strategies as "actions and processes directed at acquiring information or skill that involves agency, purpose, and instrumentality perceptions by learners."

Examples of SRL Strategies

- **Planning** – strategically plan on methods and approaches to achieve the learning goals
- **Execution/implementation of plans -** implementing the strategies/approaches as planned
- **Self-Monitoring** - monitoring and adapting the methods/approaches and progress as necessary while pursuing the learning goals
- **Self-Evaluation** - Assessing the success of the implemented methods/approaches to achieve the learning goals
- **Seeking Information** – initiation of effort to seek further information, beyond the materials provided while undertaking or completing a task.
- **Seeking Help/assistance** – seeking help/assistance from peers/teachers/adults when faced with problems, while undertaking or completing a task.

SRL Skills

SRL skills refer to a learner's ability or competence to monitor and manage their cognitive knowledge, metacognitive knowledge and their available resources for their learning. This includes a learner's ability or competence to (1) set appropriate learning goals (2) strategically plan the methods/approaches to achieve the learning goals (3) implement the planned methods accordingly (4) self-monitor their learning approaches and progress (5) self-evaluate one's approaches and progress (6) seek information from valid resources (7) seek assistance when needed and (8) ability to manage time and environment and available resources appropriately to succeed in their learning.

Cognitive strategies/skills involve thinking strategies/skills that help a learner acquire knowledge/information efficiently such as organisation, elaboration, problem solving and critical thinking skills.
Metacognitive strategies/skills can be referred as thinking about thinking which include strategies/skills that enable learners to understand and monitor their cognitive processes, such as self-monitoring and self-evaluation strategies.

Interview Questions

General question

1. Prior to this interview, were you aware or had you heard of self-regulated learning (or independent learning, self-directed learning)?

Main questions

2. In your opinion, what factors influence you to talk about SRL strategies (verbal instruction - separate from T&L materials) to your students?
3. In your opinion, what factors influence you to incorporate (or not) SRL strategies in the teaching & learning materials you develop?

Probing questions

4. In your opinion, do your students possess the necessary SRL skills (i.e. are they competent in the strategies I have outlined in the document?)
5. In your opinion, what percentages of your students possess
    a. Good SRL skills? _____
    b. Average SRL skills? _____
    c. Poor or No SRL skills? _____
6. In the scale from 1 to 5, how would you rank the importance of teaching the following to your students?
    a. Domain Knowledge and Skills (1 Lowest) (2) (3) (4) (5 Highest)
    b. Self-Regulated Learning Strategies (1 Lowest) (2) (3) (4) (5 Highest)
7. In the scale from 1 (lowest) to 5 (highest), how would you rate your:
    a. Understanding of thinking (*cognitive*) skills/strategies?
    b. Ability to teach *thinking* (*cognitive*) skills/strategies?
8. In the scale from 1 (lowest) to 5 (highest), how would you rate your
    a. Understanding of thinking about thinking (*metacognitive*) skills/strategies?
    b. Ability to teach "thinking about thinking" (*metacognitive*) skills/strategies?
9. In the scale from 1 (lowest) to 5 (highest), how would you rate
    a. Your understanding of other self-regulated learning strategies?
    b. Your ability to teach other self-regulated learning strategies?
    c. The relevance of academics (lecturers) teaching SRL strategies?
10. What do you think about the available resource, support and/or facilities for SRL facilitation in students?

Concluding questions

11. In your opinion, what factors influence you to incorporate (or not) SRL strategies in the teaching & learning materials you develop?

APPENDIX E: MEASURING ITEM CODES AND DESCRIPTIONS

Student's Questionnaire

Table E.1: Factors Identified for Students' Self-Regulation of Learning

Item Code	Description
Academic Interest (Mastery Goal)	
ACAD2	I want to develop deep understanding of what I am learning in my unit/course.
ACAD3	I want to learn new knowledge in my area of study.
ACAD5	I want to master the course I am learning.
Good Grades (Performance Goal)	
GRD1	I want to achieve good grades.
GRD2	I want to get better grades than others.
GRD5	I want to achieve high marks in my units/courses.
Employment Prospects (Performance Goal)	
EMPY1	I want to have a job with good income.
EMPY3	I want ensure I have good career opportunities once I graduate.
EMPY4	Desire to pursue a career that is intellectually challenging.
SFTR3	It increases my opportunities for a better-paid and more satisfying career.
Successful Future (Performance Goal)	
SFTR1	I self-regulate my learning because it increases my opportunities for financial security.
SFTR2	Success at university will ensure high standard of living in the future (not necessarily good career of financial security but a more balanced life, e.g.: good social well-being).
SFTR5	I desire to have position of respect and high status in the community.
EMPY2	Good learning at university means good life in the future.
Task Value	
TV3	The knowledge and skills I'm learning are very interesting.
TV4	The activities in the unit/course are very stimulating to my knowledge.
TV5	I believe I will use the knowledge and skills that I learn at some point in the future.
ACAD6	I like the subject matter that I am learning.
Family	
FMLY2	I want to prove my abilities to my family and friends.
FMLY3	I want to fulfill my family's expectations of being a successful graduate.
FMLY4	I want my parents and family to be proud of my academic achievements.
Metacognitive Knowledge Awareness	

MCK3	I am aware of the learning strategies I use while I am learning.
MCK4	I use different learning techniques depending on the situation.
MCK5	I am aware of my learning efforts.
MCK7	I know my strengths and weaknesses as a learner.
Peer Support and Influence	
PEER1	My peers and I help each other to learn better.
PEER2	My peers and I motivate each other to learn.
PEER3	My peers and I teach each other to learn effectively.
PEER4	My peers and I share various ways to self-regulate our learning.
Prior Learning Experience	
PLE1	My previous primary and secondary school learning experiences help me to self-regulate my learning now.
PLE2	My previous post-secondary learning experiences (if you have any).
PLE3	Self-regulating helped me gain good grades in the past.
PLE4	I learn my self-regulating learning skills from my previous school and postsecondary learning experiences.
Self-Efficacy	
SE3	I am confident I can complete all my learning tasks.
SE4	I am handling my learning at university very well.
SE5	I have the skills required for my university learning.
Teaching Staff	
TS2	My teaching staff guides me to self-reflect my learning effectively.
TS3	My teaching staff guides me on how to self-regulate (plan, self-monitor, self-evaluate) my learning.
TS4	My teaching staff helps me to learn effectively.
TS5	My teaching staff encourages me to self-regulate my learning.
TS6	My teaching staff emphasises the importance of self-regulated learning.

Table E.2: Measures for Students' Self-Regulation of Learning (studentSRL)

Cognitive (Learning) Strategies	
SRL_LS1	When I study, I pull together information from different sources, such as lectures, readings and discussions
SRL_LS6	I consciously focus my attention on important information
SRL_LS7	I use outlines or other organisational structures (e.g.: mind maps) to help me organise my thoughts.
SRL_LS8	I often question things I hear or read to decide if I find them convincing
Goal Setting and Planning	
SRL_GSP1	I set specific goals before I begin a learning task
SRL_GSP2	I organise my time to best achieve my learning goals.
SRL_GSP3	Before I begin a task, I plan on how I will complete the task.
SRL_GSP4	When I study, I set goals for myself in order to direct my activities in each study period.
Self-Monitoring	
SRL_SM1	I constantly monitor my learning progress in the unit/course.
SRL_SM2	I ask myself periodically if I am meeting my goals.
SRL_SM3	I find myself pausing regularly to check my understanding.
SRL_SM4	I periodically review to help me understand important relationships.
SRL_SM5	I ask myself questions about how well I am doing while learning something new.
Self-Evaluation	
SRL_SEV1	I change my learning strategies when I fail to understand.
SRL_SEV4	I adjust my way of studying based on my performance in my unit/course.
SRL_SEV5	I ask myself how well I accomplish my goals once I'm finished.
Time and Environment Management	
SRL_TE1	I usually study in a place where I can concentrate on my learning tasks.
SRL_TE2	I make good use of my study time.
SRL_TE3	I have a regular place set aside for studying.
Help Seeking	
SRL_PL1	I often set aside time to discuss the unit/course materials with my fellow students.
SRL_PL3	I try to work with other students from this class to complete the learning tasks/assignments.
SRL_HS1	I ask my teaching staff to clarify concepts and skills I don't understand well.
SRL_HS2	When I can't understand something in my unit/course, I ask another student for help.
SRL_HS3	I ask others for help when I don't understand something.

Lecturer's Questionnaire

Table E.3: Measures for Lecturer's SRL Facilitation

Lecturer's SRL Facilitation (Dependent Variable)	
DV_1	How much do you facilitate planning activities such as goal setting and task analysis in your students' learning process?
DV_2	How much do you facilitate self-monitoring activities in your students' learning process?
DV_3	How much do you facilitate self-reflection activities in your students' learning process?
DV_4	How much do you guide your students in managing their learning resources (e.g. time management, study environment)?
Lecturers' belief on facilitating SRL	
LecBelief4	Facilitating students to self-regulate their learning will help them to become independent learners.
LecBelief5	The instructions of SRL strategies lead to students being better in evaluating their learning.
LecBelief6	Lecturers/teaching staff have to provide opportunities to students to build up their own knowledge in a collaborative way or together with their teaching.
SRLBeliefs 1	I believe it is essential to promote the development of self-regulation among students.
Lecturer's knowledge of SRL facilitation	
LecKnw1	I am NOT familiar with the teaching of self-regulated learning (SRL).
LecKnw2	I have never been taught how to include SRL in my teaching.
LecKnw4	There is NO training provided on how to teach or facilitate SRL at tertiary level.
Resrcs1	There are no clear instructions on how to implement self-regulated learning in teaching activities.
Collegial influence	
Peer1	My peers achieve successful results by guiding students to self-regulate their learning.
Peer2	My colleagues make effort to improve students' self-regulated learning skills.
Policies6	My department emphasise on improving students' self-regulation of learning.
University policies	
Policies1	There is no policy or direction to promote or to include self-regulated learning (SRL) skills in my teaching activities.
Policies3	Development of self-regulation among students is not taken into consideration while assessing the performance of my unit.
Policies5	I Don't get sufficient support to incorporate SRL in my teachings.

Curriculum design and demands	
Resrcs4	Students' Self-Regulation of Learning skills are not evaluated in the curriculum.
Resrcs5	Priority is given to students acquiring subject matter knowledge and not SRL skills within the unit.
Policies2	The performance of the unit is assessed based on the students' grades and not by their acquired SRL abilities.
Student diversity	
StudDiv2	Facilitating self-regulated learning in students from diverse educational background is challenging.
StudDiv3	It's challenging to facilitate self-regulated learning in students' with varying language and cultural background.
StudDiv5	The increasing diversity of the student body makes the mix of expectations from teaching staff more complex.
Rewards and recognition	
rwd2	My efforts to help students to self-regulate their learning are recognised and rewarded.
rwd4	I am recognised and rewarded accordingly for supporting the self-regulation among my students.
Workload (Time constraint)	
time1	I lack the time to design and facilitate self-regulated learning (SRL) strategies to students on top of my teaching, research, and other responsibilities.
time3	It would take a lot of effort and time to learn about SRL and implement it in my teaching.
Resrcs3	It is challenging to incorporate SRL within the current established curriculum due to limited teaching time.

APPENDIX F: STUDENT'S FINALISED SURVEY

Information Sheet and Consent Form

Dear Participant,

Introduction: Rohini Balapumi, PhD student at Curtin University
My name is Rohini Balapumi and I am a PhD research student at the School of Information Systems, Curtin University undertaking research on students' self-regulated learning at higher education. I would appreciate if you could take part in this voluntary, anonymous and confidential online survey.

Importance and Purpose of Research: Factors that influence self-regulation of learning at university.
The purpose of this study is to investigate the relationship between the various factors that influence students' self-regulating their learning in Universities. Your input is very important for this research to assist the universities to focus on and move towards a better understanding of self-regulated learning and be better able to promote and facilitate SRL among students and to help the relevant university personnel to invest time and effort on the aspects that will help students to become self-regulated learners.

Confidentiality: We will protect your privacy and you can withdraw at any time!
This research is being conducted in accordance with Curtin University's Code of Conduct and your responses will be reported in aggregate form only and will not be identifiable with you personally. Participation in this research is completely voluntary and your responses will be completely anonymous. You may withdraw at any time without prejudice or negative consequences, and do not need to provide a reason. By completing the survey, you are consenting to participate.

Any information provided by you through the survey will be held as strictly confidential. Information will not be disclosed to any parties besides the researchers, unless required to do so by law. Finally, the researcher will ensure that published material will not contain any information that can identify you in person.

Respondent's responsibilities: Complete two sections in about 15 -20 minutes.
This survey has two sections including demographics information. It should take about 15-20 minutes to answer all the questions. We know that people respond more accurately to questionnaires when they think carefully about their answers, and take time in answering, therefore please do so when answering the questions in this survey.

Questions or Comments: Contact me if you have any questions.
If you have any queries or comments regarding this research please contact Ms. Rohini Balapumi by email (rohini.balapumi@postgrad.curtin.edu.au) or call +614 3755 0998 (mobile).

Your assistance in this research is greatly appreciated and is crucial for the validity of its findings.

Thank you.

Kind regards,Rohini Balapumi
PhD Research Student
School of Information Systems
Curtin University, Perth, Australia

This research is being overseen and guided by Dr Ashley Aitken, as the research supervisor, and has been approved under Curtin University's process for lower-risk studies (Approval Number IS_13_19). This process complies with the National Statement on Ethical Conduct in Human Research (Chapter 5.1.7 and Chapters 5.1.18-5.1.21). For further information on this study contact the researchers named above or the Curtin University Human Research Ethics Committee. c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth 6845 or by telephoning 9266 9223 or by emailing hrec@curtin.edu.au

Description of Self-Regulated Learning (SRL)

Self-Regulated Learning (also referred to as self-regulation or simply SRL) is learning in which you manage your **thoughts**, **emotions** and **actions** in order to achieve academically.

It is an iterative process in which you continuously engage in planning and goal setting, self-monitoring, self-reflection and self-evaluation of your knowledge, motivation and behaviour.

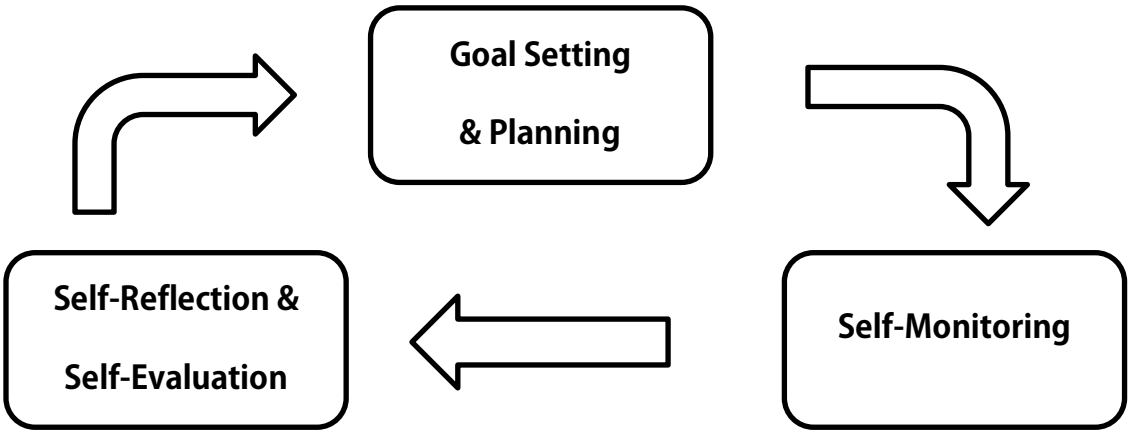

Figure 1: Iterative model of Self-Regulated Learning

In this research, we distinguish Self-Regulated Learning (SRL) from Self-Directed Learning (SDL) and Independent Learning (IL).

Self-Regulated Learning (SRL) is learning in which regulation of the learning process is managed by the learner. Typical of any classroom-based learning environment the learning goals and the learning outcomes are well established and, directions for achieving the learning goals and resources are pre-determined.

Self-Directed Learning (SDL) is learning in which the learning outcomes are clearly decided by external entities such as lecturers. The learner then decides the directions, methods and resources to achieve the learning outcomes.

Independent learning (IL) is learning in which the learning goals, methods, directions and resources to achieve the learning goals are decided and managed solely by the learner.

Section 1: The statements in this section seek to measure your approaches to self-regulate your learning.

Please read each statement carefully and then rate on the scale of 1 (Not At All True of Me) to 10 (Very True of Me), your level of agreement with each statement.

There is no "right" or "wrong" answers.

Not At All True of Me ----- Very True of Me

	1	2	3	4	5	6	7	8	9	10
When I study, I pull together information from different sources, such as lectures, readings and discussions	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I consciously focus my attention on important information	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I use outlines or other organisational structures (e.g.: mind maps) to help me organise my thoughts.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I often question things I hear or read to decide if I find them convincing	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I set specific goals before I begin a learning task	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I organise my time to best achieve my learning goals.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Before I begin a task, I plan on how I will complete the task.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
When I study, I set goals for myself in order to direct my activities in each study period.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I constantly monitor my learning progress in the unit/course.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I ask myself periodically if I am meeting my goals.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I find myself pausing regularly to check my understanding.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I periodically review to help me understand important relationships.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I ask myself questions about how well I am doing while learning something new.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Not At All True of Me ----- Very True of Me

	1	2	3	4	5	6	7	8	9	10
I change my learning strategies when I fail to understand.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I adjust my way of studying based on my performance in my unit/course.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I ask myself how well I accomplish my goals once I'm finished.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I usually study in a place where I can concentrate on my learning tasks.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I make good use of my study time.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I have a regular place set aside for studying.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I often set aside time to discuss the unit/course materials with my fellow students.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I try to work with other students from this class to complete the learning tasks/assignments.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I ask my teaching staff to clarify concepts and skills I don’t understand well.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
When I can’t understand something in my unit/course, I ask another student for help.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I ask others for help when I don't understand something.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Section 2: The statements in this section seek to measure the extent that various factors influence you to self-regulate your learning at university.

Please read each statement carefully.

Rate on the scale of 1 (No Influence At All) to 10 (Very Strong Influence), the extent each influences you to self-regulate your learning at university. There is no "right" or "wrong" answers.

I self-regulate my learning at university because:

	1	2	3	4	5	6	7	8	9	10
I want to develop deep understanding of what I am learning in my unit/course.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to learn new knowledge in my area of study.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to master the course I am learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to have a job with good income.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want ensure I have good career opportunities once I graduate.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Desire to pursue a career that is intellectually challenging.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
It increases my opportunities for a better-paid and more satisfying career.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to prove my abilities to my family and friends.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to fulfill my family's expectations of being a successful graduate.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want my parents and family to be proud of my academic achievements.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to achieve good grades.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to get better grades than others.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I want to achieve high marks in my units/courses.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

I am aware of the learning strategies I use while I am learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I use different learning techniques depending on the situation.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I am aware of my learning efforts.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I know my strengths and weaknesses as a learner.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My peers and I help each other to learn better.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My peers and I motivate each other to learn.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My peers and I teach each other to learn effectively.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My peers and I share various ways to self-regulate our learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

I self-regulate my learning at university because	1	2	3	4	5	6	7	8	9	10
My previous primary and secondary school learning experiences help me to self-regulate my learning now.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My previous post-secondary learning experiences (if you have any).	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Self-regulating helped me gain good grades in the past.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I learn my self-regulating learning skills from my previous school and postsecondary learning experiences.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I am confident I can complete all my learning tasks.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I am handling my learning at university very well.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I have the skills required for my university learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I self-regulate my learning because it increase my opportunities for financial security.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Success at university will ensure high standard of living in the future (not necessarily good career of financial security but a more balanced life, e.g.: good social well-being).	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

I desire to have position of respect and high status in the community.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Good learning at university means good life in the future.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My teaching staff guides me to self-reflect my learning effectively.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My teaching staff guides me on how to self-regulate (plan, self-monitor, self-evaluate) my learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My teaching staff helps me to learn effectively.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My teaching staff encourages me to self-regulate my learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My teaching staff emphasises the importance of self-regulated learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I like the subject matter that I am learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
The knowledge and skills I'm learning are very interesting.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
The activities in the unit/course are very stimulating to my knowledge.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I believe I will use the knowledge and skills that I learn at some point in the future.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Please add comments on any other factors that influence you to self-regulate your learning at university:

Demographics Information

Age:
___ Under 18 ___ 18 – 21 ___ 22 – 25 ___ 26 – 30 ___ 31 - 40
___ 41 - 50 ___ 51 or over

Gender: ___ Male ___ Female

What is your study level?
❍ Undergraduate - Face-to-face
Year in study:
___ First Year ___ Second Year ___ Third Year ___ Fourth/Honours Year
___ Other - Please Specify: _____

❍ Undergraduate - Online
Year in study:
___ First Year ___ Second Year ___ Third Year ___ Fourth/Honours Year
___ Other - Please Specify: _____

❍ Postgraduate - Face-to-face
❍ Postgraduate - Online
❍ Other - Please specify: _____

What is your main field of study?
__ Engineering
__ Information Technology
__ Computer Science
__ Software Engineering
__ Computer Engineering
__ Other – Please Specify: _____

Mode of Study
___ Full-time ___ Part-time

What is the highest level of education you have completed?
❍ High/Secondary School
❍ Technical and Further Education - TAFE (Vocational Training Education)
❍ Bachelor's Degree
❍ Master's Degree
❍ Others - Please Specify: _____

What is your enrollment type?

- ❍ Domestic Student (Australian born or Australian Permanent Resident)
- ❍ International Student (International Student Vise or equivalent)
- ❍ Other - Please Specify: _____

On average how would you rate your academic performance?

- ❍ High Distinction (81 - 100)
- ❍ Distinction (71 - 80)
- ❍ Credit (61 - 70)
- ❍ Pass (50 - 60)
- ❍ Below Pass (< 50)

Are you working?

- ❍ Yes, Full time
- ❍ Yes, Part time; How many hours do you work per week (on average)? _____
- ❍ No

How your course fee is paid? (Tick all that applies)

- ❑ Self-paid
- ❑ FEE-HELP Loan
- ❑ Parents
- ❑ Scholarship
- ❑ Other - Please Specify: _____

Thank You for Your Participation in the Survey

APPENDIX G: LECTURER'S FINALISED SURVEY

SURVEY INFORMATION SHEET

Dear Sir/Madam,

Introduction: Rohini Balapumi, PhD research student at Curtin University
My name is Rohini Balapumi and I am a PhD research student at the School of Information Systems, Curtin University undertaking research on students' self-regulated learning at higher education. I would appreciate if you could take part in this voluntary, anonymous and confidential online survey.

Purpose of Research: Factors influencing students' self-regulated learning (SRL) and lecturers facilitating students to self-regulate learning at Higher Education.
The aim of this research is to investigate (1) the current level of self-regulation of learning by students, (2) the factors influencing students' to self-regulate their learning and (3) the factors influencing lecturers facilitating students to self-regulate their learning. This survey is particularly addressing the third aim of this research.
Your input is very important for this research to assist the universities to focus on and move towards a better understanding of self-regulated learning concept and be better able to promote and facilitate SRL among students and to help the relevant university personnel to invest time and effort on the aspects that will help students to become self-regulated learners.

Confidentiality: We will protect your privacy and you can withdraw at any time!
This research is being conducted in accordance with Curtin University's Code of Conduct and your responses will be reposted in aggregate form only and will not be identifiable with you personally. Participation in this research is completely voluntary and your responses will be completely anonymous. You may withdraw at any time without prejudice or negative consequences, and do not need to provide a reason. By completing out the survey, you are consenting to participate.

Any information provided by you through the survey will be held as strictly confidential. Information will not be disclosed to any parties besides the researchers, unless required to do so by law. Finally, the researcher will ensure that published material will not contain any information that can identify you in person.

Respondent's Responsibilities: Complete survey in 15-20 minutes.
This survey has two sections including demographics information. It should take about 15-20 minutes to answer all the questions. Please answer the questions to the best of your knowledge. Most of the questions require your view or opinion measured on a ten-point scale.
Please contact Rohini Balapumi if you have any issues accessing the survey.

Questions or Comments: Contact me if you have any questions.
If you have any queries or comments regarding this research please contact Rohini Balapumi by email (rohini.balapumi@postgrad.curtin.edu.au) or call +614 3755 0998 (mobile).

Your assistance in this research is greatly appreciated and is crucial for the validity of its findings.

Thank you in advance for your support.

Kind regards,
Rohini Balapumi
PhD Student,
School of Information Systems, Curtin University, Perth, Australia

This research is being overseen and guided by Dr Ashley Aitken, as the research supervisor, and has been approved under Curtin University's process for lower-risk studies (Approval Number IS_13_19). This process complies with the National Statement on Ethical Conduct in Human Research (Chapter 5.1.7 and Chapters 5.1.18-5.1.21). For further information on this study contact the researchers named above or the Curtin University Human Research Ethics Committee. c/- Office of

Description of Self-Regulated Learning (SRL)

Self-regulated learning (SRL) is learning in which students manage their thoughts, motivation, behaviour and environment for successful learning.

It is an iterative process of

- forethought (planning and goal setting),
- performance (self-control and self-monitor) and,
- self-reflection and self-evaluation

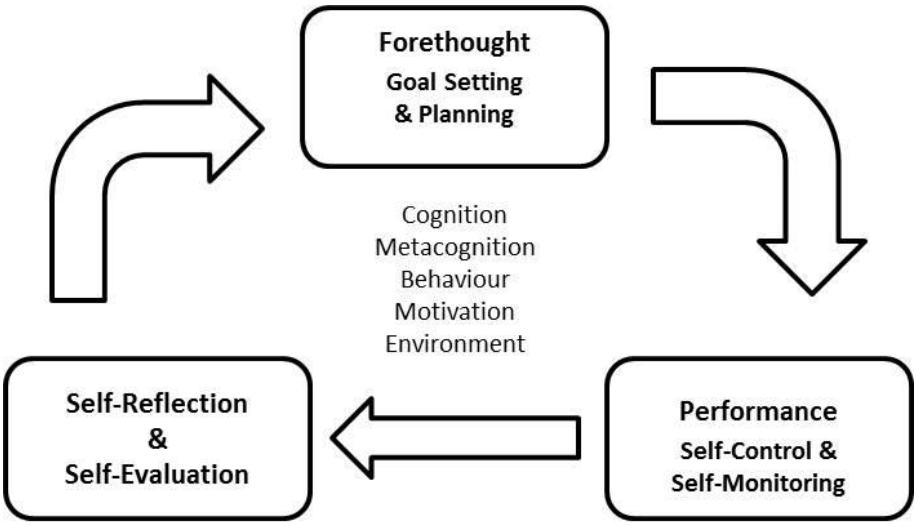

Figure 1: Iterative model of Self-Regulated Learning
(Adapted from Zimmerman 2002, Pintrich 2004)

of cognition, metacognition, behaviour, motivation and environment during their learning process to achieve their academic goals (Zimmerman 2002; Pintrich 2004).

SRL instruction can be of two types:

1. Explicit SRL instruction involves instruction of how to do SRL by the lecturers, including direct explanation, modelling, and guided practice in the application of the strategies.
2. Implicit SRL instruction involves demonstrating, and guided practice in the application of how to do SRL with the assumption that students will naturally pick up on the purpose of the strategies and begin to use them independently.

Cooperative learning, peer tutoring, guided enquiry, scaffolded support and reciprocal teachings are instructional practices that can be utilised to promote the development of self-regulation among students (Paris and Newman 1990; Paris and Paris 2001).

For the purpose of this research, we also distinguish Self-Regulated Learning (SRL) from Self-Directed Learning (SDL) and Independent Learning (IL) as follows:

Self-Regulated Learning (SRL) is learning in which regulation of learning process is managed by the learner. Typical of any classroom-based learning environment the learning goals and the learning outcomes are clearly defined and, directions for achieving the learning goals and resources are given to the student.

Self-Directed Learning (SDL) is learning in which the learning outcomes are clearly defined by external entities such as lecturers. The learner then decides the directions, methods and resources to achieve the learning outcomes.

Independent learning (IL) is learning in which the learning goals, methods, directions and resources to achieve the learning goals are decided and managed solely by the learner.

Balapumi, R., & Aitken, A. (2012). Concepts and factors influencing independent learning in IS higher education. Paper presented at the ACIS 2012: Location, location, location: Proceedings of the 23rd Australasian Conference on Information Systems 2012.
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Paris, S. G. and A. H. Paris (2001). "Classroom applications of research on self-regulated learning." Educational Psychologist 36(2): 89-101.
Pintrich, P. R. (2004). "A conceptual framework for assessing motivation and self-regulated learning in college students." Educational psychology review 16(4): 385-407.
Zimmerman, B. J. (2002). "Becoming a Self-Regulated Learner: An Overview." Theory Into Practice 41(2): 64-70.

Section 1: The statements in this section seek to measure the extent that various factors influence you to facilitate your students to self-regulate their own learning.

Please rate the following questions in the scale of 1 (Not At All) and 10 (All the Time).

Definition of some terms:

***SelfMonitoring* – tracking one's progress through their own learning, e.g. self-testing and questioning, tracking completion of tasks.**

***SelfReflection* –reflecting on one's learning process to fine-tune and continuously improve it, during and/or after the learning.**

Not At All **All the Time**

	1	2	3	4	5	6	7	8	9	10
How much do you facilitate planning activities such as goal setting and task analysis in your students' learning process?	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
How much do you facilitate self-monitoring activities in your students' learning process?	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
How much do you facilitate self-reflection activities in your students' learning process?	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
How much do you guide your students in managing their learning resources (e.g. time management, study environment)?	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Please read each statement carefully, and then indicate in the scale of 1 (Not True At All) and 10 (Very True) the extent of your agreement with each statement by clicking on one of the circles.

Acronym use: SRL – Self-Regulated Learning

Not True At All ---------- Very True

	1	2	3	4	5	6	7	8	9	10
I lack the time to design and facilitate self-regulated learning (SRL) strategies to students on top of my teaching, research, and other responsibilities.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
It would take a lot of effort and time to learn about SRL and implement it in my teaching.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
It is challenging to incorporate SRL within the current established curriculum due to limited teaching time.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My efforts to help students to self-regulate their learning are recognised and rewarded.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I am recognised and rewarded accordingly for supporting the self-regulation among my students.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Facilitating students to self-regulate their learning will help them to become independent learners.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
The instructions of SRL strategies lead to students being better in evaluating their learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Lecturers/teaching staff have to provide opportunities to students to build up their own knowledge in a collaborative way or together with their teaching.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I believe it is essential to promote the development of self-regulation among students.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I am NOT familiar with the teaching of self-regulated learning (SRL).	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I have never been taught how to include SRL in my teaching.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Not True At All ----------Very True

	1	2	3	4	5	6	7	8	9	10
There is NO training provided on how to teach or facilitate SRL at tertiary level.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
There are no clear instructions on how to implement self-regulated learning in teaching activities.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Facilitating self-regulated learning in students from diverse educational background is challenging.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
It's challenging to facilitate self-regulated learning in students' with varying language and cultural background.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
The increasing diversity of the student body makes the mix of expectations from teaching staff more complex.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Students' Self-Regulation of Learning skills are not evaluated in the curriculum.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Priority is given to students acquiring subject matter knowledge and not SRL skills within the unit.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
The performance of the unit is assessed based on the students' grades and not by their acquired SRL abilities.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My peers achieve successful results by guiding students to self-regulate their learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My colleagues make effort to improve students' self-regulated learning skills.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
My department emphasise on improving students' self-regulation of learning.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
There is no policy or direction to promote or to include self-regulated learning (SRL) skills in my teaching activities.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Development of self-regulation among students is not taken into consideration while assessing the performance of my unit.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
I Don't get sufficient support to incorporate SRL in my teachings.	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Section 2: Demographics Information

Gender:

- ☐ Male
- ☐ Female

How long have you been teaching?

- ☐ 0 - 5 years
- ☐ 6 – 10 years
- ☐ 11 - 20 years
- ☐ 21 – 30 years
- ☐ More than 30 years

What is the main field of the course/programme you are teaching (Discipline Area not necessarily school /department name).

- ☐ Information Systems / Information Technology
- ☐ Engineering
- ☐ Computer Science
- ☐ Other – Please Specify: _____

Which study level are you teaching?

- ☐ Undergraduate Face-to-face
- ☐ Undergraduate Online
- ☐ Other Please specify: _____
- ☐ Postgraduate Face-to-face
- ☐ Postgraduate Online

Which year(s) of undergraduate course are you teaching?

- ☐ First Year
- ☐ Second Year
- ☐ Other – Please specify: _____
- ☐ Third Year
- ☐ Fourth Year

What is your academic classification?

- ☐ Associate Lecturer or equivalent
- ☐ Lecturer or equivalent
- ☐ Senior Lecturer or equivalent
- ☐ Other - Please Specify:_____
- ☐ Associate Professor or equivalent
- ☐ Professor or equivalent

What is your current academic role?

- ☐ Teaching role
- ☐ Research role
- ☐ Leadership role
- ☐ Administrative role
- ☐ Other - Please Specify:_____

What is your employment status?

- ☐ Full time
- ☐ Fractional Fulltime
- ☐ Sessional/Casual

Are there any comments with regards to this research or survey?

---- THANK YOU ---