

**THE CONTRIBUTION OF THE TEACHING-
LEARNING ENVIRONMENT
TO THE DEVELOPMENT OF SELF-REGULATION
IN LEARNING**

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**THE CONTRIBUTION OF THE TEACHING LEARNING
ENVIRONMENT TO THE DEVELOPMENT
OF SELF-REGULATION IN LEARNING**

by

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DECLARATION OF ORIGINALITY

I, Peter Patrick Mahlangu (student number: 9525859) declare that:

“The contribution of the teaching-learning environment to the development of self-regulation in learning”

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. This thesis was not previously submitted by me for any degree at another university.

Signature

Date



SUMMARY

This study focuses in the students' perception of self-regulation in learning as influenced by the teaching-learning-environment. The study was conducted at the University of Pretoria. The participants in the study were first year students registered for a second semester module in Educational Psychology in the faculty of education. The size of the sample was nine (22,5%) male students and 31 (77,5%) female students. At the time of participation, the participants had attended university for a period of at least six months and had written tests and one examination.

The Interactive Qualitative Analysis (IQA) method as described by Northcutt and McCoy (2004) was used to elicit participants' knowledge and experiences of the research phenomenon. The participants were expected to complete an instrument that required them to indicate the direction of three relationships between all combinations of the themes which were selected on the basis of literature review. The participants were required to indicate how they perceive the nature of relationships between themes that were developed by the researcher as associated with self-regulated learning in a system of cause and effect.

The main findings of the study indicate that language of instruction and student personality are primary drivers that determine the academic success of the students. The two themes exert great influence on other themes that are involved in the teaching-learning environment. Academic success emerged as primary outcome which means that it is a theme that depends to a large extent on how the other themes that exist in the teaching-learning environment are structured.

The findings of the study indicate that there is no significant difference that exists in the male and female participants' perception of the factors that influence self-regulation in learning. In both sample primary drivers were language of instruction and students' personality and the primary outcome was academic success.

KEY WORDS

Interactive Qualitative Analysis

Affinities

Affinity Relationship Table

Interrelationship Diagram

Systems Influence Diagram

Self-regulation

Teaching-learning environment

Social cognitive theory

Self-efficacy

Academic success



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CHAPTER 1

INTRODUCTION, BACKGROUND, RATIONALE, RESEARCH QUESTIONS AND METHODS

1.1 INTRODUCTION

The newly introduced outcome based education (OBE) as a system of education in South Africa, states that learners should be able to organize and manage themselves and their activities responsibly and effectively, (National Curriculum Statement Grade 10-12 2003:2). The introduction of the new curriculum also implies that learners should be independent seekers of information and actively construct knowledge. For learners to succeed in the process of learning they need to be able to regulate their learning in terms of processes such as goal setting and attainment of such goals.

The philosophy of OBE suggests a change in the roles of both educators and learners. Before the introduction of OBE in South Africa, the educator was generally viewed as an expert whose main role was to transmit knowledge to learners who were viewed as passive recipients of information. It is often argued that such practices promote rote learning because many learners fail to become independent seekers of information. As a result, they cannot construct knowledge independently. Human (2003:6) has described the role of the educator as that of a mediator (as opposed to that of facilitator which promotes a hands-off approach) who is co-responsible for creation and construction of knowledge by the learners. In this scenario the learners are seen as active participants in knowledge construction. Schunk and Zimmerman (1998:viii) also place more emphasis on the active role of the students as seekers, generators and processors of information.

There are seven roles of educators that are described in the National Education Policy Act (Act No. 27 of 1996), one of them being that of the learning mediator. For the purpose of this research project I will consider this role since it is highly relevant to the study of self-regulated learning. In terms of mediator of learning as the role of educators, educators are expected to construct learning environments that are appropriately contextualised and inspirational. Effective communication, which involves language, forms part of the demands of the role of educators as learning mediators. The role expands to include creation of learning environment in which critical and creative thinking is encouraged. The description of learning mediator as a role of educators therefore appears to be relevant for

developing skills of self-regulation in learners. Schunk and Zimmerman (1998:viii) have noted that educators generally are aware that self-regulatory behaviour of students is important in learning. However, these educators often do not know how to teach students self-regulatory skills or even how to enhance the students' use of self-regulation principles in classrooms.

Comments made by Jansen (2006:1) add weight to the statement of Schunk and Zimmerman (1998:viii) that educators do not know how to teach the self-regulatory skills to learners. Jansen (2006:1) further argues that South African students enter university level studies without the skills of self-regulation in learning which characterizes the University education. Other skills that many first year students lack, comprise basic skills of reading competently, writing accurately and speaking fluently. Since university learners are adults, it is expected of them, as also suggested by Mushi (2001:5), to have clear goals as compared to high school learners.

1.2 BACKGROUND TO THE STUDY

1.2.1 DEFINITIONS OF SELF-REGULATION

Self-regulation is defined by Schunk and Zimmerman (1994:ix) as students' thoughts, feelings and actions, which are systematically oriented toward attainment of their goals. In addition, Perry, Nordby and Vandekamp (2003:317) describe self-regulated students as those who are metacognitive, intrinsically motivated and strategic.

Self-regulated learners are distinguished by their view of academic learning as something they do for themselves rather than as something that is done to or for them (Schunk & Zimmerman 1998:1). The authors further describe self-regulated students as those who believe that academic learning is a proactive activity, requiring self-initiated motivational and behavioural processes as well as metacognitive ones. Academic self-regulation is generally not regarded as a mental ability, such as intelligence, or an academic skill such as reading proficiency; rather it is a self-directive process through which students transform their mental abilities into academic skills (Schunk & Zimmerman 1998:1-2). Some theorists assume that students who self-regulate their learning are engaged actively and constructively in a process of meaning generation and that they adapt their thoughts, feelings and actions as needed to affect their learning and motivation (Boekaerts & Corno 2005:201).

Perry, Nordby and Vandekamp (2003:318) describe the attributes of self-regulated learners as follows:

- Self-regulated learners are viewed as having effective learning and problem solving skills.
- Self-regulated learners typically have a high sense of efficacy in learning and they usually attribute outcomes to factors they can control (e.g. effort and effective use of strategies).
- Self-regulated learners are usually considered to be successful in and beyond school.

Given the complex nature of self-regulation, it is important to note that there are different models of self-regulation that can be used to guide educators in their contact with students. These models will be discussed next.

1.2.2 MODELS OF SELF-REGULATION

There are various models of self-regulation which emphasize aspects such as goals, planning and strategies. For example, Boekaerts and Corno (2005:203) proposed a model of self-regulation in which students face two priorities in classroom learning. One priority addresses the student's interest in achieving goals that increase resources and the other maintains emotional well-being. In the first priority, students seek to increase their cognitive and social skills whereas with the second priority they try to avoid harm and secure resources. Student's striving for mastery or growth is energized from top down by motivation such as personal interest, values, expected satisfaction and rewards. Boekaerts and Corno (2005:203) call this top down self-regulation because students' adopted learning goals direct the process. When self-regulation is triggered by cues from the environment, they refer to it as bottom up. In this regard, instead of beginning work with goals that are firmly established, it is feedback from the task and classroom reward structures that help to establish work orientations and generate work changes in work style.

According to this model students become concerned with emotional well-being when they feel threatened by the environmental cues. This implies that they will be concerned with maintaining positive feelings than with pursuit of growth goals. Boekaerts and Corno (2005:220) mention collaborative learning as another strategy of developing self-regulated learning. The authors' general understanding is that collaborative learning supports self-regulation because peers model and discuss their own learning and motivation strategies, which are then distributed across the group for individuals to pick up and modify to suit

their own needs. It is assumed that students who work on small group activities tend to help one another. Intellectually able students expand their learning by explaining concepts to their peers who need support, redefining what is meant by self-regulated learning. Lower achieving students benefit from the explanations by their able peers as well as from students who model good work habits.

Boekaerts (1997:162) describe self-regulated learners as those who rely on internal resources to govern their own learning process. They begin a learning activity by setting goals for extending knowledge and bolstering motivation. They seem to be aware of what they know and feel about the domain of study including which general cognitive and motivation strategies are (less) effective to attain the learning goals, how easy or difficult it is to gain mastery in that domain and whether they have the capacity and the motivation to invest the necessary resources.

Students who are self-regulated are generally more intrinsically motivated or more self-motivated. A second attribute of self-regulated students is their reliance on planned or an automated method of learning. Planned approaches have often been described in terms of learning strategies. Weinstein and Mayer (1986, in Schunk & Zimmerman 1994:1) grouped the learning strategies into two major classes, namely, strategies associated with product or outcome goals and strategies associated with process goals such as monitoring or controlling affect. Lastly, students who are self-regulated are distinguished by their sensitivity to and resourcefulness in terms of the effects of the social and physical environment on their learning. These students are more likely to organize or restructure their place of study than regular students, and also more likely to seek social assistance than regular students (Zimmerman & Martinez-Pons 1988, in Schunk & Zimmerman 1994:13).

With other students, when feedback points to failure, they tend to lose efficacy for learning and adopt defensive and self-handicapping approaches to learning. Often they try to avoid failure and damage to self-esteem by seeking easy tasks, procrastinating or avoiding work altogether (Schunk & Zimmerman 1994:13).

1.3 RATIONALE FOR THE STUDY

The purpose of this study is to explore students' conceptions of self-regulation in learning as influenced by the teaching-learning environment. Eshel and Kohari (2003:249) suggest that perceived meaning of the classroom environment rather than the environment as such is the important factor when studying the students' outcomes. Perceived control over

learning appears to constitute a major determinant of both self-regulation efforts and academic achievement. Schunk and Zimmerman (1998:10) acknowledge that there is limited research on self-regulation in naturalistic contexts and that it is unlikely that self-regulation emerges directly from formal instruction.

Studies pertaining to the effect of classroom factors have been conducted with reluctant learners who, despite their abilities, choose not to participate in school learning experiences. This study therefore, provides an initial path of inquiry that deserves further study. In the findings of the research (Daniels & Arapostathis 2005:44) students felt that teachers could create classrooms that encourage student engagement in activities despite the outside factors such as poverty, violence and other social problems that disturbed their learning process. The findings of this research correspond with those of Ames (1992, in Daniels & Arapostathis 2005:44) that also emphasize the characteristics of the classroom tasks as having an impact on the students' willingness to put effort and participate actively in learning activities. Daniels and Arapostathis (2005:35) recommend researchers to engage higher classes and traditional high school students in conversations (interviews) where educators and researchers can determine if there are common elements among students' learning experiences.

1.4 RESEARCH QUESTION

1.4.1 MAIN RESEARCH QUESTION

How does the teaching-learning environment contribute to students' conception of self-regulation in learning?

1.4.2 SUB-QUESTIONS

To formulate the sub-questions, one may ask to what extent students perceive certain themes to be significant contributing factors in the development of self-regulation in learning. Thus, to address the main research question, the following sub-questions were formulated on the basis of a literature review.

How are...

1. learner factors, such as self-efficacy, motivation and personality associated with self-regulation in learning in a system of cause-and-effect?
2. lecturer factors, such as feedback and the choice of language of instruction associated with self-regulation in a system of cause-and-effect?

3. social factors such as social interaction and amount of student participation associated with self-regulation in a system of cause-and-effect?
4. formal factors such as learning content associated with self-regulation in a system of cause-and-effect?
5. outcome factors such as academic performance associated with self-regulation in a system of cause-and-effect?

These sub-questions were also used to guide the researcher in the development and selection of ten themes that were presented to participants to consider and which will be discussed in greater detail in section 1.6 (definition of key terms).

1.5 METHOD

1.5.1 RESPONDENTS

The participants were first year students registered for a second semester module in Educational Psychology in the Faculty of Education at a South African University. The size of the sample was nine (22,5%) male students and 31 (77,5%) female students. At the time of participating in the study, the students had attended university for a period of at least six months and had written tests and one examination, which lead the researcher to assume that the students will have had opportunities for experiencing the need for self-regulatory behaviours. Students are offered a choice between attending lectures in English or Afrikaans and are permitted to write tests and examinations in the instructional language that they feel most competent in.

1.5.2 MATERIALS AND PROCEDURE

The Interactive Qualitative Analysis (IQA) method as described by Northcutt and McCoy (2004) was used to elicit participants' knowledge and experiences of the research phenomenon. The participants were expected to complete an instrument that required them to indicate the direction of three relationships between all combinations of ten themes which were selected on the basis of a literature review. The participants were required to indicate how they perceive the nature of the relationship between themes that were developed by the researcher as associated with self-regulated learning in a system of cause and effect.

According to Northcutt and McCoy (2004:38), IQA is regarded as an effective reconciliation of quantitative and qualitative methods as it balances rigor and description.

IQA is a way to represent participants' understanding of a particular phenomenon. Through a transparent procedure, IQA can be used to map the participants' knowledge and experience of the phenomenon being researched with rigor and at the same time produce powerful descriptions of the phenomenon. Therefore, it is believed that IQA as a method is well suited for this study.

As mentioned in section 1.4.2, themes were generated by including constructs which were considered to be important contributors to the teaching-learning situation in terms of the sub-questions of the study. Students were presented with detailed descriptions of the themes and then asked to indicate the relationships among them in an Affinity Relationship Table (ART), which is discussed in detail in chapter 3. However, by way of an introduction, I can briefly mention here that participants had to indicate the perceived direction of the influence between two themes, as well as exercising an option that indicates no relationship. For example, A influences B could be indicated as $A \rightarrow B$; B influencing A could be indicated as $B \rightarrow A$, and no relationship would be indicated as $A \leftrightarrow B$. In addition, participants had to write, from their own experience, a statement that illustrates the meaning of the relationship for a particular theme pair.

The ART results are then subjected to a Pareto analysis as described by Northcutt and McCoy (2004:158) to obtain the visual representation of the system, indicating participants' understanding of the phenomenon. The Pareto analysis will be explained in detail in chapter 3.

1.6 DEFINITION OF KEY TERMS

1.6.1 INTERACTIVE QUALITATIVE ANALYSIS (IQA)

Interactive Qualitative Analysis is a research approach described by Northcutt and McCoy (2004) as a systems method used in qualitative research with the aim of establishing how a particular group of participants represent their experiences of a phenomenon. In addition, these visual representations can be regarded as an indication of participants' mental models of a phenomenon as they are structured in terms of perceived cause and effect relationships (Human-Vogel 2006:616).

1.6.2 AFFINITIES

Affinities are described by Northcutt and McCoy (2004:81) as sets of textual references that have an underlying common meaning or theme, synonymous to factors or topics. In this research project affinities and themes are used synonymously.

1.6.3 THE AFFINITY RELATIONSHIP TABLE (ART)

The Affinity Relationship Table is a protocol where participants' hypotheses about perceived relationships are recorded. Affinity names are written on the table preferably in an alphabetical order so that there is no affinity that is seen as more important than others. This is a table where the relationships between all possible pairs of affinities are determined (Northcutt and McCoy 2004:150)

1.6.4 THE INTERRELATIONSHIP DIAGRAM (IRD)

An IRD is a matrix containing all the perceived relationships in the system (Northcutt & McCoy 2004:47). It contains a summary of the ART in the form of arrows that show whether each affinity in a pair is perceived cause or an effect, or if there is no relationship between the affinities in the pair. When creating the IRD, arrows are placed into the table to show the direction of the relationships.

1.6.5 SYSTEMS INFLUENCE DIAGRAM (SID)

The SID is a visual representation of an entire of influences and outcomes and is created by representing information in the IRD as a system of affinities and relationships among them (Northcutt and McCoy 2004:174).

1.6.6 PARETO ANALYSIS

In Pareto analysis, records of the number of relationships in Affinity Relationships Table are arranged in descending order of frequency to determine the relative strength of each relationship in relation to the total. Although Northcutt and McCoy (2004) have found the Pareto principle (roughly 20% of the variables are responsible for 80% of the variance) to be illustrated quite well in analyses with group of about 25, Human-Vogel (2006, in press) has found that it does not necessarily hold for larger samples.

1.6.7 SELF-EFFICACY

In this study, perceived self-efficacy refers to individual's beliefs about their ability to execute a particular performance. It involves judgments about capabilities specific to particular task (Aronson 2002:186).

1.6.8 MOTIVATION

Motivation refers to personal interest in pursuing an activity. It involves extrinsic and intrinsic reasons for engaging in particular activities. It includes the tendency to invest energy in achieving goals which may be personal or externally imposed (Schunk & Zimmerman 1998).

1.6.9 SELF-REGULATION

Self-regulation refers to self-generated thoughts, feelings and actions that are systematically designed to affect one's learning of knowledge and skills. Self-regulatory processes include attending to and concentrating on instructions, organizing, coding and rehearsing information to be remembered, establishing a productive work environment, using resources effectively, holding positive beliefs about one's capabilities, the value of learning, the factors influencing learning and the anticipated outcomes of actions, and experiencing pride and satisfaction with one's efforts (Boekaerts & Corno 2005).

1.6.10 STUDENT PERSONALITY

Student personality refers to the quality of condition of being a person and therefore refers to the totality of qualities or traits as of character or behaviour, that is peculiar to specific person (Wortman & Loftus 1992:385). Personality consists of all the relatively stable and distinctive styles of thought, behaviour and emotional response that characterize a person's adaptations to surrounding circumstances (Momborg 2004:9).

1.6.11 LECTURER FEEDBACK

Lecturer feedback refers to a clear indication of a perfect answer, information about the standard actually achieved, advice about how the gap might be closed and monitoring of the student's response to the advice in future work (Tanner & Jones 2003).

1.6.12 LANGUAGE OF INSTRUCTION

Language is a tool for thought and communication. Cultural diversity and social relations are expressed and constructed through language. Learning to use language effectively enables learners to think and acquire knowledge, to express their identity, feelings and ideas, to interact with others and to manage their world (National Curriculum Statement Grade 10-12). In this study, the language of instruction refers to the language that is used

to communicate learning content to students, which, in the context of the present study, includes English and Afrikaans.

1.6.13 SOCIAL INTERACTION

When students interact, they construct and maintain knowledge and become aware of their own thinking. Students provide explanations, ask appropriate questions, exchange ideas, justifications, speculations, inferences, hypotheses and conclusions (Kenneth 1999; Kumpulainen & Wray 2002).

1.6.14 STUDENT PARTICIPATION

When students work together on small group activities they tend to help one another and often more capable students will assist their less capable peers by explaining concepts and providing other assistance their peers may need. When students are engaged in group activities, they model and discuss their learning and motivation strategies which are then distributed across the group and as a result the members of the group pick up and modify their own strategies to suit their own needs. As the students work together in groups they all get the opportunity to participate in knowledge construction. On the other hand educators share control over the learning process with their students while students take initiative and experiment with their own problem solving strategies (Boekaerts & Corno 2005).

1.6.15 LEARNING CONTENT

Learning content refers to the body of knowledge, which must be covered within a limited time span. The students have to absorb, interpret, understand, gain insight and memorize the content (Olivier 1998).

1.6.16 ACADEMIC PERFORMANCE

Academic performance refers to aspects like attaining good grades. It also entails the ability to do well enough in core academic courses and to meet the general requirements of a course of study (Wigfield & Eccles 2002).

1.7 ETHICAL CONSIDERATIONS

The ethical guidelines of the Faculty of Education, University of Pretoria will be followed. The following considerations regarding ethics will be adhered to:

- Informed consent – participants will be informed about the purpose of the study. It will be clearly explained to them that participation in this research study is voluntary and that they are free to withdraw at any stage of the project. The participants will sign a consent form before taking part in the research activity.
- Anonymity and confidentiality – absolute confidentiality with regard to the participants' personal information will be maintained. The names of the participants will not be included on the questionnaire.
- Ethical clearance was obtained from the Ethics Committee of the university in which the study was conducted.
- Protecting participants from harm – all measures will be taken to protect participants from possible emotional or physical harm.

1.8 SUMMARY OF CHAPTERS

CHAPTER 1

The chapter comprises of the introduction, definition of concepts, purpose of the study, research questions, rationale for the study and the research design.

CHAPTER 2

The chapter will comprise of the discussion of self-regulated learning and the teaching-learning environment.

CHAPTER 3

The chapter will deal with the method and results of the study.

CHAPTER 4

The chapter will deal with the discussion of results and the findings of the study.



CHAPTER 2

SELF-REGULATED LEARNING AND THE TEACHING LEARNING ENVIRONMENT

2.1 INTRODUCTION

Studies of self-regulation (SR) are currently applied to fields as diverse as health, organisational behaviour and education. In this study I consider self-regulation in an educational setting, more commonly referred to as self-regulated learning (SRL). Seeing that SR is a broad concept incorporating many aspects of behaviour aimed at goal attainment, it is important to distinguish between SR as a broad concept, and SRL which refers to the application of self-regulation in academic and learning contexts.

According to Boekaerts, Pintrich and Zeidner (2005:14), self-regulation refers to self-generated thoughts, feelings and actions that are planned and adapted cyclically to the attainment of personal goals. In terms of behaviour, self-regulation involves self-observing and strategically adjusting performance processes, such as one's method of learning. Other forms of self-regulation include environmental self-regulation which refers to observing and adjusting environmental conditions or outcomes and covert self-regulation involves monitoring and adjusting cognitive and affective states, such as imagery for remembering or relaxing (Boekaerts, Pintrich & Zeidner 2005:14).

In terms of SRL though, Boekaerts and Corno (2005:199), have suggested that there is no simple and straightforward definition of self-regulated learning, although Boekaerts, Pintrich and Zeidner (2005:306-307) have suggested that self-regulated learning can be described as referring to "the creation of new goals, new means to maintain or attain goals or changing ways to assess current states". Often, SRL refers only to learning general mechanisms for improving self-regulation as opposed to learning general or specific mechanisms for regulating variables. SRL also includes learning to set specific, measurable goals when creating new goals (Boekaerts, Pintrich & Zeidner 2005:306-307).

The concepts of self-regulation and self-regulated learning are broad and can be described from different perspectives and point of views. I will therefore consider the concept of self-regulation from different theoretical backgrounds. In the next section theoretical approaches of self-regulation will be discussed.

2.2 THEORETICAL APPROACHES TO SELF-REGULATION

2.2.1 A SOCIAL COGNITIVE PERSPECTIVE

From a social cognitive perspective of self-regulation human functioning is viewed as a series of reciprocal interactions that occur among behaviour, environmental and personal variables (Schunk & Zimmerman 1998:139).

In a learning situation, self-efficacy represents a personal variable that can influence achievement behaviours such as choice of task and persistence when working on a task. Students who are efficacious may choose to engage in a particular learning activity (e.g. a mathematical task), put effort and persist on engaging in the task to overcome obstacles and succeed. On the other hand behaviour can influence personal variables. When students engage in a learning activity, (behaviour) they note their progress mentally (personal variable) which then informs them that they are capable of learning and that raise their self-efficacy (Schunk & Zimmerman 1998:139).

Thus, the main objective of the social cognitive model is to classify and analyze the different processes which play a role in SRL (Montalvo & Torres 2004:4). From a social cognitive perspective, regulatory processes are organized according to four phases, namely planning, self-monitoring, control and evaluation. In addition, Schunk and Zimmerman (1998:140) have suggested that self-regulation comprises of three sub-processes, namely: self-observation (or self-monitoring), self-judgments and self-reaction. In the **planning phase** there are activities like setting of desired goals or the specific objectives that are to be achieved with the activity or task, activation of existing knowledge about the subject, activation of motivational belief, planning the time and effort to be used and activation of the perception regarding the task (Montalvo & Torres 2004:6). The **self-monitoring phase** is about self-awareness of the student about his or her state of cognition, motivation, emotions, use of time and effort and the conditions of the time and effort. These activities manifest when the student becomes aware that he or she understand or does not understand what he or she is reading. Schunk and Zimmerman (1998:140) describe self-monitoring as an activity of paying attention deliberately to specific aspects of one's behaviour with the objective of assessing such behaviour in terms of quality, quantity and originality. The occurrence of behaviour may be noted with particular attention given to time, place and frequency of occurrence. In the **control phase**, control activities are employed and they include use of cognitive and metacognitive strategies, motivations and emotions and strategies that relate to time and effort regulation. Lastly the **reflection or evaluation phase** includes judgments and

evaluations that students make regarding the way they execute the tasks as compared to previous results (Montalvo & Torres 2004:7; Schunk & Zimmerman 1989:140). Within each of these phases, self-regulation activities are in turn structured into four areas: cognitive, motivational / affective, behavioural and contextual. The four phases represent a general sequence which the student steps through as he or she carries out a task, but they are not hierarchically or linearly structured (Montalvo & Torres 2004:5).

2.2.2 BOEKAERTS'S SIX COMPONENT MODEL

Another approach to self-regulation is the six component model of Boekaerts (1997) explained in McMahon (2002:458) which is based on the notions such as content domain, metacognitive knowledge and motivational strategy use. This model acknowledges the role of both affective and cognitive aspects of self-regulation but also acknowledges the effects of external environmental factors upon the individual's ability to regulate their learning.

According to the six component model of self-regulation, metacognition and self-concept are viewed as primary factors that enable the process of self-regulation. According to Flavell (1979, in Evans, Kirby & Fabrigar 2003:510) metacognition refers to monitoring of one's own memory, comprehension and other cognitive enterprises. Schoenfeld (1987, in Evans, Kirby & Fabrigar 2003:510) provides a definition of three categories of intellectual behaviour that comprise metacognition which are i) knowledge about one's **thought processes** which means the accuracy to describe one's own thinking. ii) Control or self-regulation which means **self- observations** of what one is doing while solving problems and using those observations to guide actions and iii) **the beliefs and the intuitions** specifically the role they play in shaping actions.

For the students, academic self-concept or academic self-esteem is of particular significance as we would expect students with high self-concept to be confident in their approach to the learning tasks. The self-concept is broadly defined as an organized schema that contains episodic and semantic memories about the self, and that controls the processing of self- relevant information (Kihlstrom & Cantor 1983, Markus 1977, quoted in Ommundsen, Haugen & Lund (2005:461) self-concept usually refers to the knowledge aspects of the self-schema, that is, the belief that an individual holds about his or her attributes (Ommundsen, Haugen & Lund 2005:463). Self-concept focuses on cognitive and affective self-descriptions and self-evaluations in more general domains of behaviour (Har, Smith & Ming 2001:2). Evaluation of self-concept is stated as either high (positive) or low (negative). For the students, academic self-concept or academic self-

esteem is of particular significance as we would expect students with high self-concept to be confident in their approach to the learning tasks. Ommundsen, Haugen and Lund (2005:463) state that high academic self-esteem motivates students to pursue their goals, even in the face of obstacles and setbacks. The characteristics of students with high self-esteem are precisely the same as those of students who possess the self-regulated learning skills. The characteristics of students with high self-esteem as described in Ommundsen, Haugen and Lund (2005:463) states that such students regard their success as the result of their abilities and effort and feel that they have control over their results. They focus on the tasks and often have little concern about failure but have high expectancy for success.

In educational contexts, it is considered important to enhance one's self-concept to balance psychosocial development. Self-concept may be more important during the adolescent years because at that stage the learners seek to know their identities, find meaning in what they are doing and have a sense of worth in their existence. Marsh (1992, in Har, Smith & Ming 2001:2) acknowledges that research has shown the existence of a positive and significant relationship between academic self-concept and academic achievement. For the students to be able to adapt to the demands of information and technological age, they need to be able to initiate and direct their learning. When learning processes are aimed at enhancing self-efficacy, improving self-concept and also assisting students to move to a more internal locus of control, a better platform is created for students to make lasting changes in their beliefs about learning (Har, Smith & Ming 2001:2).

Self-monitoring and motivation are seen as subordinate processes that are involved in the development of cognitive and motivational strategies (McMahon 2002:458). One of the ways to increase motivation and persistence in students' learning is to change the emotional factors in the students since they are more accessible than cognitive factors.

2.3 APPLICATION OF SELF-REGULATION IN HEALTH, ORGANIZATIONAL AND EDUCATIONAL CONTEXTS

2.3.1 SELF-REGULATION IN A HEALTH SETTING

As previously mentioned, knowledge of self-regulation can be applied in educational settings, organizations as well as health settings. In this section I will discuss self-regulation as applied in these domains. When self-regulation is applied in health settings, the focus is on optimal health enhancement and the prevention of disease. In a health

context, individuals are expected to take initiative to maintain and adopt behaviours that will enhance their physical and psychological health. There are a number of models of behaviour that individuals engage with in changing their behaviour to adopt healthy ones. The models include health belief model, Rotter's social learning theory and protection motivation theory. Health belief model emphasizes the role of personal characteristics such as age and gender on the process of decision making with regard to behaviour change. Rotter's social learning theory takes up the environmental characteristics such as reminders from the external environment that one should change his or her behaviour and the example of using leaflets is used to explain this model. Health belief model and the protection motivation theory emphasize the importance of threat appraisal on decisions to change behaviour. With threat appraisal the combination of the individual's perception of the susceptibility to a certain disease (e.g. cancer) when he or she continues with unhealthy behaviour (e.g. smoking) and the perception of the severity of the disease (Boekaerts, Pintrich & Zeidner 2005:3).

2.3.2 SELF-REGULATION IN AN ORGANIZATIONAL SETTING

With regard to organizations, psychologists pay particular attention to the role of individuals in regulating their level of performance. Self-regulation models when applied in organizations pay attention to the role of individuals in the process of determining their levels of performance. Karoly (1993, as quoted in Boekaerts, Pintrich & Zeidner 2005:305) defines self-regulation as "a process that enables an individual to guide his or her goal directed activities over time and across changing circumstances." This implies that self-regulation does not refer to the actions per se, but the processes that mediate and support the actions. Self-regulation in organization includes description and measurement of individual differences for purposes of selection and performance appraisal. It also involves the creation of interventions designed to increase performance or satisfaction among workers.

2.3.3 SELF-REGULATION IN AN EDUCATIONAL SETTING

Self-regulation in an educational setting generally refers to thoughts, feelings and actions which students orient systematically to attain their goal. Boekaerts (1999:447) states that one of the key issues in self-regulated learning is the student's ability to select, combine, and coordinate cognitive strategies in an effective way. It can be applied through the use of memory strategies in educational settings. Examples of these strategies include mnemonic techniques. Application of SRL also implies a shift in a learning model which in the past viewed a learner as a passive recipient of knowledge to a learner who is active, self-determined individual who processes information in different ways (Boekaerts,

Pintrich & Zeidner 2005:278). The above discussion of self-regulation in a learning context seems to be in agreement with the constructivist approach to learning which views learning as a process of knowledge construction. During the process of constructing knowledge, the goals are the development of concepts and comprehensive understanding of this knowledge (Chen 2003:19). Phye (1997, quoted in Chen 2003:19) states that constructivism as an approach to learning, combines cognition from a developmental point of view with other aspects such as motivation, self-directed learning and also a focus on the social context of learning. Von Glasersfeld (1996, in Chen 2003:19) provides two aspects of constructivism which he considers to be the main ones. First he views learning as a process of knowledge construction instead of absorption. According to the author, individuals construct knowledge based on the perception and conceptions they have of the world. Glasersfeld (1996) and Schank (1997) (both in Chen 2003:19) emphasize the fact that since each learner has to construct his or her knowledge, concepts cannot be transferred from teacher to learner by means of words. The statement therefore implies that learning can only occur when learners are actively involved in the construction and reorganization of concepts (Chen 2003:19). The second main aspect of constructivism is the emphasis of context and environment which is similar to situated learning in the sense that it also emphasizes social interaction. With regard to constructivism as a approach to teaching, the role of the teacher is to provide teaching techniques that support students' construction of their understanding. The learner is placed in the centre of the learning process. Learners receive instructions that make them examine their existing knowledge and structures which result in them reorganizing and constructing new models. This activity places a high cognitive demand on learners (Chen 2003:21). Learners have to take more responsibility for task management than in conventional instruction.

Self-regulation in educational settings is an important aspect of learning since it involves goal setting, planning and metacognition. Since students have to manage and self-regulate their learning behaviour against the background of a particular learning context, it will be of great value to consider how the teaching-learning environment can potentially impact on students' self-regulatory learning behaviour.

In the next section I am going to discuss the characteristics of the students who are able to regulate their learning. The characteristics of self-regulating persons happen to coincide with those that are attributed to students who display high performance and high capacity as opposed to those with low performance. However, the students who manifest learning disabilities that impedes their skills of self-regulation can improve on these skills if they receive adequate training in the areas in which they manifest deficits and the disabilities

can also be alleviated (Reyero & Tournon 2003; Roces & Gonzalez Torres 1998; and Zimmerman 1998, quoted in Montalvo & Torres 2004:3).

2.4 CHARACTERISTICS OF STUDENTS WHO SELF-REGULATE THEIR LEARNING

The following characteristics of students who self-regulate their learning are discussed by Montalvo and Torres (2004:3).

- They are familiar with and know how to use a series of cognitive strategies which help them to attend to, and transform, organize, elaborate and recover information.
- They know how to plan, control and direct their mental processes toward the achievement of personal goals (metacognition).
- They show a set of motivational beliefs and adaptive emotions, such as high sense of academic self-efficacy, the adoption of learning goals, the development of positive emotions towards tasks (e.g. joy, satisfaction, enthusiasm) as well as the capacity to control and modify these, adjusting them to the requirements of the task and of the specific learning situation.
- They plan and control the time and effort to be used on tasks, and they know how to create and structure favourable learning environments, such as finding a suitable place to study and help- seeking from teachers and classmates when they have difficulties.
- To the extent that the content allows it, they show greater efforts to participate in the control and regulation of academic tasks, classroom climate and structure (e.g. how one will be evaluated, task requirements, the design of class assignments and organization of work teams.
- They are able to put into play a series of volitional strategies, aimed at avoiding external and internal distractions, in order to maintain their concentration, effort and motivation while performing academic tasks.

So far I have discussed the three settings in which self-regulation can be applied and the characteristics of students who are able to self-regulate their learning. Since this study focuses on self-regulation in a learning context, in the next section I will discuss the factors that exist in the teaching-learning environment that may have influence on the students' ability to self-regulate their learning.

2.5 TEACHING-LEARNING ENVIRONMENT

2.5.1 INTRODUCTION

On the most basic level, the teaching-learning environment consists of a dynamic participation of three key role players, namely the learner, the teacher and the learning content. If we consider the teaching-learning environment from an ecosystemic perspective, we see that individual people and groups at different levels of the social context are linked in dynamic, interdependent and interacting relationships (Donald, Lazarus & Lolwana 1997:34).

In the context of school, the family, church, community and society form part of the system that has impact on teaching and learning. This relationship of people and other factors that are mentioned below have great influence on how teaching and learning take place. Thus, the teaching-learning environment is assumed to comprise a variety of factors which have influence on one another and in turn on teaching and learning. In this study, I have grouped these factors in terms of their relatedness for the purpose of this study. The first category is that of **the learner** and it includes such concepts as *self-efficacy*, *motivation* and *personality*. The second category considers **lecturer-related** factors such as *feedback* and the choice of *language of instruction*. A third category focuses on **social factors** such as *interaction* and the amount of *student participation*. Lastly, the last category considers **formal factors** such as *learning content* as well as **outcome factors** such as *academic performance*.

2.5.2 LEARNER RELATED FACTORS

2.5.2.1 Self-efficacy

According to Wigfield and Eccles (2002:194), self-efficacy beliefs refer to individual's beliefs about their ability to execute a particular task. It involves judgments about capabilities specific to a particular task. Other definitions of self-efficacy include that of Bandura (in Schunk 1991:122) where self-efficacy is defined as the judgments of one's capability to organize and implement actions necessary to attain designated performances. The definitions of self-efficacy by Wigfield and Eccles (2002:194) and Bandura (in Schunk 1991:122) both suggest that self-efficacy and self-regulation in learning are related. Both self-efficacy and self-regulated learning require the presence of specific cognitive abilities, including the abilities to set goals, self monitor, reflect and make judgments.

Zimmerman (1995, in Wigfield & Eccles 2002), as well as Aronson (2002:194) describe the interaction between self-regulated learning and self-efficacy in the following manner. First a student's self-efficacy predicts his or her use of cognitive strategies and self-regulation. Use of these strategies then predicts academic achievement. In this way the two creates a reciprocal relationship, for as students increase their use of learning strategies and their academic performance improves their academic self-efficacy increases. It is noted that high-ability students feel more efficacious about learning compared with low-ability students. However, it is important to note that efficacy is not another name for ability.

Literature reveals that student self-efficacy in learning plays a role in academic achievement. It occupies a central role in the motivation to succeed, sustain effort, and persevere in the face of challenges (Linares, Rosbruch, Stern, Edwards, Walker, Abikoff & Alvir 2005:406). In relation to self-regulated learning, self-efficacy can influence choice of activities. Students with low-efficacy for learning may avoid tasks whereas those who judge themselves efficacious should participate more eagerly. Efficacy can also affect effort expenditure, persistence and learning. When facing difficulties, students who feel efficacious about learning generally expend greater effort and persist longer than those who doubt their capabilities (Schunk 1991:122).

(a) Development of self-efficacy

Wigfield and Eccles (2002:18) discuss the different ways in which self-efficacy develops and they are:

▪ Family influence

The family is seen here as the primary source of self-efficacy in the sense that the parents and caregivers provide the experiences that influence children's self-efficacy. Parents could create an environment that stimulates the curiosity of the children and one that allows for the mastery of experiences to build children's self-efficacy. Environments that promote curiosity are the ones that have plenty of interesting activities and which offer challenges that can be met by the child. Material such as computers, puzzles and books that stimulate children's thinking are good examples of the material that can be provided to children to create an environment that promotes curiosity in children. Parents can also teach ways of dealing with difficulties and model persistence to the children.

▪ Peer influence

Peers influence children's self-efficacy through modelling. When children see other children accomplish tasks successfully their self-efficacy is raised and thinking that they

will also succeed motivates them. The opposite also applies in the sense that when children see others fail, they are discouraged because they think that they also lack the competency to carry out the task successfully.

▪ **The role of school**

It is surprising to learn as the students progress with school their self-efficacy may be influenced negatively. This is caused by the competition that may exist between the students, grading of the students according to norm references, less teacher attention that is given to individual students and the stress that is associated with school transition (Wigfield & Eccles 2002:20). Classrooms that promote social comparison also tend to lower the self-efficacy of students who usually perform poorer than their peers.

2.5.2.2 Motivation

(a) Definition

Motivation is an important aspect of self-regulation and involves the thoughts and actions through which students deliberately try to influence their motivation regarding a particular activity. Theories of motivation emphasize the subjective control that various beliefs and attitudes have on students' choice, effort and persistence. On the other hand regulation of motivation concerns students' active control of the processes that influence these outcomes. The need to use a motivational regulation strategy only becomes necessary when students experience problems with their own level of motivation, learning or performance (Wolters 2003:191). When comparing students with high levels of self-efficacy and those with low self-efficacy, one finds that those with high efficacy for acquiring a skill or performing a task participate more readily, work harder, persist longer when they encounter difficulties and achieve at higher levels (Schunk & Zimmerman 1998:141).

Schunk (1991:229) defines motivation as the process whereby goal-directed behaviour is instigated and sustained. Eysenck (2000:126) defines the concept of motivation as generally conceived of by psychologists in terms of the process or a series of processes, which somehow starts, steers, sustains and finally stops a goal-directed sequence of behaviour. The former definition is a cognitive one because it postulates that people set goals and engage in cognitive activities (e.g. monitor goal progress and behaviours (e.g. expend effort) to attain their goals. According to Schunk (1991:229), in terms of learning, motivation is not observed directly but rather inferred from such behavioural indices as people's verbalizations, task choices, effort expenditure and persistence. Motivation is an explanatory concept used to understand why people behave as they do. Students who are

motivated to learn attend to instructions and engage in such activities as rehearsing information, relating it to previously acquired knowledge, and asking questions. They choose to work on task when they are not required to do so. In their spare time they read books on topics of interest solve problems and puzzles and work on special projects. In short, motivation leads students to engage in activities facilitating learning (Schunk 1991:229). In the next section I will discuss the intrinsic and extrinsic forms of motivation.

(b) Intrinsic motivation

In their description of motivation, Schunk and Zimmerman (1994:11) include the concept of intrinsic motivation. According to them the term has been used to describe the willingness of self-regulated students to continue to practice or study in the absence of direct external control by parents, educators and lecturers. Students who reported using self-regulated strategies were significantly more likely to volunteer for special projects and to bring into class relevant information that was not included in assigned readings. Intrinsic motivation is reflected in the value they assign to personal progress and deep understanding, their willingness to attempt challenging tasks to develop new skills, and constructive view that mistakes present opportunity to learn (Perry, Nordby & Vandekamp 2003:318).

(d) Extrinsic motivation

Extrinsic motivation is described in terms of behaviours that are viewed as instrumental in nature. The behaviours are performed because they are instrumental to some consequences (Deci, Vallerand, Pelletier & Ryan 1991:328). Extrinsically motivated behaviours were previously viewed as not determined behaviours, however, recent research has revealed that there are different types of extrinsically motivated behaviours and that the types differ in the extent to which they represent self-determined versus controlled responding (Deci, Vallerand, Pelletier & Ryan 1991:328).

Wolters (2003:194) suggest strategies that students could use to enhance their motivation and among others they include self-consequating in which students provide consequences for their behaviour either in the form of a reward or punishment. Secondly students could reduce the possibility of encountering distractions by avoiding them. Another strategy is to eat and drink food that they believe would increase their level of attention and also taking short breaks and listening to music to become more attentive and ready to study.

2.5.2.3 Personality

Wortman and Loftus (1992:385) define personality as consisting of all the relatively stable and distinctive styles of thought, behaviour and emotional response that characterize a person's adaptations to surrounding circumstances. The ability to self-regulate whether with successfully or not is reflected in personality traits (Hoyle 2006:2). The basic elements of the self-system and the capacity to self-regulate begin to emerge early in life. The individual becomes increasingly more able to postpone gratification and less likely to act impulsively. These constructs influence the development of self-regulation and underlie personality traits relevant to adult self-regulation.

Personality traits that are relevant to self-regulation include such traits as conscientiousness and impulsivity. Conscientiousness concerns the ways in which people manage their behaviour (Hoyle 2006:4). People who possess a high degree of conscientiousness as a trait are confident, disciplined, orderly and planful. People who are low on conscientiousness are not confident in their ability to control their behaviour and are spontaneous, distractible and likely to postpone things that they should do. Impulsivity as a trait is defined the tendency to act without thought or planning. People who are high on impulsivity exhibit behaviours that are quick, often inappropriate and frequently risky (Hoyle 2006:4).

From the above discussion on personality I can assume that different students will possess different personality traits and therefore will have different skills and ability to self-regulate their behaviour and therefore learning as such.

2.5.3 LECTURER RELATED FACTORS

2.5.3.1 Feedback

Since feedback informs the students about their performance at a particular point in time and that it can either be positive or negative, depending on the students' perceptions of it, it shows potential of influencing the students' self-regulated learning. We may therefore question to what extent students' goal setting behaviours are likely to be influenced by the feedback they receive from the lecturers on their performance.

Tanner and Jones (2003:59) describe feedback as a key element of formative assessment and further mention that if it is to support formative purposes, it must contain the following components:

- a clear indication of the nature of a perfect answer
- information about the standard actually achieved
- advice about how the gap must be closed
- monitoring of the student's response to the advice in future work.

Feedback is provided through the monitoring of student's written tasks, exercises, tests or examinations. Sometimes feedback on written tasks is provided orally while teaching and learning takes place. For practical reasons feedback often takes place outside the classroom and is usually provided in a written form (Tanner & Jones 2003:59).

Black and William (1998a, b, in Tanner & Jones 2003:60) have highlighted some of the negative assessment practices that educators often engage in. Sometimes, test questions used by the educators encourage rote and superficial learning. Educators may concentrate more on giving marks and grades instead of giving formative feedback. Feedback often serves social and managerial functions and lastly, the collection of marks to keep records can be given greater priority than the analysis of student's work to determine the learning needs.

There are seven principles of good feedback practice that are discussed by Nicol and Macfarlane-Dick (2006:206-214). According to them effective feedback:

- **Helps to clarify what good performance is**

It is important for the students to understand learning goals and also feel the ownership of those goals to be able to achieve them. There need to be a reasonable degree of overlap between the goals set by the educator and those set by the students. It is the students' goals that serve as one of the important criteria for self-regulation.

- **Facilitates the development of self-assessment in learning**

One way of developing self-regulation in students is to provide them with opportunities to practice regulation aspects of their own learning and to reflect on the practice itself. Educators need to create opportunities for the students to monitor their progress towards the attainment of their set goals.

- **Delivers high quality information to students about their learning**

The feedback that students receive from the educators remains the source against which they evaluate their progress and check their own internal construction of goals. Educators are effective in identifying mistakes or misconceptions in students' work than peers or the students themselves can do.

- **Encourages teacher and peer dialogue around learning**

For external feedback to be effective, it must be understood and internalized by the students before it can be used to make productive improvements. Chanock (2000) and Hyland (2000) (both in Nicol & Macfarlane-Dick 2006:210) acknowledge that there is evidence that students do not understand feedback given by the lecturers and tutors and as a result students are unable to take actions to reduce the difference in their goals and the effect they would like to introduce. The example of feedback that may not be understood by the students is when the tutor makes remarks on the student's work and say, "this essay is not sufficiently analytical". A student may not know how to make the essay analytical as required. Therefore, Nicol and Macfarlane (2006:210) recommend that for the feedback to be effective and for the information provided to be understood by students is to conceptualize it as a dialogue rather than information transmission. When feedback is in the form of a dialogue it means that the student is given the opportunity to discuss it with the tutor. This kind of feedback has been found to be more effective in higher education (Nicol & Macfarlane-Dick 2006:210).

- **Encourages positive motivational beliefs and self-esteem**

Feedback given in the form of grades tends to have a negative impact on student motivation in the sense that it encourages students to focus on performance goals rather than learning goals. Feedback in a form of comments is therefore recommended as compared to feedback given in a form of marks.

- **Provides opportunities to close the gap between current and desired performance**

With external feedback, students should be given a chance to correct their mistakes and improve on the work so that the gaps can be closed. Ways of doing that is to support the students whilst they produce their work and secondly is to give them opportunity to repeat the same task and re-submit it.

- **Provides information to teachers that can be used to help shape the teaching**

Good feedback practice works reciprocally in the sense that it also provides usable information to the teacher on whether the assessment is meeting the needs of the learners or not. From the feedback information, the teachers themselves will be informed on how the students progress.

2.5.3.2 Language of instruction

Language of instruction is a tool for thought and communication. Cultural diversity and social relations are expressed and constructed through the use of language. Being able to use language effectively enables learners and students to think and acquire knowledge, to express their identity, feelings and ideas, to interact with others and to manage their world (National Curriculum Statement Grade 10-12). With specific reference to learning, language skills are fundamental in the sense that they are necessary for the students to be able to interpret lectures, text and assessment tasks correctly. Donald, Lazarus and Lolwana (2004:70) describe language as a tool of cognitive development. People use language in their social interaction to communicate and social interaction is also a basis for cognitive development and therefore language becomes an important tool for cognitive development. Language proficiency in students who study in their second language may be a great barrier to their studies. We can assume that when students are not proficient enough in a language of instruction and learning, they will battle with self-study particularly with interpretation of text. This will therefore ultimately prevent them from being able to self-regulate their learning.

If one considers the South African context with eleven official languages, one may definitely expect to experience problems when it comes to language of instruction and learning and this is a well-documented fact. The South African Department of Education requires that learners in public schools receive their education in their mother tongue until they pass Grade Three, which is the end of the Foundation Phase. Although this is a government policy, it is not necessarily practiced. When the learners enter Grade Four, the beginning of the Intermediate Phase, they start to receive their education in either English or Afrikaans with the majority of the non- Afrikaans speaking learners receiving theirs in English. This is the stage in the life of the learner where the issue of language becomes a burning one. This is even worse for learners whose parents are illiterate and learners who stay alone without adults in their homes because there is no one to assist them with their schoolwork. The majority of learners who experience language as a barrier to their learning are labelled as slow learners when actually they are not slow learners had they been taught in a language that they understand. The issue of language of instruction is even complicated further when educators themselves teach the learners in a language that is also not their first language or a language that they are not competent in which is likely to be the case in South Africa.

With regard to my study I do not know whether the students take Afrikaans or English as first or second language. However, the point here is the proficiency level of the students

with the language and not whether is first or second language. Some students may take English or Afrikaans as second language but still be competent enough to an extent that the language does not necessarily impact negatively on their learning

2.5.3.3 Social interaction and amount of student participation

Students learn and copy from the behaviour of other people and other students. During the process of interacting with other people the possibility of learning and copying from the behaviour of these people exists. It means that the students can even learn how other students self-regulate their learning and begin to do the same. The concept of social interaction seems to have a link with self-regulated learning and therefore becomes relevant to the study of self-regulated learning.

Social interaction among student groups tends to differ from traditional teacher-student interaction in its degree of reciprocity (Forman 1989, in Kumpulainen & Wray 2002:14). In peer interaction, students have wider chances of communicating with one another readily available. Ultimately this provides opportunities of using language and participating in classroom interactions. Then students have enough opportunities to make meaning jointly and construct knowledge. As students work collaboratively in groups, they are provided with opportunity to construct and become aware of their thinking processes (Kumpulainen 2002:14-15). Students also have the opportunity to share their views and perspectives with each other. Mercer (1994), Phillips (1990) and Fisher (1993, in Kumpulainen 2002:15) reveal that exploratory and argumentative talk can be more effective in fostering students' critical thinking than procedural and routinised interaction.

Some social influences involve formal efforts to convey specific self-regulatory techniques, such as a teacher showing students a strategy for multiplying fractions in arithmetic. Other social influences are informal and subtle, such as parents' expectations that their children will assume responsibility for completing homework assignments without encouraging them. Optimal self-regulatory development appears to take root in socially supportive environments that provide extensive opportunities for self-directed practice. There is much opportunity for self-regulation during homework and studying, which students must schedule, organize and complete out of their instructor's presence.

2.5.4 FORMAL FACTORS

2.5.4.1 Learning content

Csikszentmihalyi, Rathunde and Whalen (1993, in Daniels & Araposthesis 2005:36) suggest that students engage in learning when they find enjoyment in activities. It appears that student disengagement with tasks and activities result if there is little connection between students' interest and abilities and the skills and abilities that schools value. This implies that the curriculum may have an important impact on the students' level of engagement with learning content. Learning content that is meaningful help students realize the importance of learning. The learning content that makes meaning to the students is the one that links with the students 'prior knowledge or existing frame of references. This will occur if the content matches with the students' culture and history. It is likely that students will understand history that relates to their own lives rather than history that relates to other people because then it will be abstract and foreign to them. Paris and Turner (1994, in Donald 1997:91) and Blumenfeld (1992:271-274) describe the following characteristics that academic tasks must comply with to have a motivating effect on learning:

(a) Choice

This characteristic of a task is synonymous with autonomy of students. If students have freedom to choose among alternative courses of action, they find the tasks to be interesting and worthwhile then ultimately become self-regulated and persist with the learning activity. Generally, first year students have relative freedom within a particular course to exercise choices in terms of the modules that they take and it was not different for the participants in this sample.

(b) Challenge

Generally, it is well acknowledged that learning tasks have to be challenging in the sense that they are experienced as moderately difficult and, therefore, motivating. A variety of sources can contribute to the challenging nature of a task and they include the level of difficulty of the content, the form in which the work must be accomplished and the social organization of the task or the combination of these factors. To emphasize the importance of challenge of the learning task, Vygotsky's concept of zone of proximal development becomes of relevance. The zone of proximal development is defined as the space that lies just beyond a child's or anyone's present understanding. It is a critical space where a child cannot quite understand something alone, but has the potential to do so through proximal interaction with another person who has the capacity. The capable person could be a

parent, a teacher or a peer (Donald, Lazarus & Lolwana 2004:72). When learning begins with what the learner can do on his or her own, then it becomes challenging to the learner because the learner will start with what he or she knows then move on to what he or she does not know. When the learner will be dealing with unknown, the adult person or more capable peers will be there to assist him or her. This format of learning will encourage the learner and develop a sense of confidence in the learner if he or she is able to solve a problem on his or her own. It is important to note that what the child can do with assistance today she or he will be able to do by herself or himself tomorrow (Steward 1995:13).

(c) Variety

Variety of tasks could be created in different ways which include the use of games, fantasy, computer and cooperative learning. If variety is used with the tasks it may promote mastery of the task or short-term attention. However, Blumenfeld (1992:273) cautions us that care should be taken that variety does not promote interest and attention at the expense of cognitive engagement. Variety should also include written and oral tasks because there is a possibility that some students may be more interested in one of the two activities more than the other one and therefore an opportunity should be created for all of them.

(d) Meaning

A point that is worth noting is that tasks can include variety and challenge but still be meaningless to the students. This then becomes a challenge on the part of the educators and lecturers since it is not possible for them to know if the tasks are meaningful to the learners and students. On the other hand, we need to consider the fact that what is meaningful to someone may not necessarily be meaningful to another person. In University contexts, where first year classes are often large (ranging from 100–500 students), it may not always be practical or possible for a lecturer to design learning tasks that suit the diversity of learning styles and needs of all the students.

(e) Collaborative learning / Cooperative learning

Dillenbourg (1999:1) states that the concept of collaborative learning has a wide variety of uses and therefore will be defined differently by the different users. However, he provides a definition which he sees as a broad one but still not a satisfactory one. Collaborative learning is broadly defined as a situation in which two or more people learn or attempt to learn something together (Dillenbourg 1999:1). To clarify the concept of collaboration further, four aspects that are associated with it as an adjective are addressed. Firstly a situation can be characterized as either more or less collaborative. A more collaborative

situation is likely to occur between people with a similar status like a learner and another learner rather than people with a different status like a teacher and a learner. Secondly, the interaction which takes place between the group members can either be more or less collaborative. A more collaborative situation is characterized by negotiations rather than instructions. Thirdly, collaborative learning involves a joint problem solving activity which occurs as an outcome which Dillenbourg (1999:4) calls side effect of problem solving. These side effects become evident when new knowledge is exhibited and there is improvement in the ability to solve problems. The last element is about the effects of collaborative learning, that is, how its effect is viewed by different people (Dillenbourg 1999:6-7).

According to Bruffee (1981:745), the primary aim of collaborative learning is to help students test the quality and value of what they know by trying to make sense of it to other people like themselves (their peers). Collaborative learning personalizes knowledge by socializing it, providing students with a social context of learning peers with whom they are engaged on conceptual issues. It gives students a stronger sense that knowledge itself is an inherently social artefact and learning an inherently social phenomenon (Bruffee 1981:745).

When students are given tasks to complete in small groups, they get an opportunity to work collaboratively and share responsibility and ideas for the completion of the task (Larivee 2005:161). During the process of cooperative learning, students get a chance of talking and working with others and ultimately as a result from this they derive fun and enjoyment. In the group, the students exchange the role of leadership and that provides them with the freedom of making decisions and serves the students' need to have control over the learning activity. In the context of the university, cooperative learning would be common given that students are expected to do more work independently.

2.5.5 OUTCOME FACTORS

2.5.5.1 Academic performance

Wigfield and Eccles (2002:51) suggest that feelings of competence develop primarily from academic success. The statement therefore suggests that academic success leads to feelings of competence which also result in a person being encouraged to engage intrinsically in a task. However the authors also reveal that it is not only high grades that are the key here, rather it is the subjective purpose ascribed to being competent that counts. When a person has acquired new competencies and perceives them as

instrumental in meeting the valued challenges or for satisfying one's curiosity, they promote intrinsic engagement (Wiggles & Eccles 2002:52). On the other hand it is stated that when competency is defined in terms of doing better than others, in other words for comparison purposes or with the purpose of enhancing one's ability status, then the application of one's abilities threatens the will to learn. Perry, Nordby and Vandekamp (2003:318) describe students who are not successful in self-regulation as those who look for performance indicators (e.g. grades and rewards, social comparison, that is, comparing themselves with the group as to whether they are the best or the worst) to get feedback on their performance.

In the above subsection the themes that are associated with self-regulation in learning have been discussed by specifically looking at how they relate to self-regulation in learning. All these themes form part of the teaching and learning environment. Participants will compare the themes and indicate how they influence self-regulation in learning as stated in the research topic.

2.6 SUMMARY

In this chapter I have discussed self-regulation with special reference to the definition and the theoretical approaches to self-regulation. The social-cognitive theory and the six component model of Boekaerts were discussed. I also reviewed the different settings in which self-regulation is applicable which are health, organizational and educational contexts. Furthermore, the teaching-learning environment was discussed from the perspective of the constructs that form part of the teaching-learning environment with the aim of determining how the constructs influence self-regulation in the students.

The definitions of self-regulation involve goal setting, planning and control of behaviour towards the attainment of the planned goals. At this stage we assume that teaching-learning environment has a direct influence on the students' learning and achievement. However, we do not know how the students themselves perceive the constructs that are part of the teaching-learning environment as related to each other in a cause and effect relationship. The constructs that are part of the teaching learning environment may exist in the environment but different students will definitely perceive them differently when it comes to how they impact on one another.

This then gives us good reason why we need to explore the student's perception on the impact of these constructs on their learning. Previous research on self-regulation in learning reveals that students who succeed in regulating their learning are motivated and ready to put effort when doing activities even when they are faced with adversities.



CHAPTER 3

METHODS AND RESULTS

3.1 INTRODUCTION

In this chapter, the research methodology is outlined and explained and all the steps that were taken in data collection are also explained. The tables and diagrams that were used to analyze the data are also included. This study follows the Interactive Qualitative Analysis (IQA) research approach. IQA is described by Northcutt and McCoy (2004) as a systems method used in qualitative research with the aim of establishing how a particular group of participants represent their experiences of a phenomenon. In addition, these visual representations can be regarded as an indication of participants' mental models of a phenomenon as they are structured in terms of perceived cause and effect relationships (Human-Vogel 2006:616).

3.2 METHODS

3.2.1 PARTICIPANTS

The participants in this study are first year students registered for a second semester module in Educational Psychology in the Faculty of Education at a South African University. The size of the sample comprise of 31 female and nine male students (n=40). The number of male and female participants does not have a bearing on the outcome of the study. The samples of male and female participants will be used to compare them and to establish if there is any significant difference that exists in their perceptions about self-regulated learning. At the time of participating in the study, the students had already completed six months of their study period and had written tests and at least one examination. This therefore informs us that the students had sufficient experience of the university education to be able to reflect on it for the purpose of the study. The participants have a choice of attending lectures in either Afrikaans or English and are also permitted to write tests, assignments and examination in the instructional language that they feel most competent in.

3.2.2 IDENTIFICATION OF AFFINITIES (THEMES)

For the purpose of this study, themes, which Northcutt and McCoy (2004:81) call affinities, were generated by including constructs which were considered to be important contributors to the teaching-learning situation in terms of the sub-questions of the study. Each affinity was described in two forms. First, themes were developed from literature review and secondly, the theoretical description presented to the participants was rewritten in less academic language so the participants could understand the exact meaning of the affinity. The affinities are listed below with the theoretical description on the left and the re-worked description on the right.

Affinities were grouped into four groups, firstly as learner factors such as self-efficacy, motivation and personality. Secondly as lecturer factors which comprise of lecturer-feedback and language of instruction. Thirdly as social factors such as social interaction and amount of student participation and lastly, learning content as a formal factor.

TABLE 3.1: DESCRIPTION OF AFFINITIES

LEARNER FACTORS	
Self- efficacy (SE – Affinity 1)	
LITERATURE DESCRIPTION	PARTICIPANT DESCRIPTION
<p>Perceived self-efficacy refers to individuals' beliefs about their ability to execute a particular performance. It involves judgments about capabilities specific to particular task. (Aronson 2002:186).</p>	<p>This theme can be described as the confidence you have in your abilities. If you are very confident that you can do something, then you have a high sense of self-efficacy. If you have little confidence in your ability to be successful in something, then you have a low sense of self-efficacy. It is possible and considered normal to have confidence in your ability to do certain things, but have less confidence in your ability to do other things.</p>
Motivation (Mot – Affinity 2)	
LITERATURE DESCRIPTION	PARTICIPANT DESCRIPTION
<p>Motivation refers to personal interest in pursuing an activity, intrinsic or extrinsic reasons for engaging in particular activities. It involves the tendency to invest energy in achieving goals which may be personal or externally imposed and persevering in the face of adversity (Schunk & Zimmerman 1998).</p>	<p>This theme describes the intrinsic and/ or extrinsic reasons you may have for engaging in particular activities. It also reflects your personal interest in pursuing an activity and the tendency to invest energy into achieving goals, whether these goals are your own or imposed on you by others (such as a parent, teacher, or lecturer). It reflects the tendency to persevere in the face of adversity.</p>

Social interaction (SI – Affinity 3)	
<p>LITERATURE DESCRIPTION</p> <p>During social interaction, lecturers and students construct and maintain knowledge. Students construct and become aware of their own thinking. Students provide explanations, ask appropriate questions, exchange ideas, justifications, speculations, inferences, hypotheses and conclusions (Kenneth 1999; Kumpulainen & Wray 2002).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme describes the amount of social interaction that occurs among students in class during learning activities. It includes class discussions, group work, completing assignments in a group. People differ in the amount of social interaction that they require as part of their studies. Lecturers also differ in the amount of social interaction they allow in class or as part of assignments.</p>
Academic success (AS – Affinity 4)	
<p>LITERATURE DESCRIPTION</p> <p>Academic performance involves attaining high grades. The ability to do well enough in core academic courses and to meet the general requirements of a course of study (Wigfield & Eccles 2002).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme can be described as achieving high marks in academic studies. It is associated with good grades on semester tests and in examinations. It includes performing well on assignments and receiving positive feedback from the lecturer. It also reflects the student's mastery of the learning content</p>
LECTURER FACTORS	
Student participation (S part – Affinity 5)	
<p>LITERATURE DESCRIPTION</p> <p>When students work together on small group activities they tend to help one another. Intellectually able students explain concepts to peers in need of support. Peers model and discuss their own learning and motivation strategies which are then distributed across the group for individuals to pick up and modify to suit their own needs. During the process learners participate in knowledge construction and educators share control over the learning process with their students while students take initiative and experiment with their own problem-solving strategies (Boekaerts & Corno 2005).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>The affinity describes the extent to which a student asks questions in class, feels free to participate in discussions and to enter into debates with the lecturer and other students.</p>
Learning content (LC – Affinity 6)	
<p>LITERATURE DESCRIPTION</p> <p>Learning content reflects the body of knowledge which must be covered within a limited time span. The students have to absorb, interpret, understand, gain insight and memorize the content (Olivier 1998).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme describes the learning material that has to be mastered. Learning materials vary in terms of their difficulty and complexity. Some learning materials may be interesting while others may be boring. Learning materials in your module may also be too easy or too difficult.</p>

SOCIAL FACTORS	
Self-regulation (SR – Affinity 7)	
<p>PARTICIPANT DESCRIPTION</p> <p>Self-regulation refers to self-generated thoughts, feelings and actions that are systematically designed to affect one's learning of knowledge and skills. Self-regulatory processes include attending to and concentrating on instructions, organizing, coding and rehearsing information to be remembered, establishing a productive work environment, using resources effectively, holding positive beliefs about one's capabilities, the value of learning, the factors influencing learning and the anticipated outcomes of actions, and experiencing pride and satisfaction with one's efforts. (Schunk & Zimmerman 1998).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme can be described broadly as setting goals or standards of performance for yourself, evaluating and monitoring your responses in attaining your goals and the belief that you are able to attain your goals. In terms of goal-setting this theme specifically relates to the tendency to regulate your thoughts, emotions and actions to achieve the outcomes you desire. The ability to envision desired future events allows you to create incentives that motivate and guide your actions. This theme also describes your tendency to adopt personal standards. Self-evaluation refers to your beliefs about your progress that also determines your emotional reactions during goal directed activities.</p>
Lecturer feedback (LF – affinity 8)	
<p>LITERATURE DESCRIPTION</p> <p>Lecturer feedback implies a clear indication of the nature of a perfect answer, giving information about the standard actually achieved and advice about how the gap might be closed. It also involves monitoring of the student's response to the advice in future work (Tanner & Jones 2003).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme describes what the lecturer tells students about their progress in class and during the semester. It includes the presence as well as the absence of feedback. It is also about different kinds of feedback. Some feedback from lecturers may be positive and inspiring, and some feedback may be negative and discouraging.</p>
FORMAL FACTORS	
Student personality (S pers – Affinity 9)	
<p>LITERATURE DESCRIPTION</p> <p>The quality of condition of being a person. The totality of qualities or traits as of character or behaviour, that is peculiar to specific person (Wortman & Loftus 1992:385).</p> <p>Personality consists of all the relatively stable and distinctive styles of thought, behaviour and emotional response that characterize a person's adaptations to surrounding circumstances (Momberg 2004:9).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme describes a student's typical behaviour in general. Personality is about the typical ways in which we interact with the world and how we approach situations and other people. Some personality traits include being an extravert, or an introvert, or being someone who prefers social interaction or individual activities.</p>
Language of instruction (LoI – affinity 10)	
<p>LITERATURE DESCRIPTION</p> <p>Language is a tool for thought and communication. It is through language that cultural diversity and social relations are expressed and constructed. Learning to use language effectively enables learners to think and acquire knowledge, to express their identity, feelings and ideas, to interact with others and to manage their world (National Curriculum Statement Grade 10 – 12).</p>	<p>PARTICIPANT DESCRIPTION</p> <p>This theme describes the language that is used in class to communicate to students. It is also the language in which textbooks, tests, assignments and examinations are presented. The language that the lecturer uses may correspond to the home language of the students, or it may be a second or third language. Not all students may be equally competent in the language of instruction.</p>

In table 3.1 above, each affinity has a number written next to it. The number represents the affinity and not the value of the affinity. As a first step in the research process, participants were given a table on which they could indicate their understanding of the cause and effect relationships among the 10 affinities described above. This will be discussed in the next section.

3.2.3 AFFINITY RELATIONSHIP TABLE (ART)

The Affinity Relationship Table is a protocol where participants' hypotheses about perceived relationships are recorded. Affinity names are written on the table (preferably in an alphabetical order) so that there is no affinity that is seen as more important than others. The affinity number does not necessarily represent any value placed on the affinity, but is only used as a quick reference to the affinity (Northcutt & McCoy 2004:150). Participants are then required to indicate the relationship between all possible pairs of constructs and the direction of the relationship. There are three kinds of relationships that can be indicated, namely: $1 \rightarrow 2$ (1 leads to 2) or $1 \leftarrow 2$ (2 leads to 1) or $1 \leftrightarrow 2$ (absence of relationship) Participants were also provided with a space next to the affinity pair to write a short statement indicating their understanding of the relationship in the form of IF/THEN relationship. The ART that was used in this study is included in Appendix A.

After participants have completed the ART, the results were subjected to a Pareto analysis which will be described in the next section.

3.2.4 PARETO ANALYSIS

In Pareto analysis, records of the number of relationships in Affinity Relationship Table are arranged in descending order of frequency to determine the relative strength of each relationship in relation to the total (Northcutt & McCoy 2004:157). Table 3.1 shows the Pareto composite of the participants in this study. The frequency of each relationship was determined and recorded on a spreadsheet by tallying all the relationships from the ARTs. The total number of votes for each relationship was calculated and the relationships were sorted out in descending order (Northcutt & McCoy 2004:157) Cumulative relationships were then calculated for each relationship as in table 3.2.

The cumulative frequencies are necessary to determine the optimal number of relationships to make up the composite system. The researcher used fewest number of relationships but still achieved comprehensive and rich information that represent a great

amount of variation (Northcutt & McCoy 2004:157). “This is explained by using Pareto principle which states that something like 20% of the variables in the system will account for 80% of the total variation in outcomes” (Northcutt & McCoy 2004:157). Another way of expressing the explanation is that 80% of the work done is the results of 20% effort. Relationships that attracted a very low percentage of votes were left out of the group composite. Secondly, to resolve conflicting relationships. These are relationships that attract votes in either direction (Northcutt & McCoy 2004:157).

TABLE 3.2: FREQUENCY AFFINITIES IN DESCENDING ORDER WITH PARETO AND POWER ANALYSIS

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
2 → 4	32	32	1.1	2.2	1.1
4 ← 10	31	63	2.2	4.4	2.2
1 → 4	29	92	3.3	6.4	3.1
1 → 5	29	121	4.4	8.4	4.0
4 ← 6	28	149	5.6	10.4	4.8
5 ← 10	28	177	6.7	12.3	5.7
4 ← 8	27	204	7.8	14.2	6.4
2 ← 8	27	231	8.9	16.1	7.2
1 → 3	27	258	10.0	18.0	8.0
1 → 2	26	284	11.1	19.8	8.7
7 ← 9	26	310	12.2	21.6	9.4
1 ← 10	25	335	13.3	23.4	10.0
5 ← 9	25	360	14.4	25.1	10.7
1 ← 8	24	384	15.6	26.8	11.2
3 ← 9	24	408	16.7	28.5	11.8
3 ← 10	24	432	17.8	30.1	12.3
4 ← 9	23	455	18.9	31.7	12.8
2 → 5	23	478	20.0	33.3	13.3
5 ← 8	23	501	21.1	34.9	13.8
4 ← 7	23	524	22.2	36.5	14.3
2 → 7	22	546	23.3	38.1	14.7
6 ← 10	22	568	24.4	39.6	15.2
3 → 5	21	589	25.6	41.1	15.5
2 ← 10	21	610	26.7	42.5	15.9
2 → 3	20	630	27.8	43.9	16.2
1 ← 6	20	650	28.9	45.3	16.4
3 → 4	19	669	30.0	46.7	16.7
2 → 6	19	688	31.1	48.0	16.9
2 ← 9	19	707	32.2	49.3	17.1
1 → 7	18	725	33.3	50.6	17.2
1 → 9	18	743	34.4	51.8	17.4

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
7 ← 10	18	761	35.6	53.1	17.5
3 ← 8	18	779	36.7	54.3	17.7
4 ← 5	17	796	37.8	55.5	17.7
6 ← 7	17	813	38.9	56.7	17.8
3 ← 7	17	830	40.0	57.9	17.9
8 ← 0	16	846	41.1	59.0	17.9
7 ← 8	15	861	42.2	60.0	17.8
1 → 6	15	876	43.3	61.1	17.8
3 → 6	15	891	44.4	62.1	17.7
9 → 10	15	906	45.6	63.2	17.6
6 → 8	15	921	46.7	64.2	17.6
8 ← 9	15	936	47.8	65.3	17.5
2 ← 7	15	951	48.9	66.3	17.4
8 → 9	14	965	50.0	67.3	17.3
1 ← 2	14	979	51.1	68.3	17.2
1 ← 9	14	993	52.2	69.2	17.0
2 ← 3	14	1007	53.3	70.2	16.9
2 ← 6	14	1021	54.4	71.2	16.8
1 ← 7	14	1035	55.6	72.2	16.6
5 → 7	13	1048	56.7	73.1	16.4
2 → 9	13	1061	57.8	74.0	16.2
6 ← 8	13	1074	58.9	74.9	16.0
4 → 5	13	1087	60.0	75.8	15.8
5 → 6	13	1100	61.1	76.7	15.6
3 → 9	13	1113	62.2	77.6	15.4
5 ← 6	13	1126	63.3	78.5	15.2
6 ← 9	13	1139	64.4	79.4	15.0
7 → 8	13	1152	65.6	80.3	14.8
6 → 7	12	1164	66.7	81.2	14.5
4 → 7	12	1176	67.8	82.0	14.2
9 ← 10	12	1188	68.9	82.8	14.0
5 ← 7	12	1200	70.0	83.7	13.7
5 → 8	11	1211	71.1	84.4	13.3
8 → 10	11	1222	72.2	85.2	13.0
2 → 10	11	1233	73.3	86.0	12.6
1 ← 4	11	1244	74.4	86.8	12.3
2 ← 5	11	1255	75.6	87.5	12.0
1 ← 3	10	1265	76.7	88.2	11.5
7 → 9	10	1275	77.8	88.9	11.1
3 ← 6	10	1285	78.9	89.6	10.7
3 ← 5	10	1295	80.0	90.3	10.3
3 → 8	9	1304	81.1	90.9	9.8
6 → 9	9	1313	82.2	91.6	9.3

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
5 → 9	9	1322	83.3	92.2	8.9
3 → 7	9	1331	84.4	92.8	8.4
4 → 8	9	1340	85.6	93.4	7.9
1 → 10	9	1349	86.7	94.1	7.4
7 → 10	9	1358	87.8	94.7	6.9
2 → 8	8	1366	88.9	95.3	6.4
6 → 10	8	1374	90.0	95.8	5.8
3 ← 4	8	1382	91.1	96.4	5.3
1 → 8	8	1390	92.2	96.9	4.7
2 ← 4	8	1398	93.3	97.5	4.2
1 ← 5	7	1405	94.4	98.0	3.5
4 → 6	7	1412	95.6	98.5	2.9
4 → 9	6	1418	96.7	98.9	2.2
3 → 10	6	1424	97.8	99.3	1.5
5 → 10	5	1429	98.9	99.7	0.8
4 → 10	5	1434	100.0	100.0	0.0
Total Frequency	1434	Equal Total Frequency	Equals 100%	Equals 100%	Power = E-D

After the Pareto analysis, conflict relationships are identified and marked in a process that will be discussed in the next section.

3.2.5 CONFLICT ANALYSIS

Affinity pair relationships that are conflicting, that is, they are both present in such a way that affinity $1 \leftarrow 2$ and $1 \rightarrow 2$ are marked by placing a question mark in the conflict box as recommended by Northcutt and McCoy (2004:290). When this occurs, the conflicting relationship with the highest frequency is used to construct the complex SID. For example in table 3.3, affinities $1 \leftarrow 2$ attracted 14 votes and $1 \rightarrow 2$ attracted 26 votes and the affinity with the highest frequency, that is affinity $1 \rightarrow 2$ with 26 votes is used while affinity $1 \leftarrow 2$ (14 votes) will later be reconciled on the Systems Influence Diagram (SID). All the affinity pair relationships that are conflicting were dealt with in the same way as explained with affinity pair $1 \rightarrow 2$ and $1 \leftarrow 2$ and are indicated in each case by placing a question mark next to them.

TABLE 3.3: CONFLICT ANALYSIS FOR THE TOTAL SAMPLE

Affinity Pair Relationship	Frequency	Conflict
1← 10	25	
1← 2	14	?
<u>1← 6</u>	<u>22</u>	<u>?</u>
1← 7	13	?
1← 8	24	
1← 9	14	?
<u>1→ 2</u>	<u>26</u>	<u>?</u>
1→ 3	27	
1→ 4	29	
1→ 5	30	
1→ 6	13	?
<u>1 → 7</u>	<u>19</u>	<u>?</u>
<u>1 → 9</u>	<u>19</u>	<u>?</u>
2 ← 10	21	
2 ← 3	14	?
2 ← 6	14	?
2 ← 7	15	?
2 ← 8	27	
<u>2 ← 9</u>	<u>19</u>	<u>?</u>
<u>2 → 3</u>	<u>20</u>	<u>?</u>
2 → 4	32	
2 → 5	23	
<u>2 → 6</u>	<u>19</u>	<u>?</u>
<u>2 → 7</u>	<u>22</u>	<u>?</u>
2 → 9	13	?
3 ← 10	24	
3 ← 7	18	
3 ← 8	18	?
<u>3 ← 9</u>	<u>24</u>	<u>?</u>
3 → 4	19	
3 → 5	21	
3 → 6	15	
<u>3 → 8</u>	<u>19</u>	<u>?</u>
3 → 9	13	?
4 ← 10	30	
<u>4 ← 5</u>	<u>16</u>	<u>?</u>
<u>4 ← 6</u>	<u>29</u>	<u>?</u>
4 ← 7	26	
4 ← 8	27	
4 ← 9	25	
4 → 5	13	?
4 → 6	17	?

Affinity Pair Relationship	Frequency	Conflict
5 ← 10	28	
<i><u>5 ← 6</u></i>	<i><u>14</u></i>	<i><u>?</u></i>
5 ← 7	15	
5 ← 8	23	
5 ← 9	25	
5 → 6	13	?
6 ← 10	23	
6 ← 7	17	
6 ← 8	13	?
6 ← 9	13	
<i><u>6 → 8</u></i>	<i><u>15</u></i>	<i><u>?</u></i>
7 ← 10	17	
<i><u>7 ← 8</u></i>	<i><u>15</u></i>	<i><u>?</u></i>
7 ← 9	26	
7 → 8	13	?
<i><u>8 ← 10</u></i>	<i><u>17</u></i>	<i><u>?</u></i>
<i><u>8 ← 9</u></i>	<i><u>15</u></i>	<i><u>?</u></i>
8 → 10	13	?
8 → 9	13	?
9 → 10	14	

Thus, using the process explained above, the affinities that are in italics in table 3.3 above were involved in conflicts. Of these conflicting affinities, those that are underlined will be used in the next step namely the construction of the Interrelationship Diagram.

3.2.6 THE INTERRELATIONSHIP DIAGRAM (IRD)

In the next step of the process, the construct pairs and the direction of relationship were indicated and with regard to the conflict pairs, the relationship with the most votes were used and recorded in a table called Interrelationship Diagram (IRD). The IRD is a matrix containing all the perceived relationships in the system. It contains a summary of the ART in the form of arrows that shows whether each affinity in a pair is perceived cause or an effect, or if there is no relationship between the affinities in the pair.

On the IRD, arrows are placed into the table to show the direction of the relationship (Northcutt & Northcutt 2004:170). In table 3.4 below, an analysis of the relationship between the constructs is done by calculating the delta values per row. The delta values are calculated by noting the number of arrows facing inward (left) and subtracting the total from the number of arrows facing outward (up). Deltas that have positive values are regarded as drivers (causes) which entails that they influence other constructs more than they are influenced by other constructs. Deltas with negative values are regarded as

outcomes (effects) and this entails that they are mostly influenced by other constructs (Human-Vogel 2006:623).

TABLE 3.4: INTERRELATIONSHIP DIAGRAM FOR TOTAL SAMPLE

The numbers 1-10 on the diagram below, represent the names of the affinities.

Tabular IRD													
	1	2	3	4	5	6	7	8	9	10	OUT	IN	Δ
1		↑	↑	↑	↑	←	↑	←	↑	←	6	3	3
2	←		↑	↑	↑	↑	↑	←	←	←	5	4	1
3	←	←		↑	↑	↑	←	↑	←	←	4	5	-1
4	←	←	←		←	←	←	←	←	←	0	9	-9
5	←	←	←	↑		←	←	←	←	←	1	8	-7
6	↑	←	←	↑	↑		←	↑	←	←	4	5	-1
7	←	←	↑	↑	↑	↑		←	←	←	4	5	-1
8	↑	↑	←	↑	↑	←	↑		←	←	5	4	1
9	←	↑	↑	↑	↑	↑	↑	↑		↑	8	1	7
10	↑	↑	↑	↑	↑	↑	↑	↑	←		8	1	7

As a next step, to identify drivers and outcomes, the affinities in the IRD were re-arranged to reflect a descending order of delta. The results are presented in table 3.5 below.

TABLE 3.5: IRD FOR TOTAL SAMPLE IN DESCENDING ORDER OF DELTA

Tabular IRD													
	1	2	3	4	5	6	7	8	9	10	OUT	IN	Δ
9	←	↑	↑	↑	↑	↑	↑	↑		↑	8	1	7
10	↑	↑	↑	↑	↑	↑	↑	↑	←		8	1	7
1		↑	↑	↑	↑	←	↑	←	↑	←	6	3	3
2	←		↑	↑	↑	↑	↑	←	←	←	5	4	1
8	↑	↑	←	↑	↑	←	↑		←	←	5	4	1
3	←	←		↑	↑	↑	←	↑	←	←	4	5	-1
6	↑	←	←	↑	↑		←	↑	←	←	4	5	-1
7	←	←	↑	↑	↑	↑		←	←	←	4	5	-1
5	←	←	←	↑		←	←	←	←	←	1	8	-7
4	←	←	←		←	←	←	←	←	←	0	9	-9

The primary drivers that emerged were student personality (Affinity 9; $\Delta = 7$) and language of instruction (Affinity 10; $\Delta = 7$). Secondary drivers were self-efficacy (Affinity 1; $\Delta = 3$), motivation (Affinity 2; $\Delta = 1$), lecturer-feedback (Affinity 8; $\Delta = 1$). Secondary outcomes were social interaction (Affinity 3; $\Delta = -1$), learning content (Affinity 6; $\Delta = -1$),

self-regulation (Affinity 7; $\Delta = -1$), student participation (Affinity 5; $\Delta = -7$). Primary outcome was academic success (Affinity 4; $\Delta = -9$)

The relationships between the affinities as they emerged from Interrelationship Diagram were used in the next step to construct the complex System Influence Diagram (SID).

3.2.7 COMPLEX SYSTEM INFLUENCE DIAGRAM (SID)

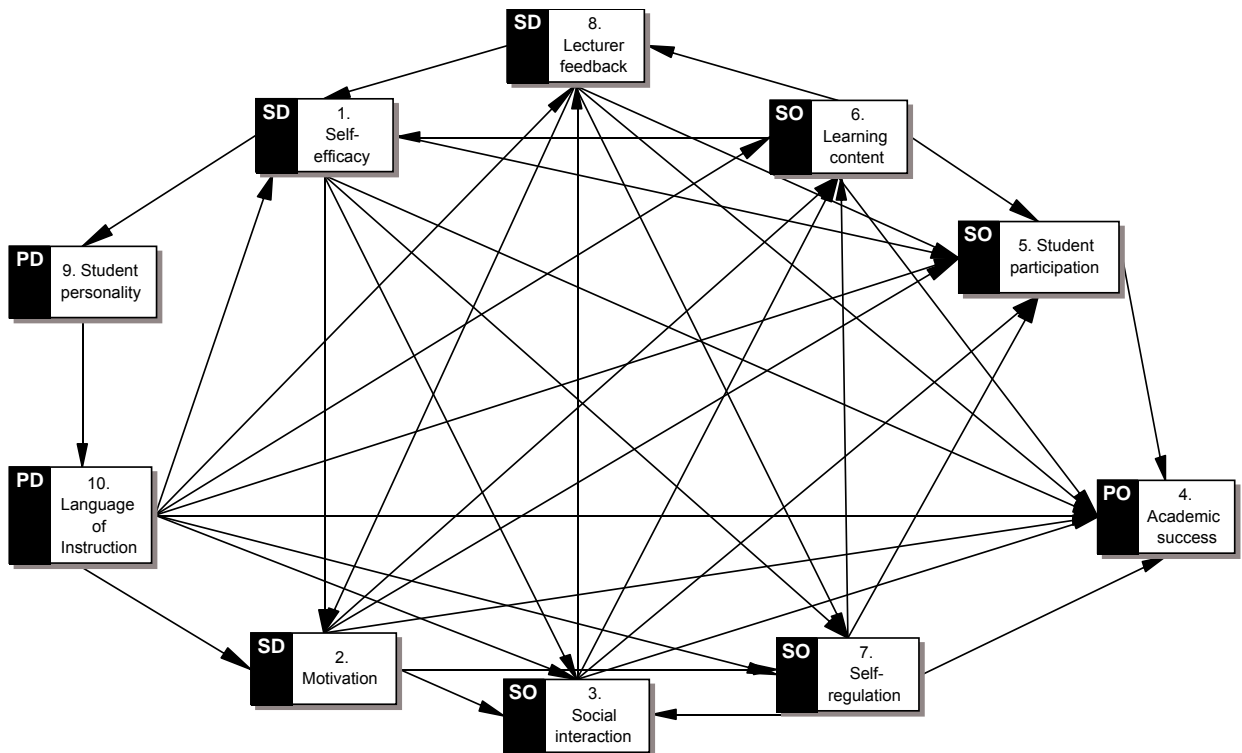


FIGURE 3.1: COMPLEX SID FOR TOTAL SAMPLE

The SID is a visual representation of an entire system of influences and outcomes and is created by representing information in the IRD as a system of affinities and relationship among them (Northcutt & McCoy 2004:174).

A complex SID contains each link present in the IRD. The complex SID as in figure 3.1 contains all the links identified by participants in the protocol leading to the IRD. Since the complex SID contains all the links, it is difficult to interpret and therefore to counteract this problem a simple SID is developed wherein the redundant links are removed. The links in the complex SID are inspected carefully and checked in a sequence from the construct with the highest delta to the construct with the lowest delta. In our case the process started with construct 9 and 4 and then followed by construct 9 and 5 and the list is carried on with as it appears in table 3.6 below. The link between constructs 9 and 4 is

removed because there are other indirect links between the two constructs (9-6-5-4) and the link between 9 and 5 is also removed because there are other indirect links which are (9-6-5). Once the redundant links are removed we will be left with a clean SID as shown in figure 3.2 (see p.47). Once a clean SID is created it becomes easier to interpret.

To eliminate redundant links in the complex SID above, links were examined systematically in the following way:

TABLE 3.6: ELIMINATION OF REDUNDANT LINKS TOTAL SAMPLE

Examine	Action	Rationale
9-4	Delete	9-6-5-4
9-5	Delete	9-6-5
9-7	Delete	9-2-7
9-6	Delete	9-10-6
9-3	Delete	9-2-3
9-8	Delete	9-10-8
9-2	Delete	9-10-2
9-1	Retain	Backward link
9-10	Retain	Direct link
10-4	Delete	10-7-4
10-5	Delete	10-6-5
10-7	Delete	10-2-7
10-6	Delete	10-2-6
10-3	Delete	10-2-3
10-8	Delete	10-1-2-3-8
10-2	Delete	10-1-2
10-1	Retain	No alternative path
1-4	Delete	1-7-4
1-5	Delete	1-2-5
1-7	Delete	1-2-7
1-6	Retain	Backward link
1-3	Delete	1-2-3
1-8	Retain	Backward link
1-2	Retain	Direct link
2-4	Delete	2-7-4
2-5	Delete	2-6-5
2-7	Delete	2-8-7
2-6	Delete	2-3-6
2-3	Retain	Direct link
2-8	Delete	8-1-2
8-4	Delete	8-5-4
8-5	Delete	8-7-5
8-7	Retain	No alternative path

Examine	Action	Rationale
8-6	Retain	Backward link
8-3	Retain	Backward link
RECONCILING CONFLICTS		
2-1	Present	2-3-6-8-1
7-1	Present	7-3-6-8-1
9-1	Present	9-10-1
1-6	Present	1-2-3-6
3-2	Present	3-6-8-1-2
6-2	Present	6-8-1-2
7-2	Present	7-3-6-8-1-2
2-9	Present	2-3-6-8-1-9
8-3	Present	8-7-3
3-9	Present	3-6-8-9-1
4-5	Add	Not present
4-6	Add	Not present
4-5	Delete	4-6-8-7-5
5-6	Present	5-4-6
7-8	Present	7-3-6-8
8-10	Present	8-1-9-10
8-9	Present	8-1-9
3-4	Delete	3-5-4
3-5	Delete	3-6-5
3-7	Retain	Backward link
3-6	Retain	Direct link
6-4	Delete	6-5-4
6-5	Delete	6-7-5
6-7	Retain	Direct link
7-4	Delete	7-5-4
7-5	Retain	Direct link
LOOKING AT RECURSIVE LINKS		
7-6	Delete	7-3-6
7-3	Retain	No alternative path
6-8	Retain	No alternative path
6-1	Delete	6-8-1
3-8	Retain	3-6-8
8-1	Retain	No alternative path
1-9	Retain	No alternative path

Having concluded the elimination of redundant links, we are now ready to represent the clean SID which will be used as the basis of the discussion of participants' representations of the phenomenon being researched.

3.2.8 CLEAN SID

This is a clean SID that resulted from the elimination of the redundant links in the complex SID.

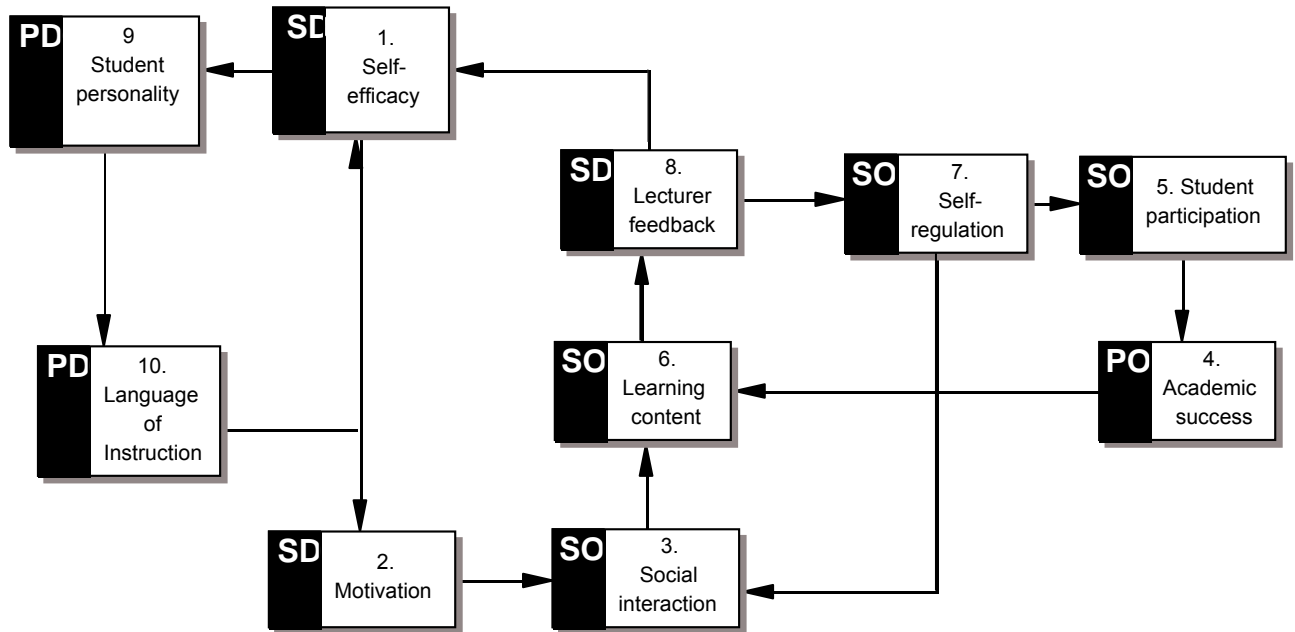


FIGURE 3.2: CLEAN SID FOR TOTAL SAMPLE

The clean SID will now be used in chapter 4 for a discussion of the relationships between the affinities. The feedback loops have now emerged and will also be discussed in detail in chapter 4.

The same process of removing redundant links between the constructs was also done with the males and females participants separately. The purpose of looking at males and females participants separately is simply to compare the perceptions of the two groups with regard to the phenomenon of self-regulation in learning. The tables and figures for the separate details appear in the appendix.

3.2.9 THE INTERRELATIONSHIP DIAGRAM FOR MALE PARTICIPANTS

As it was done with the total sample, the IRD for the male participants, was constructed and the construct pairs and the direction of the relationship were indicated. In case of conflict pairs, the relationship with the most votes were used and recorded. The IRD table for the male participants appears in appendix E.

In this IRD, the primary driver that emerged was language of instruction (Affinity 10, $\Delta = -7$). Secondary drivers were student participation (Affinity 9 $\Delta = 5$), learning content (Affinity 6, $\Delta = 5$), lecturer feedback (Affinity 8, $\Delta = 4$), self-efficacy (Affinity 1, $\Delta = 1$). Pivot was motivation (Affinity 2, $\Delta = 0$). Secondary outcomes were social interaction (Affinity 3, $\Delta = -4$), self-regulation (Affinity 7, $\Delta = -4$), student participation (Affinity 5, $\Delta = -5$). Primary outcome was academic success (Affinity 4, $\Delta = -9$).

The relationships between the affinities as they emerged from the Interrelationship Diagram were used in the next step to construct the Complex System Influence Diagram the same manner as it was done with the total sample in section 3.2.7 above.

3.2.10 COMPLEX SID FOR MALE PARTICIPANTS

The same process of removing redundant links between the constructs was also carried out with the male and female participants separately. Figure 3.3 below represents the complex SID for male participants.

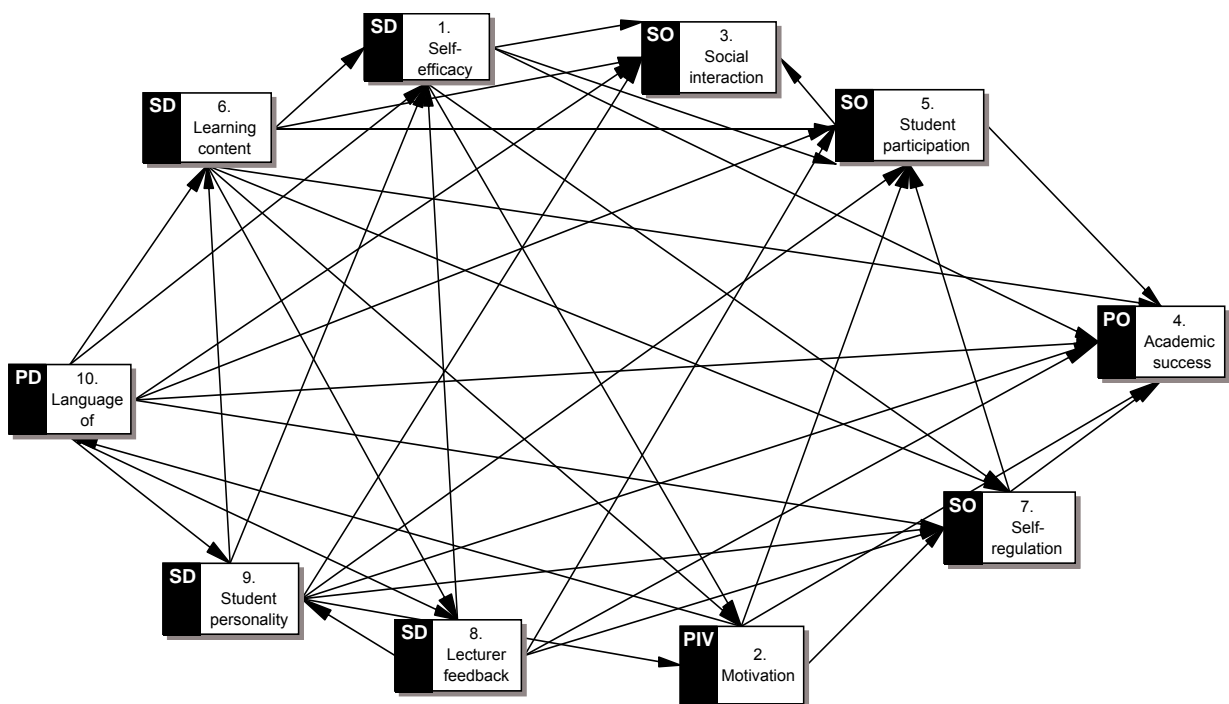


FIGURE 3.3: COMPLEX SID FOR MALE PARTICIPANTS

To eliminate redundant links in the complex SID, links were examined systematically in the following way:

TABLE 3.7 ELIMINATION OF REDUNDANT LINKS MALE SAMPLE

EXAMINE	ACTION	RATIONALE
10-4	Delete	10-7-4
10-5	Delete	10-1-5
10-7	Delete	10-8-7
10-3	Delete	10-1-3
10-2	Delete	10-8-2
10-1	Delete	10-6-1
10-8	Delete	10-6-8
10-6	Delete	10-9-6
10-9	Retain	No alternative path
9-4	Delete	9-7-4
9-5	Delete	9-1-5
9-7	Delete	9-2-7
9-3	Delete	9-1-3
9-2	Delete	9-1-2
9-1	Delete	9-6-1
9-8	Retain	Backward link
9-6	Retain	No alternative path
6-4	Delete	6-5-4
6-5	Delete	6-1-5
6-7	Delete	6-1-7
6-3	Delete	6-1-3
6-2	Delete	6-1-2
6-1	Delete	6-8-1
6-8	Retain	No alternative path
8-4	Delete	8-7-4
8-5	Delete	8-2-5
8-7	Delete	8-2-7
8-2	Delete	8-1-2
8-1	Retain	No alternative path
1-4	Delete	1-3-4
1-5	Delete	1-2-5
1-7	Delete	1-2-7
1-3	Delete	1-2-7-5-3
1-2	Retain	No alternative path
2-4	Delete	2-7-4
2-5	Delete	2-7-5
2-7	Retain	No alternative path
3-4	Retain	No alternative path
3-5	Retain	Recursive link

EXAMINE	ACTION	RATIONALE
3-7	No link	
7-4	Delete	7-5-4
7-5	Retain	No alternative path
5-4	Delete	5-3-4
CHECKING RECURSIVE LINKS		
5-3	Retain	No alternative path
8-9	Retain	No alternative path
RECONCILING CONFLICTS		
2-1	Present	2-9-7-3-5-6-1
4-1	Add	Not present
1-6	Present	1-2-7-5-10-9-6
10-2	Present	10-9-6-8-1-2
3-2	Present	3-4-1-2
4-2	Present	4-1-2
2-3	Present	2-7-5-3
2-6	Add	Not present
2-9	Present	2-7-5-10-9
7-3	Present	7-5-3
8-3	Present	8-1-2-7-5-3
3-6	Present	3-4-1-6
3-7	Present	3-4-1-2-7
3-8	Present	3-4-1-2-7-5-10-9-6-8
4-5	Present	4-1-2-7-5
4-6	Present	4-1-2-7-5-10-9-6
4-7	Present	4-1-2-7
5-10	Add	Not present
5-8	Present	5-10-9-6-8
8-6	Present	8-9-6
7-9	Present	7-5-10-9
8-9	Present	8-9
NEW REDUNDANT LINK AS A RESULT OF ADDING CONFLICTS		
2-6	Delete	2-7-5-10-9-6

The clean SID will be used for the discussion of the relationships between the affinities. There are feedback loops that have emerged and they will be discussed in detail in chapter 4.

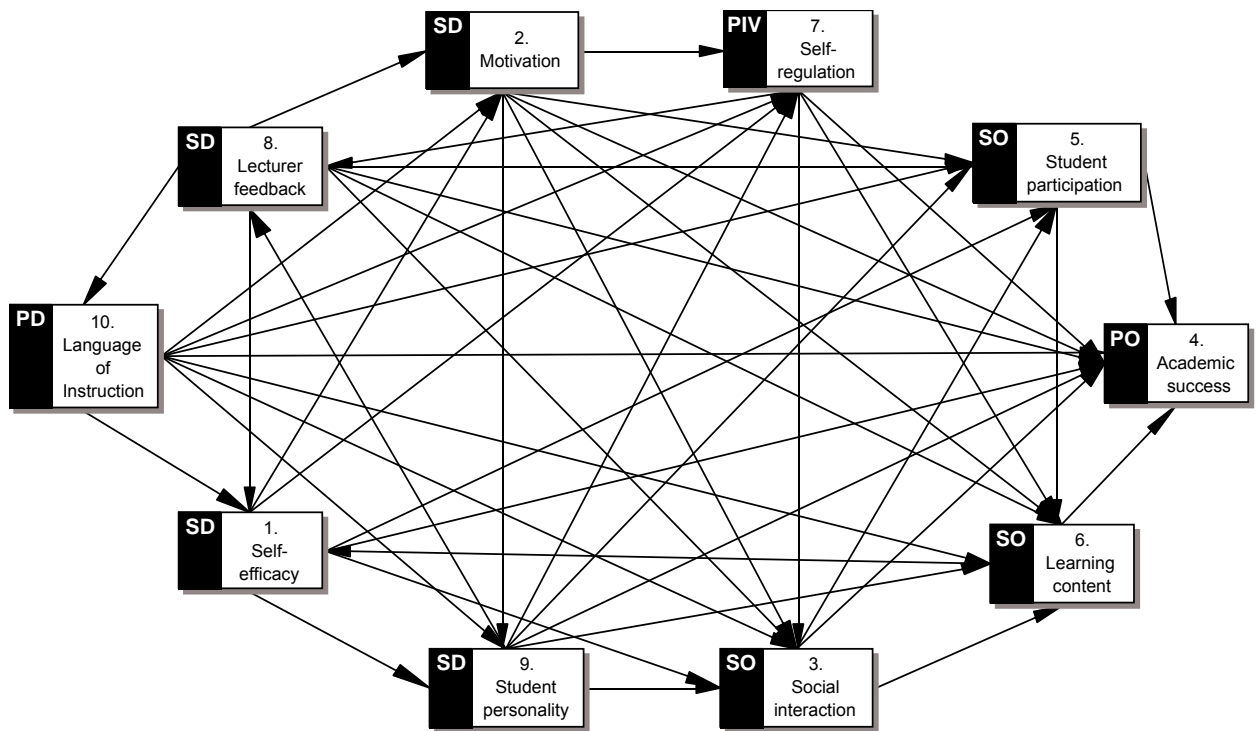


FIGURE 3.5: COMPLEX SID FOR FEMALE PARTICIPANTS

To eliminate redundant links in the complex SID, links were examined systematically in the following way:

TABLE 3.8: ELIMINATION OF REDUNDANT LINKS FEMALE SAMPLE

EXAMINE	ACTION	RATIONALE
10-4	Delete	10-5-4
10-6	Delete	10-3-6
10-5	Delete	10-3-5
10-3	Delete	10-1-9-3
10-7	Delete	10-9-7
10-9	Delete	10-1-9
10-2	Delete	10-1-2
10-1	Retain	No alternative path
10-8	Retain	Backward link
8-4	Delete	8-5-4
8-6	Delete	8-3-6
8-5	Delete	8-3-5
8-3	Delete	8-2-3
8-7	Retain	Backward link
8-9	Retain	Backward link
8-2	Delete	8-1-2
8-1	Retain	Direct link
1-4	Delete	1-5-4

EXAMINE	ACTION	RATIONALE
1-6	Retain	Recursive link
1-5	Delete	1-3-5
1-3	Delete	1-9-3
1-7	Delete	1-2-7
1-9	Delete	1-2-9
1-2	Retain	No alternative path
2-4	Delete	2-7-4
2-6	Delete	2-7-6
2-5	Delete	2-3-5
2-3	Delete	2-9-3
2-7	Delete	2-9-7
2-9	Retain	No alternative path
9-4	Delete	9-6-4
9-6	Delete	9-3-6
9-5	Delete	9-3-5
9-3	Delete	9-7-3
9-7	Retain	No alternative path
7-4	Delete	7-6-4
7-6	Delete	7-3-6
7-5	No link	
7-3	Retain	No alternative path
3-4	Delete	3-6-4
3-6	Delete	3-5-6
3-5	Retain	No alternative path
5-4	Delete	5-6-4
5-6	Retain	Direct link
6-4	Retain	Direct link
CHECKING RECURSIVE LINKS		
6-1	Retain	No alternative path
7-8	Delete	7-3-5-6-1-2-9-8
9-8	Delete	9-7-3-5-6-1-2-9-8
RECONCILING CONFLICTS		
1-2	Present	
7-1	Present	7-8-1
9-1	Present	9-7-8-1
1-6	Present	1-2-9-7-3-5-6
1-9	Present	1-2-9
3-2	Present	3-5-6-1-2
5-2	Present	5-6-1-2
6-2	Present	6-1-2
7-2	Present	7-3-2
2-9	Present	2-9

EXAMINE	ACTION	RATIONALE
3-9	Present	3-5-2-9
4-5	Add	Not present
7-5	Present	7-3-5
5-7	Present	5-6-1-2-9-7
8-7	Present	8-2-9-7
7-8	Present	7-8
8-10	Present	8-10
8-9	Present	8-10-1-2-9

This is a clean SID that emerged after the redundant links were eliminated.

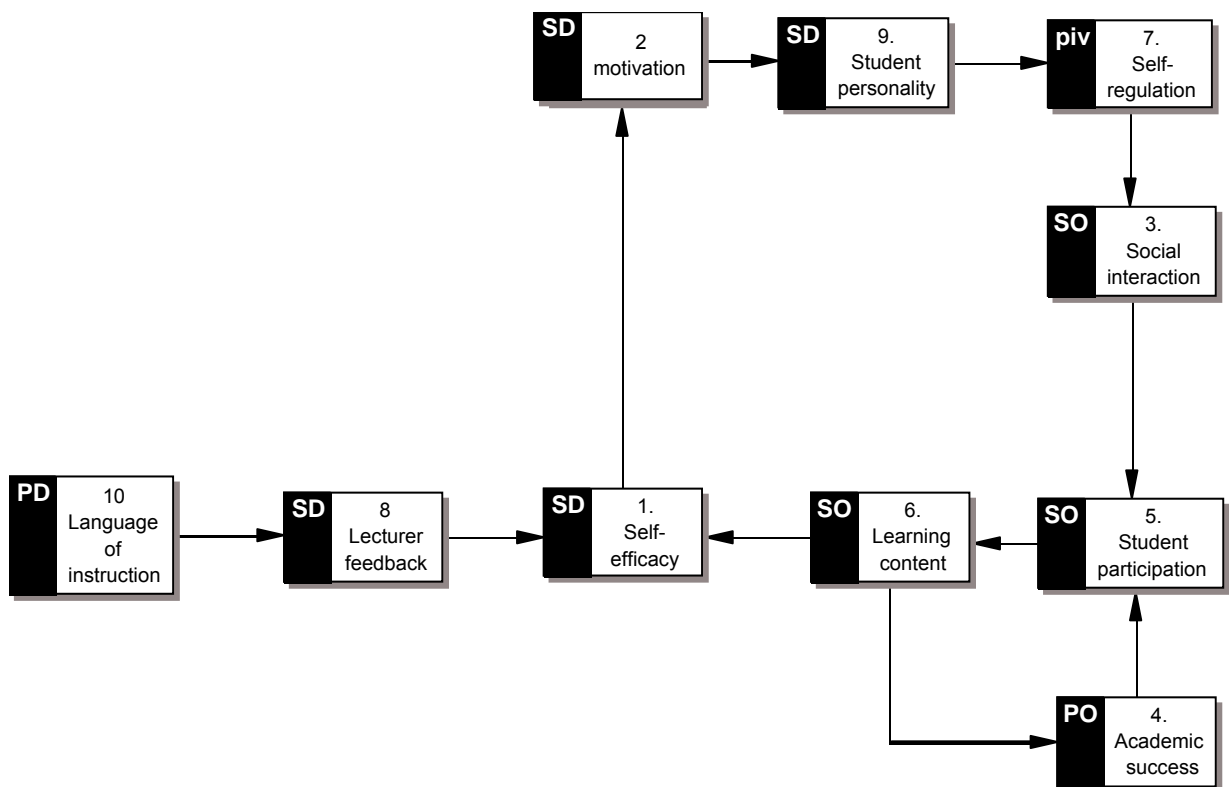


FIGURE 3.6: CLEAN SID FEMALE PARTICIPANTS

The clean SID as well as the feedback loops that emerged will be used for the discussion of the results in chapter 4.

3.3 CONCLUSION

This chapter presented a systematic process of how data for the research study was collected, analyzed and the results thereof. An explanation of how the participants' responses were recorded on the ART that contained affinities that were generated by the researcher was explained. The manner in which the IRD was developed and how the

complex and simple SIDs were developed was also explained. The next chapter will present the conclusion and the results with reference to relevant literature.



CHAPTER 4

DISCUSSION OF RESULTS AND FINDINGS

4.1 INTRODUCTION

This chapter provides a discussion of the results and findings of the study. The clean SIDs of the total sample of participants, male participants and female participants will be discussed. The main differences and similarities in the findings of the male and female participants will be discussed. The feedback loops that occurred in each clean SID will be discussed separately. The limitations of the study will also be discussed in this chapter.

4.2 CLEAN SID FOR TOTAL SAMPLE

The figure represents the participants' perception of the factors that influence self-regulation in learning.

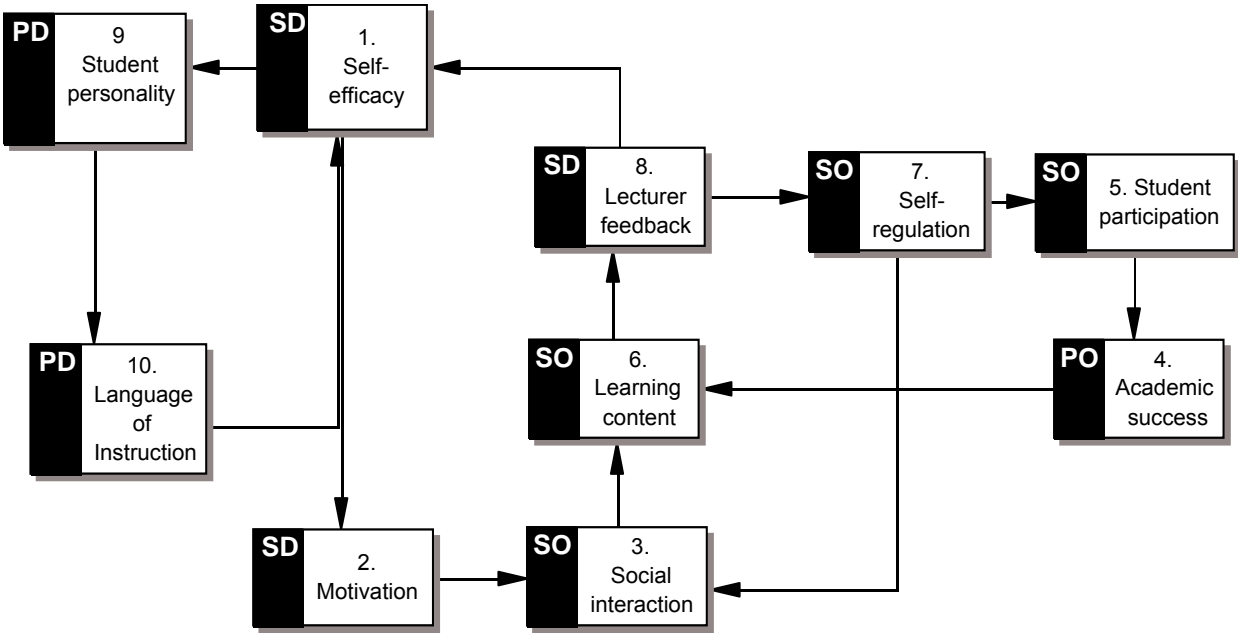


FIGURE 4.1: CLEAN SID FOR TOTAL GROUP

From the figure, student personality and language of instruction emerged as primary drivers with academic success emerging as primary outcome. It is not surprising to have language of instruction as a primary driver as it is stated that the ability to use language effectively enables learners and students to think and acquire knowledge, to express their

identity, feelings and ideas, to interact with others and to manage their world (National Curriculum Statement Grade 10-12). Donald, Lazarus and Lolwana (2004:70) describe language as a tool of cognitive development. This description supports the belief that learning depends primarily on language. It is also not unusual for student personality to emerge as a primary driver since (Hoyle 2006:2) acknowledges that the ability to self-regulate successfully or not is reflected in personality traits. That academic success emerged as a primary outcome in the total sample’s mental model is supported by Perry, Nordby and Vandekamp (2003:318) who assert that self-regulated learners tend to be successful in school and even beyond school. Further, for many learners, the success of their studies is largely measured by their academic success, the primary goal of their studies at university. However, when looking carefully at the figure, one will notice that the primary drivers do not necessarily represent the beginning of the system and the primary outcome does not mark the end of the system. The system can be regarded as open in the sense that all the affinities influence one another either directly or indirectly, making it a very complex system of interactions.

The complex system consists of four feedback loops that are interlinked and which will be discussed individually in the next section.

4.2.1 FEEDBACK LOOP 1: PERSON X INSTRUCTION = I CAN DO IT

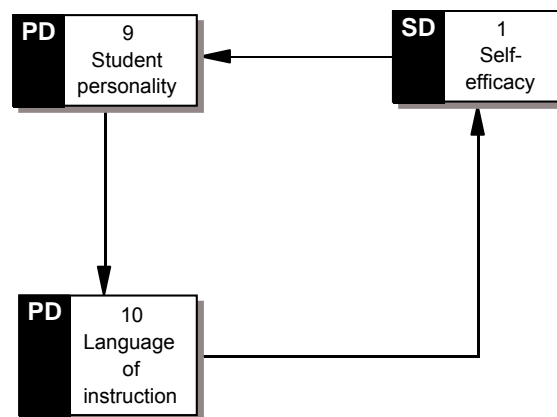


FIGURE 4.2: FEEDBACK LOOP 1 TOTAL SAMPLE

The feedback loop depicted in figure 4.2 comprises student personality, language of instruction and self-efficacy. The feedback loop is named *person (student personality) x instruction (language of instruction) = I can do It (self-efficacy)*. The figure indicates that participants consider personality to have influence on their perception of the language of instruction. In turn, the language of instruction in place in the academic context is thought to influence their perceived self-efficacy directly. Put differently, we may surmise that

when participants feel that they have good command of the language of instruction, their confidence judgments about their abilities will be more positive with the result that they might be ready to venture into new challenges with confidence. Increased confidence is likely to mediate the expression of some of the big five personality traits such as extraversion, openness to experience and anxiety (Cattell & Schuerger 2003:7). It is well-known that students who doubt their abilities will generally not engage constructively with the challenges of studying. Students who are faced with learning material that requires that they use a language in which they are not competent, whether by reading or verbal and/or written expression, at least according to the current sample, will experience a negative impact on their perceived self-efficacy which in turn will influence their approach to a learning task. If the students feel confident and efficacious about their use of language, they are more likely to approach the learning task with confidence and the confidence will increase their chances of succeeding with the learning task.

4.2.2 FEEDBACK LOOP 2: COURAGE X OTHERS = I CAN DO IT

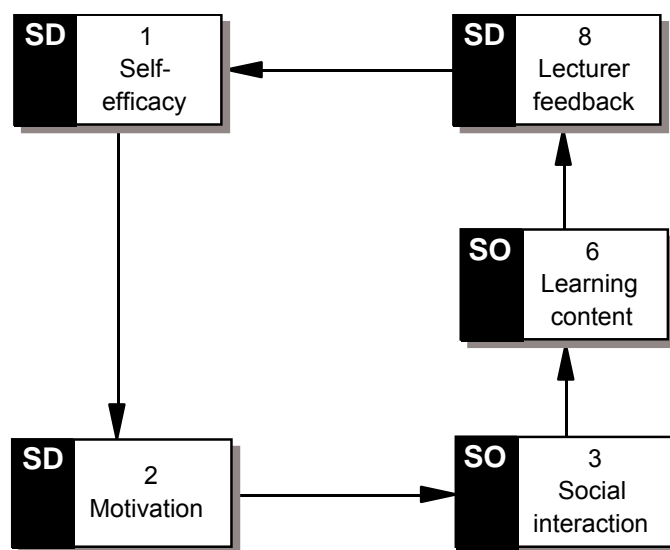


FIGURE 4.3: FEEDBACK LOOP 2 TOTAL SAMPLE

Feedback loop number 2 comprises of self-efficacy and motivation as secondary drivers which have direct impact on social interaction and on how the students engage with the learning content. The feedback loop can be called *courage (motivation, lecturer feedback and learning content) x others (social interaction) = I can do it (self-efficacy)*. This finding is supported by literature where it was found that self-efficacy can influence students' motivation in regulating cognitive and social processes (Har, Smith & Ming 2001:2). The manner in which the students engage with the learning content has an impact on the feedback they get from the lecturer. The students feel that the feedback they get from the

lecturer is a reflection of their engagement with the learning content. The feedback then impacts on the self-efficacy of the students. It is not surprising to find that feedback informs the students about their beliefs in their abilities as literature has indicated that positive feedback will enhance motivation in general, that is both extrinsic and intrinsic forms because it enhances perceived competence (Deci, Vallerand, Pelletier & Ryan 1991:333). Lecturer feedback on the SID also form part of another feedback loop where it directly influences students' self-regulation. One can notice here that the feedback the students receive from the lecturer can impact on their skills in self-regulation. Generally, this feedback loop points to the crucial role of the lecturer in structuring comments to students in such a manner that it targets the development of self-regulation skills or at least increase the likelihood that students will deploy their self-regulatory skills effectively.

Students feel that the amount of social interaction and/or the manner in which they are afforded opportunities to interact socially during learning activities, may impact directly on how they engage with the learning content. A possible explanation of the relationship is that learning tasks that involve group activities may be more interesting and that such activities provide them with opportunities to share ideas and therefore making the learning tasks interesting and less difficult. It is also a known fact that when students learn in groups they are given a chance to learn from one another especially from the more able ones.

4.2.3 FEEDBACK LOOP 3: CLASSROOM FACTORS X PERSON FACTORS = SUCCESS

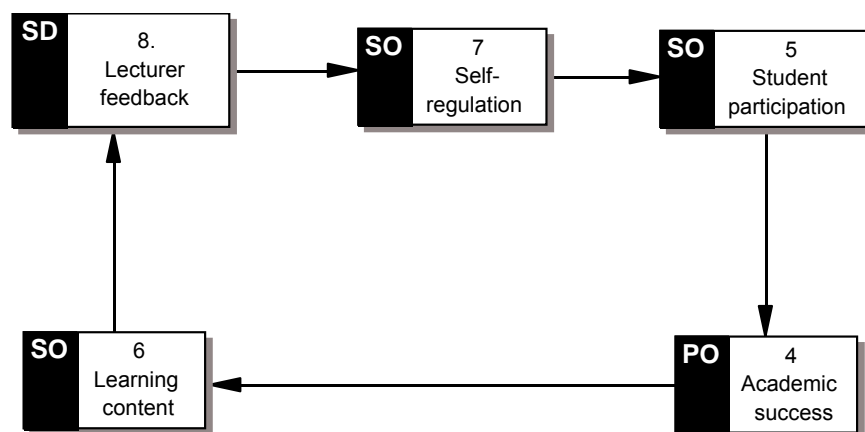


FIGURE 4.4: FEEDBACK LOOP 3 TOTAL SAMPLE

The feedback loop is called *classroom factors (lecturer feedback and learning content) x person factors (student participation and self-regulation) = success (academic success)*.

Feedback loop number 3 comprises of lecturer feedback as a secondary driver which impacts on students' self-regulation. The students' ability to regulate their behaviour further impacts on the manner in which they participate in the classroom learning activities and this ultimately impacts on their academic success which came out as a primary outcome. The feedback loop is supported by Butler and Winne (1995:246) where they state that the function of feedback that comes from an external source such as a teacher is to confirm or change a student's knowledge as represented in the answer of the test or an assignment. Furthermore, since self-regulation develops step-by-step, the students use the feedback to revisit their tactics and strategies they use to approach a task or an activity. The success students derive in the classroom further determines how they engage with their learning content.

4.2.4 FEEDBACK LOOP 4: CLASSROOM FACTORS X PERSON FACTORS = ACHIEVEMENT

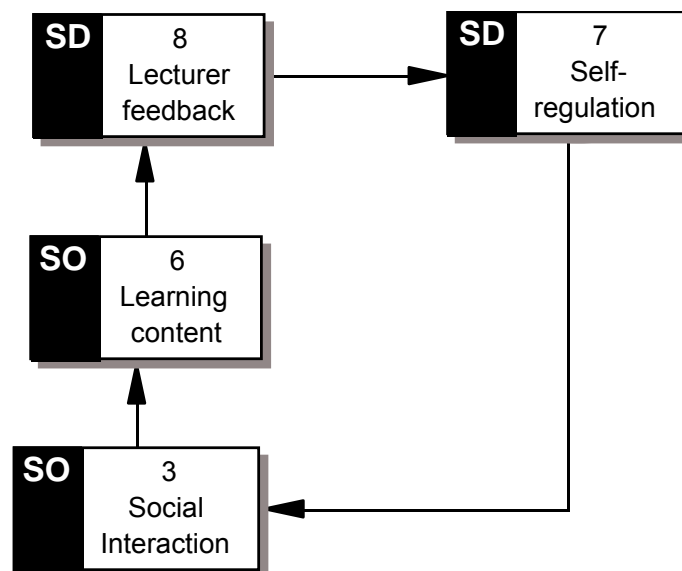


FIGURE 4.5: FEEDBACK LOOP 4 TOTAL SAMPLE

Feedback loop number 4 comprises of lecturer feedback as a secondary driver that impacts on self-regulation, social interaction and learning content as secondary outcomes. The feedback loop is called *classroom factors (lecturer feedback and learning content) x person factors (social interaction and self-regulation) = Achievement (Self-regulation and lecturer-feedback)*. Lecturer feedback can influence self-regulation in the sense that from the feedback provided by the lecturer, students can change their goals and strategies that they set before (Butler & Winne 1995:246). This finding supports the notion that positive feedback may encourage the students to take more active part in their learning and to be more initiative. Negative feedback on the other hand may lead to students doubting their abilities and as a result become dependant on their lecturers than becoming independent

learners. Self-regulation can also influence social interaction since students who succeed at self-regulation are likely to be successful at how they interact with others (Hoyle 2006:2). Once the students are able to interact with others successfully they stand a good chance of learning from others by sharing ideas with them.

This next section will discuss the clean SIDs of male and female participants with the aim of comparing them to investigate if there are differences or similarities that exist between them. The section will discuss the main differences and similarities only. The feedback loops that occurred in the SIDs will be discussed in detail thereafter.

4.3 CLEAN SID MALE AND FEMALE PARTICIPANTS

4.3.1 CLEAN SID MALE PARTICIPANTS

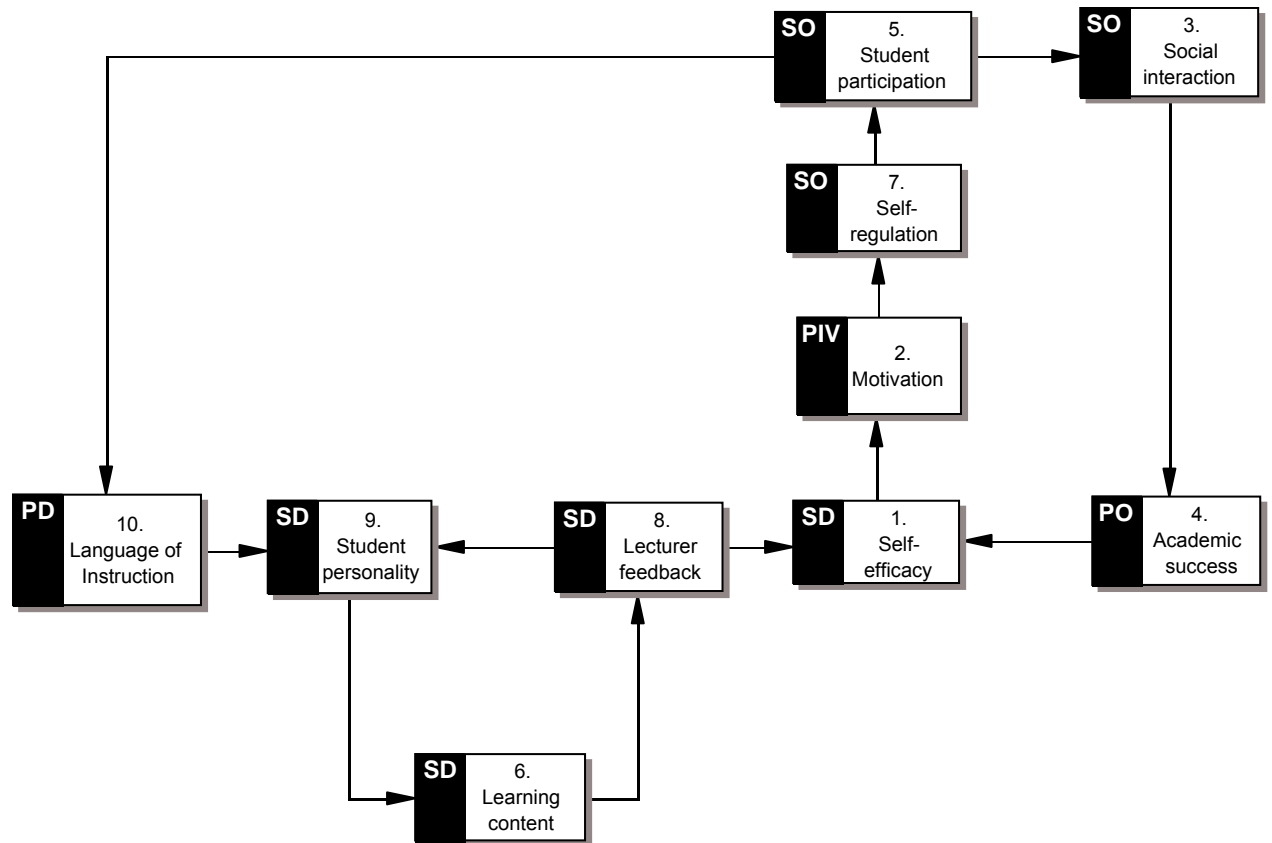


FIGURE 4.6: CLEAN SID MALE PARTICIPANTS

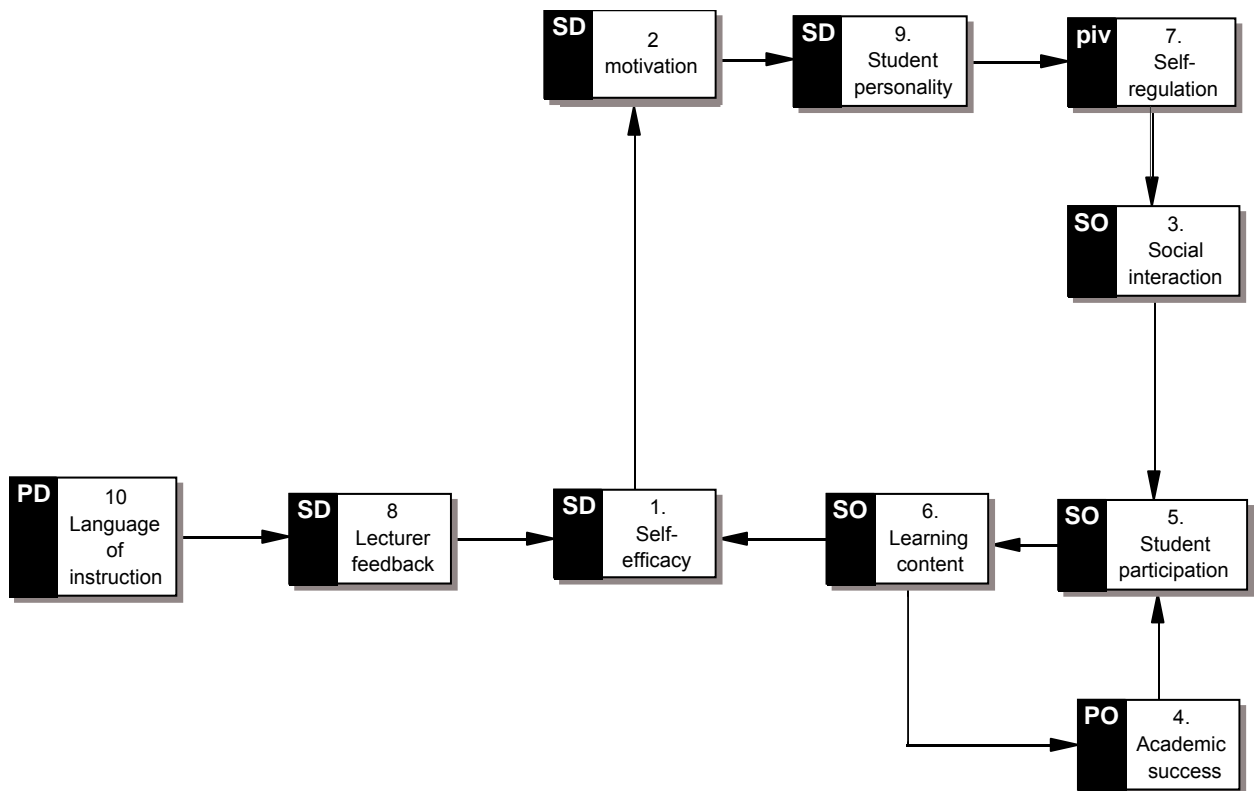


FIGURE 4.7: CLEAN SID FEMALE PARTICIPANTS

There are no significant differences in the clean SID of male participants and the clean SID of female participants. There are more similarities than differences. Language of instruction emerged as a primary driver in both female and male samples. Secondary drivers were student personality, lecturer feedback and self-efficacy in both samples. However, in the female sample motivation was also a secondary driver whereas in the male sample motivation emerged as a pivot. The female respondents perceive motivation as influenced by a number of other factors whereas the male respondents perceive it as influencing other factors as much as those factors can influence it. Given what is depicted in the SID, it appears that gender does not play a significant role with regard to the level of motivation needed by the respondents to be able to self-regulate their learning. It also emerged that female participants regard self-regulation as a factor that influences other factors as much as those other factors can influence it, whereas to the male respondents self-regulation is an outcome factor which means that they perceive it as dependent on other factors particularly motivation. In both samples there was a pivot. In male sample the pivot was motivation and in the female sample it was self-regulation. In both samples academic success emerged as primary outcome.

Three feedback loops occurred in the clean SID of male participants and they will be discussed in the next section in the same way as in the SID for the total sample.

4.3.2 FEEDBACK LOOP 1: PERSON CHARACTERISTICS X CURRICULUM = WHO I AM

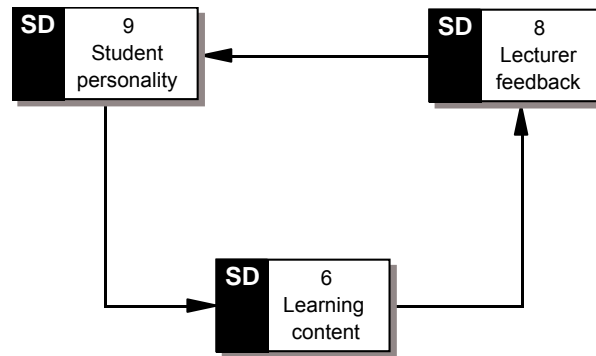


FIGURE 4.8: FEEDBACK LOOP 1 MALE PARTICIPANTS

The feedback loop is made up by drivers which influence one another with none of them being the first or the last. The feedback loop can be called *person characteristics (student personality) x curriculum (learning content) = Who I am (lecturer feedback)*. This implies that the personality of the students will determine how they interact with the learning situation. The students will either participate actively or passively in a learning situation depending on their personality. The students' approach to the learning situation is mediated by who they think they are and that will also determine their response to the feedback given by the lecturer.

4.3.3 FEEDBACK LOOP 2: SUCCESS X SUCCESS = SUCCESS

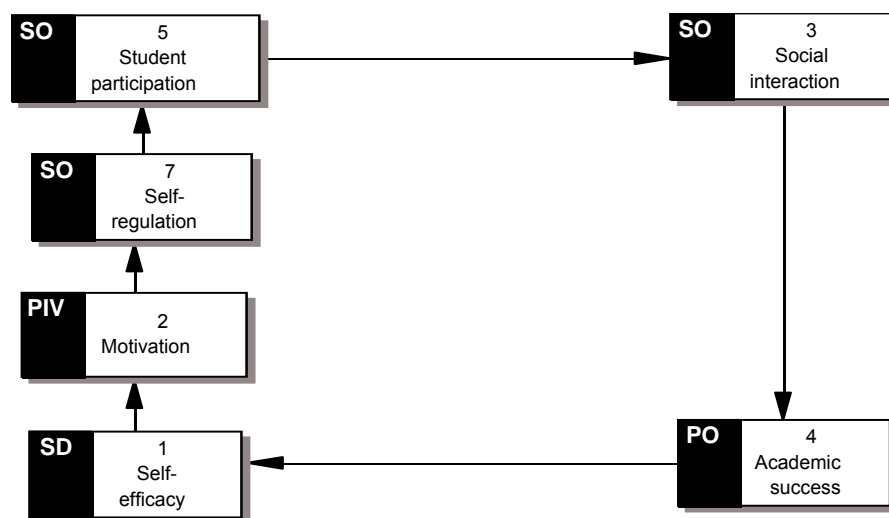


FIGURE 4.9: FEEDBACK LOOP 2 MALE PARTICIPANTS

The feedback loop like all others, has no beginning and ending. The feedback loop can be called *success (self-efficacy, motivation) x success (self-regulation, student participation) = success (social interaction, academic success)*. The name of the feedback loop is

derived from the explanation that success in one aspect leads to success in the next one (success breeds success). For instance, if students have high self-efficacy, they become motivated to learn and to persevere even if the learning material is not easy. If students are motivated, then they are able to self-regulate their behaviour and their learning. If students are able to self-regulate their behaviour, and then they are able to participate actively in the learning situation and also interact with others successfully and ultimately succeed academically. The circle could begin anywhere and will still yield the same explanation that success in one aspect leads to success in the next one. If one could start with self-efficacy which is perceived by the participants as having influence on motivation, one will notice that this relationship is not unusual and is supported by existing literature. For instance, Har, Smith and Ming (2001:2) acknowledge that self-efficacy has been found to influence students' motivation in regulating cognitive and social processes. Furthermore, students who are high in self-efficacy beliefs are better able to regulate their learning activities. These positive beliefs also impact one's ability to regulate affect in social relations and vulnerability to social pressure which in the long term will ensure academic success (Har, Smith & Ming 2001:2).

4.3.4 FEEDBACK LOOP 3: CONFIDENCE X COURAGE = PARTICIPATION

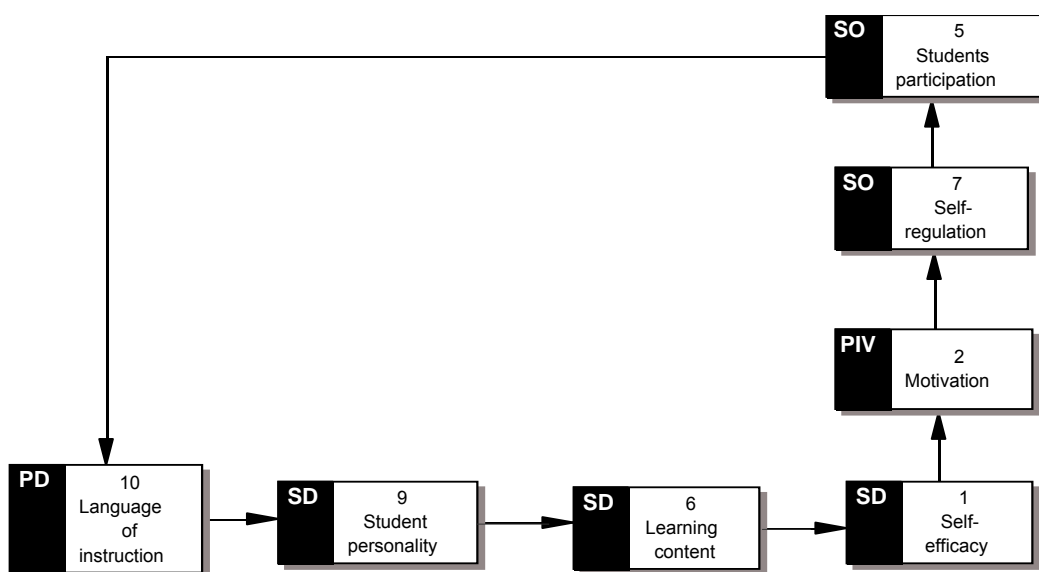


FIGURE 4.10: FEEDBACK LOOP 3 MALE PARTICIPANTS

The personality of the students, their ability to use and understand language and their ability to master learning content enhance their self-confidence. Self-efficacy, motivation and ability to self-regulate encourage the students to participate in learning activities. The feedback loop is therefore called *confidence (self-efficacy, personality, language of*

instruction) x courage (learning content, motivation) = participation (student participation, self-regulation).

Suppose we were to start with self-efficacy when looking at our SID in figure 4.10, the explanation will be that the belief the students hold about their abilities will enhance their level of motivation, as it has already been said (Har, Smith & Ming 2001:2) that self-efficacy has been found to influence students' motivation in regulating cognitive and social processes, it is therefore not unusual to have the explanation. Motivation places the students at a better position to be able to regulate their cognitive and social activities and therefore participation in a learning activity is facilitated. Language of instruction and student personality as primary drivers are also not unusual in the relationship.

The next section is the discussion of the feedback loops as they occurred in the clean SID of the female sample. Two feedback loops occurred in this SID and both of them will be discussed in detail.

4.4 FEEDBACK LOOPS FROM THE CLEAN SID OF FEMALE PARTICIPANTS

4.4.1 FEEDBACK LOOP 1: SOCIAL ENVIRONMENT X PERSON CHARACTERISTICS = SELF-CONCEPT

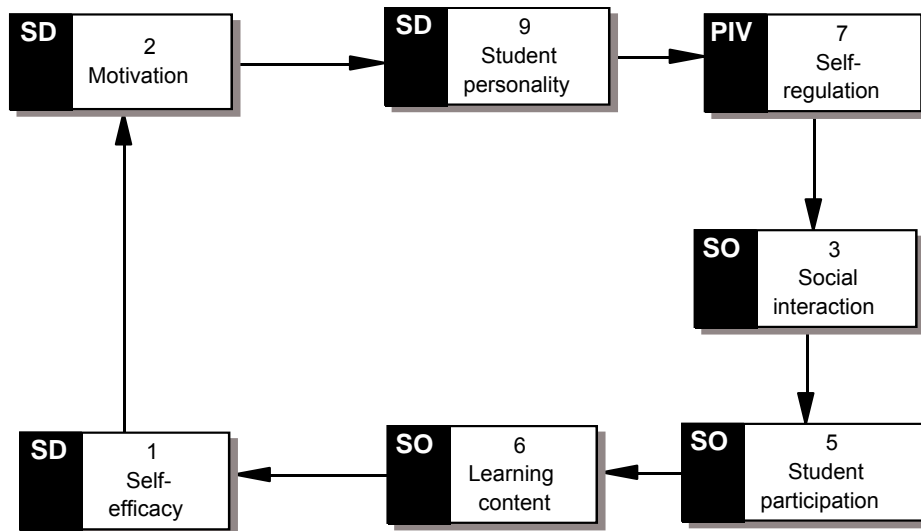


FIGURE 4.11: FEEDBACK LOOP 1 FEMALE PARTICIPANTS

The feedback loop does not differ much from the feedback loop called success breeds success represented in figure 4.8 above and therefore the relationship between the affinities will be explained exactly in the same manner. The feedback loop is called *social environment (social interaction, motivation, learning content) x person characteristics*

(student personality, self-efficacy, self-regulation) = self-concept (student participation).
The manner and the degree to which students interact socially and their personal characteristics result in the formation of the students' self-concept which could be positive or negative.

4.4.2 FEEDBACK LOOP 2: ACTIVITY X SUCCESS = INVOLVEMENT

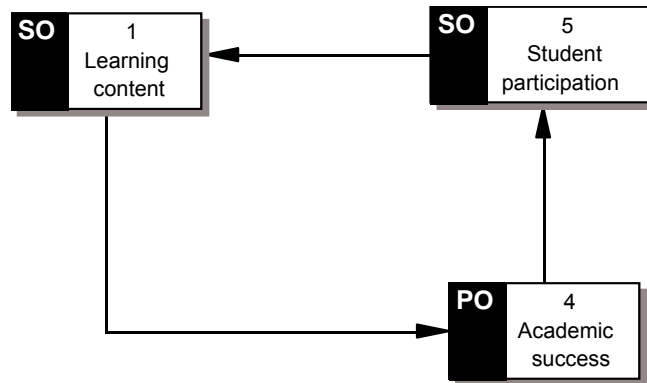


FIGURE 4.12: FEEDBACK LOOP 2 FEMALE PARTICIPANTS

The feedback loop is made up of outcome factors. The name of the feedback loop can be *activity (learning content) x success (academic success) = involvement (student participation)*. If we start with learning content we realize that the nature of the learning content and the students' perception of it influence how the students will engage with it (Ames 1992:263). This will include the attitude that students will have and the manner in which they will approach the learning task. The students also indicate that if they succeed academically, then they are motivated to participate in class.

In the next section I will discuss the main findings of the study with reference to existing relevant literature.

4.5 SUMMARY OF THE MAIN FINDINGS

When looking at the manner in which the ten affinities relate to one another, it appears that they form a system. A systems approach is described as “examining objects or processes, not as isolated phenomena, but as interrelated components or parts of a complex” (Boguslaw in Borgatta & Montgomery, 2000:3102). Systems are viewed as component blocks that have links between them. All the ten affinities that are looked at in this study connect to one another in different ways as described below:

Language of instruction emerged as a primary driver in the clean SID of the total sample. **Language of instruction** as a primary driver is to be expected given the fact that learning takes place via the medium of language. The statement implies that students must understand the language that is used in the learning situation to be able to learn and to be able to demonstrate that they have learned. Furthermore, the Constitution of the Republic of South Africa (Act No 108 of 1996) ensures serious commitments to the provision of the rights of children to be educated in their own language (De Klerk 2002:2).

Donald, Lazarus and Lolwana (2002:70) state that language is a tool of cognitive development which is a vehicle or carrier of values, information and ways of understanding. From the study it emerged that language influences other factors that are involved in the learning environment such as social interaction and self-regulation.

In the SIDs of total sample and of male sample, **personality** also emerged as a primary driver that influences other factors that influence self-regulation in learning. Without considering any personality theory specifically, some dimensions of personality are more likely to be closely associated with **self-regulation** than others. For example, Sue (2002:14) reveals that Judging / Perceiving personality dimension is the most predictor variable for self-regulated learning. A preference for J indicates that one prefers to come to judgments (using either thinking or feeling) instead of continuing to gather data (using either sensing or intuition). The person who prefers to live mainly in the dimension of judging prefers a decisive, planned and orderly way of life and aims to regulate and control events (McCaulley 1981, in Sue 2002:14) the foregoing discussion of personality confirms that **personality** has a direct influence on self-regulation in learning. Other factors that are involved in the teaching-learning environment are also influenced by student personality. This is confirmed by the position of **student personality** in the clean SID being the primary or secondary driver.

Empowering students to participate (**student participation**) in decision making and giving them an active role in their own learning is an intended outcome of life long learning (McLoughlin 1996:105). Life long learning requires students to be able to self-regulate their learning and therefore if students are empowered in the early years of learning they will be able to continue to be life long learners who are able to self-regulate their learning.

Finkel and Campbell (2001) and Vohs (2004) (both in Finkel, Campbell, Brunell, Dalton, Scarbeck & Chartrand 2006:473) suggest that effective self-regulation may be an important factor helping people to engage in behaviours that promote relationship well-being. In the outcome of the study it emerged that participants perceived **self-regulation**

as having potential to influence student participation and social interaction. This explanation therefore supports the findings of the study. The implication here is that if people are able to regulate their behaviour, they will be able to interact with others and participate in groups in an appropriate manner without experiencing difficulties.

In all three SIDs, **academic success** emerged as a primary outcome. The relationship implies that all the factors that are involved in the teaching-learning situation interact to exert influence on **academic success**. It also occurred that students perceive **social interaction** and **student participation** as factors that depend on **self-regulation**. The participants views the ability to self- regulate behaviour as a factor that promotes good social relations. It also emerged that participants perceive **motivation** and **self-efficacy** as factors that are directly interdependent. Participants view self-efficacy as having direct influence on motivation. In other words they feel that feelings of competency lead to motivation.

4.6 RELEVANCE OF THE STUDY

The study is relevant to the education system of South Africa which encourages students to construct knowledge and to monitor their own process and progress of learning. This implies that students must be able to demonstrate the knowledge they have gained in learning. To be able to do so, students need to be able to regulate their learning so that they will have full understanding of the knowledge to be able to demonstrate it. Furthermore, the nature of education at universities and other institutions of higher learning requires students to be self-regulated learners. Students are generally expected to seek information and initiate knowledge independently with little assistance from the lecturers. Therefore, the study will contribute to understanding the factors that can help students to develop self-regulated learning skills. If students can read about self-regulated learning and all the factors that are involved in teaching-learning situation as they are discussed in this study, they may be able to mobilise all the aspects in such a way that their skills to self-regulate their learning can be improved. Educators on the other hand also need to assist the students in developing the skills of self-regulation in learning. The study will therefore assist them in providing opportunities to the students that will assist them to become self-regulated learners. The findings of the study therefore suggest that the role of the lecturers and institutions of higher learning should include mobilisation of the classroom-related factors that are involved in teaching and learning in such a way that they promote self-regulation in students. Lecturers should give feedback in such a way that it gives students clear direction with regard to their assignments and tests. Lecturers and institutions may structure the courses of study in such a way that they give meaning

and are relevant to the students' world of work. The learning content and the manner in which the content is presented should be such that it creates interest in the students so that they can persevere even when it seems to be difficult to them. Since language of instruction has emerged as primary driver, it poses a challenge on the role of lecturers and institutions on how they will address the problem. The findings therefore require that lecturers and institutions devise means to ensure that students are not disadvantaged by language that is used in teaching and learning. It seems like there may be no solution at hand to the challenge of language particularly in the context of South Africa with the eleven official languages. There may be a need for the institutions to employ lecturers that can speak and understand few of the official languages rather than only Afrikaans and English as is the case at the moment.

The study can assist educators and lecturers in developing strategies that will promote self-regulation in their students. Furthermore, students may become aware of the factors in their lives that prevent them from being self-regulated learners. Students may also be able to develop strategies that will enhance their ability to self-regulate their learning. Strategies like participating in group activities and learning in groups and approaching learning tasks with confidence are among those that may assist in developing self-regulated learning strategies. Students' ability to self-regulate their learning may assist them in becoming independent seekers and initiators of knowledge and information.

4.7 LIMITATIONS OF THE STUDY

The possible limitation of this study is the use of Interactive Qualitative Analysis as a method. Research done through the use of IQA is limited to the book published on the subject and an article by Human-Vogel (2006). Furthermore, the participants did not provide qualitative data to explain the relationships between the affinities and as a result it was difficult to see if they understood the meanings of the affinities which is a possibility that exists. Due to the lack of qualitative data, the danger of misinterpreting respondents' views in explaining the relationships is always a factor. It is also difficult to know what the respondents had in mind when they considered the constructs. The results of the study also bear a limitation. The results are too broad and therefore difficult to make specific recommendations for the lecturers and the students. Furthermore, the results are not clear enough to influence the language policy of the institution. It is therefore suggested that further research be done on self-regulation through the use of IQA.

4.8 CONCLUSION

The purpose of this study was to explore students' conceptions of self-regulation in learning as influenced by the teaching-learning environment. Factors that exist in teaching-learning environment were investigated and the association between them and self-regulation in learning in a system of cause and effect was explored. The generalisability of the findings of this study to other settings of learning may not be guaranteed given the fact that research was done in one setting.



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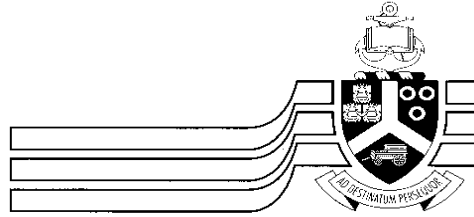
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APPENDICES

APPENDIX A	Letter re The contribution of the teaching-learning environment to the development of self-regulation in learning
APPENDIX B	Example of completed Questionnaire
APPENDIX C	Frequency affinities in descending order with Pareto and power analysis for male sample
APPENDIX D	Conflict analysis for male sample
APPENDIX E	Interrelationship diagram for male sample
APPENDIX F	Interrelationship diagram for male sample in descending order
APPENDIX G	Frequency affinities in descending order for female sample
APPENDIX H	Conflict analysis for female sample
APPENDIX I	Interrelationship Diagram for female sample
APPENDIX J	Interrelationship Diagram in descending order for female sample



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THE CONTRIBUTION OF THE TEACHING-LEARNING ENVIRONMENT TO THE DEVELOPMENT OF SELF-REGULATION IN LEARNING

July 2005

Dear Participant

You are invited to participate in a research project aimed at exploring and understanding how undergraduate students experience the contribution of the teaching-learning environment to the development of self-regulation in learning.

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established, unless you are willing to be contacted for an individual follow up interview. Should you declare yourself willing to participate in an individual interview, confidentiality will be guaranteed and you may decide to withdraw at any stage should you wish not to continue with an interview.

Accompanying this letter, is a document in which you are requested to indicate from your personal experience, the relationships between various aspects of the teaching-learning situation that are considered to be relevant to self-regulated learning. By participating in this project you will help the researcher to understand how the teaching-learning environment could enhance our understanding of self-regulation in learning.

The results from this study will be used to structure the individual interviews with participants who declare themselves willing. On the basis of the individual interviews, the results of the study will be used to construct a questionnaire designed to measure self-regulation in learning.

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time. Under no circumstances will the identity of interview participants be made known to any lecturer or personnel officer of the University of Pretoria.

Participant's signature : Date:

Researcher's signature : Date:

Yours Sincerely

Salomé-Vogel, PhD

AFFINITY DESCRIPTIONS

1. Self-efficacy

This affinity can be described as the **confidence** you have in your abilities. If you are very confident that you can do something, then you have a high sense of self-efficacy. If you have little confidence in your ability to be successful in something, then you have a low sense of self-efficacy. It is possible and considered normal to have confidence in your ability to do certain things, but have less confidence in your ability to other things.

2. Motivation

This affinity describes the intrinsic and/or extrinsic reasons you may have for engaging in particular activities. It also reflects your **personal interest** in pursuing an activity and the tendency to invest energy into **achieving goals**, whether these goals are your own or imposed on you by others (such as a parent, teacher, or lecturer). It reflects the tendency to persevere in the face of adversity.

3. Social interaction

This affinity describes the amount of social interaction that occurs among students in class during learning activities. It includes class **discussions, groupwork**, completing assignments in a group, or solving problems in a group. People differ in the amount of social interaction that they require as part of their studies. Lecturers also differ in the amount of social interaction they allow in class or as part of assignments.

4. Academic success

This affinity can be described as achieving high marks in academic studies. It is associated with good **grades** on semester tests and in examinations. It includes **performing well** on assignments and receiving positive feedback from the lecturer. It also reflects the student's **mastery** of the learning content.

5. Student participation

This affinity describes the extent to which a student **asks questions** in class, feels free to participate in discussions and to enter into debates with the lecturer and other students.

6. Learning content

This affinity describes the **learning material** that has to be mastered. Learning materials vary in terms of their difficulty and complexity. Some learning materials may be interesting while others may be boring. Learning materials in your module may also be too easy or too difficult.

7. Self-regulation

This affinity can be described broadly as setting goals or standards of performance for yourself, evaluating and monitoring your responses in attaining your goals and the belief that you are able to attain your goals. In terms of **goal-setting** this affinity specifically relates to the tendency to **regulate** your thoughts, emotions and actions to achieve the outcomes you desire. The ability to envision desired future events allows you to create incentives that motivate and guide your actions. This affinity also describes your tendency to adopt personal standards and to evaluate your behaviour against those standards. Self-evaluation refers to your beliefs about your progress that also determines your emotional reactions during goal-directed activities.

8. Lecturer feedback

This affinity describes what the lecturer tells students about their **progress** in class and during the semester. It includes the presence as well as the absence of feedback. It is also about different kinds of feedback. Some feedback from lecturers may be positive and inspiring, and some feedback may be negative and discouraging.

9. Student personality

This affinity describes a student's **typical behaviour** in general. Personality is about the typical ways in which we interact with the world and how we approach situations and other people. Some personality traits include being an extravert or an introvert, or being someone who prefers social interaction or individual activities.

10. Language of instruction

This affinity describes the **language** that is used in class to **communicate** to students. It is also the language in which textbooks, tests, assignments and examinations are presented. The language that the lecturer uses may correspond to the home language of the students, or it may be a second or third language. Not all students may be equally competent in the language of instruction.

DETAILED AFFINITY RELATIONSHIP TABLE (DART)

Please complete the attached table below by indicating what you think the direction of the relationship between two affinities are. Use the affinity descriptions that is supplied with this table to help you with this task.

For example:

If you think that 1 influences 2, then indicate $1 \rightarrow 2$

If you think that 2 influences 1, then indicate $1 \leftarrow 2$

If you think that there is no relationship between 1 and 2, then indicate $1 < > 2$.

PLEASE NOTE: An arrow may only go in one direction. Although you may feel that the direction of the relationship can go both ways, you must indicate the direction you think illustrates the strongest or most important influence.

Example:

An example of an IF/THEN statement in the case where $1 \rightarrow 2$ may look as follows:
If I have a positive attitude going into a counseling session then it feels to me as if the session flows more comfortably.

PLEASE NOTE: Use a specific example from your own experience to illustrate your point rather than a vague statement.

Thank you for the time and effort that you are willing to put into this research project.

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PERSONAL INFORMATION

Please tick the appropriate box:

1. What is your gender?

Male	Female
------	--------

2. For which course are you enrolled?

BA	B.Ed	Other, please specify: _____
----	------	------------------------------

Below is a list of the affinities you are requested to consider. Please also refer to the list of affinity descriptions for completing the table below. Remember that an arrow can go either left or right, but not in both directions.

Affinities			Possible relationships
1. Self-efficacy 2. Motivation 3. Social interaction 4. Academic success 5. Student participation 6. Learning content 7. Self-regulation 8. Lecturer feedback 9. Student personality 10. Language of instruction			If Affinity 1 influences Affinity 2 then: $1 \rightarrow 2$ If Affinity 2 influences Affinity 1 then: $1 \leftarrow 2$ If there is no relationship between affinities: $1 < > 2$
Affinity pair			Give an example in natural language using an IF/THEN statement to explain the relationship according to your personal experience
1		2	
1		3	
1		4	
1		5	
1		6	
1		7	
1		8	
1		9	
1		10	
2		3	
2		4	
2		5	
2		6	
2		7	
2		8	
2		9	
2		10	

3		4	
3		5	
3		6	
3		7	
3		8	
3		9	
3		10	
4		5	
4		6	
4		7	
4		8	
4		9	
4		10	
5		6	
5		7	
5		8	
5		9	
5		10	
6		7	
6		8	
6		9	
6		10	
7		8	
7		9	
7		10	
8		9	

8		10	
9		10	

Thank you for your participation!

If you are interested in participating in a follow – up interview based on the results of this phase of the study, please supply your contact details below. Follow-up interviews will be scheduled for August 2005. Please take note that confidentiality will be guaranteed and under no circumstances will your identity be made known.

Name Student number

Telephone Email address

APPENDIX B

EXAMPLE OF A COMPLETED QUESTIONNAIRE

APPENDIX C

Frequency affinities in descending order with Pareto and power analysis for male sample

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
1 > 5	7	7	1.1	2.2	1.0
1 > 3	7	14	2.2	4.3	2.1
5 < 6	7	21	3.3	6.5	3.1
2 > 4	6	27	4.4	8.3	3.9
1 > 4	6	33	5.6	10.2	4.6
4 < 8	6	39	6.7	12.0	5.3
1 > 2	6	45	7.8	13.8	6.1
5 < 9	6	51	8.9	15.7	6.8
4 < 9	6	57	10.0	17.5	7.5
1 < 10	6	63	11.1	19.4	8.3
3 < 9	6	69	12.2	21.2	9.0
5 < 8	6	75	13.3	23.1	9.7
2 > 5	6	81	14.4	24.9	10.5
2 > 7	6	87	15.6	26.8	11.2
5 < 7	6	93	16.7	28.6	11.9
4 < 10	5	98	17.8	30.2	12.4
4 < 6	5	103	18.9	31.7	12.8
5 < 10	5	108	20.0	33.2	13.2
2 < 8	5	113	21.1	34.8	13.7
7 < 9	5	118	22.2	36.3	14.1
4 < 7	5	123	23.3	37.8	14.5
1 < 8	5	128	24.4	39.4	14.9
1 < 6	5	133	25.6	40.9	15.4
2 < 9	5	138	26.7	42.5	15.8
7 < 10	5	143	27.8	44.0	16.2
4 < 5	5	148	28.9	45.5	16.6
7 < 8	5	153	30.0	47.1	17.1
1 < 9	5	158	31.1	48.6	17.5
6 > 7	5	163	32.2	50.2	17.9
2 > 10	5	168	33.3	51.7	18.4
3 < 10	4	172	34.4	52.9	18.5
6 < 10	4	176	35.6	54.2	18.6
2 > 3	4	180	36.7	55.4	18.7
3 > 4	4	184	37.8	56.6	18.8
6 > 8	4	188	38.9	57.8	19.0

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
2 < 6	4	192	40.0	59.1	19.1
2 < 3	4	196	41.1	60.3	19.2
8 > 9	4	200	42.2	61.5	19.3
1 > 6	4	204	43.3	62.8	19.4
9 < 10	4	208	44.4	64.0	19.6
3 < 6	4	212	45.6	65.2	19.7
3 < 5	4	216	46.7	66.5	19.8
2 < 10	3	219	47.8	67.4	19.6
3 > 8	3	222	48.9	68.3	19.4
2 > 6	3	225	50.0	69.2	19.2
1 > 7	3	228	51.1	70.2	19.0
3 < 8	3	231	52.2	71.1	18.9
3 < 7	3	234	53.3	72.0	18.7
8 < 10	3	237	54.4	72.9	18.5
4 > 6	3	240	55.6	73.8	18.3
8 < 9	3	243	56.7	74.8	18.1
3 > 6	3	246	57.8	75.7	17.9
1 < 2	3	249	58.9	76.6	17.7
6 < 9	3	252	60.0	77.5	17.5
6 < 8	3	255	61.1	78.5	17.4
4 > 5	3	258	62.2	79.4	17.2
2 > 9	3	261	63.3	80.3	17.0
5 > 8	3	264	64.4	81.2	16.8
4 > 7	3	267	65.6	82.2	16.6
1 < 4	3	270	66.7	83.1	16.4
7 > 9	3	273	67.8	84.0	16.2
3 > 7	3	276	68.9	84.9	16.0
2 < 4	3	279	70.0	85.8	15.8
5 > 10	3	282	71.1	86.8	15.7
3 > 5	2	284	72.2	87.4	15.2
6 < 7	2	286	73.3	88.0	14.7
2 < 7	2	288	74.4	88.6	14.2
9 > 10	2	290	75.6	89.2	13.7
8 > 10	2	292	76.7	89.8	13.2
7 > 8	2	294	77.8	90.5	12.7
1 < 7	2	296	78.9	91.1	12.2
5 > 7	2	298	80.0	91.7	11.7
2 < 5	2	300	81.1	92.3	11.2

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
6 > 9	2	302	82.2	92.9	10.7
1 < 3	2	304	83.3	93.5	10.2
5 > 9	2	306	84.4	94.2	9.7
3 < 4	2	308	85.6	94.8	9.2
1 > 8	2	310	86.7	95.4	8.7
4 > 8	2	312	87.8	96.0	8.2
1 < 5	2	314	88.9	96.6	7.7
4 > 10	2	316	90.0	97.2	7.2
3 > 10	2	318	91.1	97.8	6.7
1 > 9	1	319	92.2	98.2	5.9
3 > 9	1	320	93.3	98.5	5.1
7 > 10	1	321	94.4	98.8	4.3
1 > 10	1	322	95.6	99.1	3.5
6 > 10	1	323	96.7	99.4	2.7
2 > 8	1	324	97.8	99.7	1.9
4 > 9	1	325	98.9	100.0	1.1
5 > 6	0	325	100.0	100.0	0.0
Total Frequency	325	Equal Total Frequency	Equals 100%	Equals 100%	D Power = E-D

APPENDIX D

Conflict analysis for male sample

Affinity Pair Relationship	Frequency	Conflict?
1 < 10	6	
1 < 2	3	?
1 < 4	3	?
1 < 6	5	?
1 < 8	5	
1 < 9	5	
1 > 2	6	?
1 > 3	7	
1 > 4	6	?
1 > 5	7	
1 > 6	4	?
1 > 7	3	
2 < 10	3	?
<u>2 < 3</u>	<u>4</u>	<u>?</u>
2 < 4	3	?
2 < 6	4	?
2 < 8	5	
2 < 9	5	?
2 > 10	5	?
<u>2 > 3</u>	<u>4</u>	<u>?</u>
2 > 4	6	?
2 > 5	6	
2 > 6	3	?
2 > 7	6	
2 > 9	3	?
3 < 10	4	
3 < 5	4	
3 < 6	4	?
<u>3 < 7</u>	<u>3</u>	<u>?</u>
<u>3 < 8</u>	<u>3</u>	<u>?</u>
3 < 9	6	
3 > 4	4	
3 > 6	3	?
<u>3 > 7</u>	<u>3</u>	<u>?</u>
<u>3 > 8</u>	<u>3</u>	<u>?</u>
4 < 10	5	
4 < 5	5	?

Affinity Pair Relationship	Frequency	Conflict?
4 < 6	5	?
4 < 7	5	?
4 < 8	6	
4 < 9	6	
4 > 5	3	?
4 > 6	3	?
4 > 7	3	?
5 < 10	5	?
5 < 6	7	
5 < 7	6	
5 < 8	6	?
5 < 9	6	
5 > 10	3	?
5 > 8	3	?
6 < 10	4	
6 < 8	3	?
6 < 9	3	
6 > 7	5	
6 > 8	4	?
7 < 10	5	
7 < 8	5	
7 < 9	5	?
7 > 9	3	?
8 < 10	3	
8 < 9	3	?
8 > 9	4	?
9 < 10	4	

APPENDIX G

Frequency affinities in descending order for female sample

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
2 > 4	26	26	1.1	2.3	1.2
4 < 10	25	51	2.2	4.6	2.4
4 < 6	24	75	3.3	6.8	3.4
1 > 5	23	98	4.4	8.8	4.4
1 > 4	23	121	5.6	10.9	5.4
5 < 10	23	144	6.7	13.0	6.3
2 < 8	22	166	7.8	15.0	7.2
4 < 8	21	187	8.9	16.9	8.0
7 < 9	21	208	10.0	18.8	8.8
4 < 7	21	229	11.1	20.7	9.6
1 > 3	20	249	12.2	22.5	10.3
1 > 2	20	269	13.3	24.3	10.9
3 < 10	20	289	14.4	26.1	11.6
5 < 9	19	308	15.6	27.8	12.2
4 < 9	19	327	16.7	29.5	12.8
1 < 10	19	346	17.8	31.2	13.4
1 < 8	19	365	18.9	32.9	14.1
6 < 10	19	384	20.0	34.7	14.7
3 > 5	19	403	21.1	36.4	15.3
3 < 9	18	421	22.2	38.0	15.8
2 < 10	18	439	23.3	39.6	16.3
1 > 9	18	457	24.4	41.2	16.8
5 < 8	17	474	25.6	42.8	17.2
2 > 5	17	491	26.7	44.3	17.6
1 < 6	17	508	27.8	45.8	18.1
2 > 7	16	524	28.9	47.3	18.4
2 > 3	16	540	30.0	48.7	18.7
2 > 6	16	556	31.1	50.2	19.1
1 > 7	16	572	32.2	51.6	19.4
3 > 4	15	587	33.3	53.0	19.6
3 < 8	15	602	34.4	54.3	19.9
3 < 7	15	617	35.6	55.7	20.1
6 < 7	15	632	36.7	57.0	20.4
2 < 9	14	646	37.8	58.3	20.5
8 < 10	14	660	38.9	59.6	20.7

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
2 < 7	13	673	40.0	60.7	20.7
5 > 6	13	686	41.1	61.9	20.8
7 < 10	12	698	42.2	63.0	20.8
8 < 9	12	710	43.3	64.1	20.7
3 > 6	12	722	44.4	65.2	20.7
9 > 10	12	734	45.6	66.2	20.7
3 > 9	12	746	46.7	67.3	20.7
4 < 5	11	757	47.8	68.3	20.5
1 < 2	11	768	48.9	69.3	20.4
8 > 10	11	779	50.0	70.3	20.3
7 > 8	11	790	51.1	71.3	20.2
1 < 7	11	801	52.2	72.3	20.1
7 < 8	10	811	53.3	73.2	19.9
2 < 6	10	821	54.4	74.1	19.7
2 < 3	10	831	55.6	75.0	19.4
6 < 9	10	841	56.7	75.9	19.2
6 < 8	10	851	57.8	76.8	19.0
4 > 5	10	861	58.9	77.7	18.8
2 > 9	10	871	60.0	78.6	18.6
5 < 7	9	880	61.1	79.4	18.3
1 < 9	9	889	62.2	80.2	18.0
8 > 9	9	898	63.3	81.0	17.7
1 > 6	9	907	64.4	81.9	17.4
5 > 7	9	916	65.6	82.7	17.1
2 < 5	9	925	66.7	83.5	16.8
9 < 10	8	933	67.8	84.2	16.4
5 > 8	8	941	68.9	84.9	16.0
4 > 7	8	949	70.0	85.6	15.6
1 < 4	8	957	71.1	86.4	15.3
6 > 9	8	965	72.2	87.1	14.9
1 < 3	8	973	73.3	87.8	14.5
7 > 10	8	981	74.4	88.5	14.1
1 > 10	8	989	75.6	89.3	13.7
5 < 6	7	996	76.7	89.9	13.2
6 > 7	7	1003	77.8	90.5	12.7
7 > 9	7	1010	78.9	91.2	12.3
5 > 9	7	1017	80.0	91.8	11.8
6 > 10	7	1024	81.1	92.4	11.3

Affinity Pair Relationship	Frequency Sorted (Descending)	Cumulative Frequency	Cumulative Percent (Relation)	Cumulative Percent (Frequency)	Power
2 > 8	7	1031	82.2	93.1	10.8
3 > 8	6	1037	83.3	93.6	10.3
2 > 10	6	1043	84.4	94.1	9.7
3 < 6	6	1049	85.6	94.7	9.1
3 < 5	6	1055	86.7	95.2	8.5
3 > 7	6	1061	87.8	95.8	8.0
3 < 4	6	1067	88.9	96.3	7.4
1 > 8	6	1073	90.0	96.8	6.8
4 > 8	5	1078	91.1	97.3	6.2
1 < 5	5	1083	92.2	97.7	5.5
4 > 9	5	1088	93.3	98.2	4.9
4 > 6	4	1092	94.4	98.6	4.1
2 < 4	4	1096	95.6	98.9	3.4
4 > 10	4	1100	96.7	99.3	2.6
3 > 10	4	1104	97.8	99.6	1.9
5 > 10	3	1107	98.9	99.9	1.0
6 > 8	1	1108	100.0	100.0	0.0
Total Frequency	1108	Equal Total Frequency	Equals 100%	Equals 100%	Power = E-D

APPENDIX H

Conflict analysis for female sample

Affinity pair relationship	Frequency	Conflicts
1←10	19	
1←2	11	?
1←6	17	?
1←7	11	?
1←8	19	
1←9	9	?
1→2	20	?
1→3	20	
1→4	23	
1→5	23	
1→6	9	?
1→7	16	?
1→9	18	?
2←10	18	
2←3	10	?
2←5	9	?
2←6	10	?
2←7	13	?
2←8	22	
2←9	14	?
2→3	16	?
2→4	26	
2→5	17	?
2→6	16	?
2→7	16	?
2→9	10	?
3←10	20	
3←7	15	
3←8	15	
3←9	18	?
3→4	15	
3→5	19	
3→6	12	
3→9	12	?
4←10	25	
4←5	11	?
4←6	24	
4←7	21	

Affinity pair relationship	Frequency	Conflicts
4←8	21	
4←9	19	
4→5	10	?
5←10	23	
5←7	9	<u>?</u>
5←8	17	
5←9	17	
5→6	13	
5→7	9	<u>?</u>
6←10	19	
6←7	15	
6←8	10	
6←10	10	
7←10	12	
7←8	10	?
7←9	21	
7→8	11	?
8←10	14	?
8←9	12	?
8→10	11	?
8→9	9	?
9→10	12	

APPENDIX I

Interrelationship Diagram for female sample

Tabular IRD													
	1	2	3	4	5	6	7	8	9	10	OUT	IN	Δ
1		↑	↑	↑	↑	←	↑	←	↑	←	6	3	3
2	←		↑	↑	↑	↑	↑	←	↑	←	6	3	3
3	←	←		↑	↑	↑	←	←	←	←	3	6	-3
4	←	←	←		←	←	←	←	←	←	0	9	-9
5	←	←	←	↑		↑		←	←	←	2	6	-4
6	↑	←	←	↑	←		←	←	←	←	2	7	-5
7	←	←	↑	↑		↑		↑	←	←	4	4	0
8	↑	↑	↑	↑	↑	↑	←		←	↑	7	2	5
9	←	←	↑	↑	↑	↑	↑	↑		←	6	3	3
10	↑	↑	↑	↑	↑	↑	↑	←	↑		8	1	7

APPENDIX J

Interrelationship Diagram in descending order for female sample

Tabular IRD – Sorted in Descending Order of Δ													
	1	2	3	4	5	6	7	8	9	10	OUT	IN	Δ
10	↑	↑	↑	↑	↑	↑	↑	←	↑		8	1	7
8	↑	↑	↑	↑	↑	↑	←		←	↑	7	2	5
1		↑	↑	↑	↑	←	↑	←	↑	←	6	3	3
2	←		↑	↑	↑	↑	↑	←	↑	←	6	3	3
9	←	←	↑	↑	↑	↑	↑	↑		←	6	3	3
7	←	←	↑	↑		↑		↑	←	←	4	4	0
3	←	←		↑	↑	↑	←	←	←	←	3	6	-3
5	←	←	←	↑		↑		←	←	←	2	6	-4
6	↑	←	←	↑	←		←	←	←	←	2	7	-5
4	←	←	←		←	←	←	←	←	←	0	9	-9

