Self-regulated learning as a prerequisite for successful distance learning

Franciska Bothma* and J.L.dK. Monteith
School of Education and Training, North-West University (Potchefstroom Campus), Potchefstroom, 2520 South Africa
soofb@puknet.ac.za; nsojm@puknet.ac.za

* To whom correspondence should be addressed

The relationship between the application of self-regulated learning strategies and the academic achievement of tertiary distance learners from a rural area is explored. The literature review indicated a positive relationship between self-regulation, application of learning strategies and academic achievement. The study focused on investigating the differences in the application of self-regulated learning strategies by a group of successful and non-successful distance learners (n=143). An *ex post facto* design was used and data were statistically analysed by means of factor analyses and multiple regression analyses. It is argued that distance learners, who are successful in their endeavours to complete an academic module, apply more and/or different self-regulated learning strategies than non-successful learners.

Introduction and contextualisation

Traditional contact-based education providers are continuously seeking means to offer their services to greater numbers of diverse learners in an increasing variety of ways (Mays, 2001; Barron, 2002). The possibility of offering tertiary education programmes in a variety of fields to learners not in a position to attend residential classes is broadened by the availability of an increasing number of technologies aimed at potential distance learners from all over the world (Daniels, 2002; Wheeler, 2002; Zheng & Smaldino, 2003). The growth of the Internet and the rapid development of other multimedia with easy access to information and communication technologies aid in a process of redefining the traditional learning environment (Sala, 2003). The varying models of distance education differ with regard to the level of sophistication of technology, the kind of interaction available to students and the cognitive skills that are required for effective learning (Wheeler, 2002). This fundamental shift in education necessitates a rethinking of the role of the teacher and the learner during the learning process (Sala, 2003; Daniels, 2002).

Whilst distance learning as a mode of education and training is in ever-increasing demand, the success rate of students engaging in this mode of learning is not always satisfactory (Daniels, 2002). Although Bates (1995) states that the success of any distance learning programme is in part dependent on the quality of the learning material and the manner in which the education institution designs and delivers the study material, Ertmer and Newby (1996) are of the opinion that it should remain the personal responsibility of the student to master the study content and meet the necessary requirements to ensure successful completion of the registered course. However, within the South African context, the typical distance learner seems to be more dependent, as corroborated by the findings of this study.

Many of the rural areas of South Africa, housing most of the tertiary distance learners, differ vastly from other first-world countries, since they show a lack of "easy access" to old or new technologies. Institutions offering distance learning often face almost insurmountable obstacles in an effort to ensure that remote students have access to all paper-based study materials and receive all the necessary correspondence regarding facilitation sessions, assignments and examinations. Many of these learners live in areas with no electricity services, denying them access to learning technologies such as computers, e-mail and the Internet. These learners are no strangers to postal service difficulties either and often face transport problems preventing them from accessing nearby libraries. In an effort to deliver distance learning programmes, institutions thus have to be so meticulous in their planning and crisis management, that it is not surprising that they rarely consider whether their clients are also in need of developing skills to study independently to enhance their chances of learning success. This is unfortunate, since available literature supports the fact that independent, self-regulated learning is imperative for effective learning.

Self-regulated learning generally refers to learners' proactive efforts to mobilize available emotional, cognitive, and environmental resources during learning and subsequent self-observation, judgement, and reaction to their progress (Gredler, 1997). This implies that self-regulated learners are aware of and use specific learning strategies appropriate to attain expected outcomes, maintain perceptions of self-efficacy, are able to persist in their efforts to attain certain academic goals and monitor their progress to ensure timely intervention or adjustment in strategy use should it be deemed necessary (Zimmerman & Martinez-Pons, 1992). For the purposes of this study, self-regulated learning was viewed from the social-cognitive perspective, defined by Zimmerman (1998) as a cyclical process sub-divided into three phases, namely the forethought, volitional control, and self-reflection phases (see Figure 1).

The purpose of this investigation was to determine whether self-regulated learning is a determinant of successful learning at a distance and, if so, which variables of self-regulation are the best predictors of academic success at a distance.
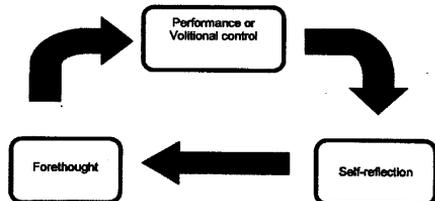

Figure 1 The self-regulation cycle (Zimmerman, 1998:2)

Literature review

Distance learning defined

Bates (1995) and Gottschalk (1998) define distance learning as a learning approach that offers the dedicated, motivated student, despite his/her geographical location, the opportunity to qualify him/herself in a specific field of study with the aid of available technology.

Distance learners study at home, in a classroom, at work or any other place of convenience and, furthermore, study in the absence of an instructor (Giannasi & Berbel, 1999; Daniels, 2002; Barron, 2002). The individualisation/student-centred dimension (especially in terms of learning tempo and learning progress) of distance learning is one of the main characteristics that distinguishes distance learning from more traditional study, where it is mostly the educator who determines the tempo of instruction and learning (Waghid, 1996). In addition, Waghid (1996) identifies learner autonomy and individual responsibility for learning as important characteristics of successful distance learning.

Distance learning can be characterised by the following: the facilitator and the student are separated for most part of the teaching-learning process; the relevant education institution, with its distinctive policy, influences the whole teaching-learning process; effective two-way communication must be established among the material developers, the facilitators and the education institution; and the distance learner should be serviced with quality education irrespective of distance, since he or she is not able to study full-time on campus because of geographical or time limitations (Roberts, 1997; Bates 1995; Daniels, 2002).

According to Winne (2003), apart from all the positive aspects related to distance education, distance learning modes do no more than deliver the necessary information to the student. What the student does with the information after it has been delivered remains his/her own responsibility. It follows that learning occurs when students generate knowledge from within, not when they receive information from an outside source (Winn, 2003). In effect, it can be hypothesized that successful learning at a distance does not only depend on the quality of service received from the education provider or the student's ability to manage his or her time effectively, but also on his/her ability to study actively and independently, in other words, his or her self-regulated learning abilities.

Self-regulation

Self-regulation implies a self-directed process by which learners transform their mental abilities into academic skills, referring to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals (Zimmerman, 2000). Self-regulated learning requires students to be metacognitively, motivationally, and behaviourally active participants in their own learning (Zimmerman, 1989a). Metacognitively, self-regulated learners plan, set goals, organise, self-monitor, and self-evaluate at various stages during the learning process (Zimmerman, 1989b). Motivationally, they report high levels of self-efficacy, intrinsic task interest, and perceive themselves to be competent and autonomous. Behaviourally, self-regulated learners are self-starters who display extraordinary effort and persistence during learning. They select, structure, and understand their environment and improve it through the use of various strategies (Zimmerman, 1990).

According to Schunk (2000) self-regulation can be distinguished from any other form of learning behaviour by the fact that the student exercises certain choices during the learning process, by answering questions such as: *Why* do I study? *How* do I study? *When* do I study? *What* do I study? *Where* do I study? With *whom* do I study? Where the student does not have a choice in these matters and where learning is controlled by others, the measure of self-regulation during learning is negligent (Schunk, 2000).

Schunk (2000) explains that the student who has the choice to identify his or her own motive for learning will be self-motivated to actively participate in the learning process to realise personal outcomes. A student who can select his or her own method of learning will learn to plan more effectively and to select appropriate learning strategies to realise his or her learning outcomes. A student who can select the time and place, and with whom to study, will develop effective resource-management strategies to ensure the timely completion of learning tasks (Schunk, 2000).

Therefore, self-regulation implies a process through which the student directs and adjusts his or her thoughts (cognitions), feelings, and behaviour in order to realise personal goals. This, in turn, enhances self-satisfaction and motivation, and learning methods are further improved (Schunk, 2000; Zimmerman, 2002).

The self-regulation cycle

Zimmerman (2000) describes self-regulation as cyclical because the feedback from prior performance is used to make adjustments during current learning efforts. Such adjustments are necessary because personal, behavioural, and environmental factors are constantly changing

during the course of learning, and must be monitored using three self-oriented feedback loops. Behavioural self-regulation requires the student to self-observe and strategically adjust performance processes, such as the method of learning. Environmental self-regulation refers to observing and adjusting environmental conditions or goals, whereas covert self-regulation involves monitoring and adjusting cognitive and affective states, such as imagery for remembering or relaxing. The accuracy and consistency of students' self-monitoring of these triadic sources of self-control directly influence the effectiveness of their strategic adjustments and the nature of their self-beliefs (Zimmerman, 2000).

The self-regulation cycle occurs through three major phases: forethought, performance or volitional control, and self-reflection (see Figure 1).

The Forethought phase

The forethought phase refers to influential processes and beliefs that *precede* efforts to learn and set the stage for learning. Zimmerman (2002) distinguishes two distinctive but closely linked categories of forethought: task analysis and self-motivational beliefs (see Table 1).

The Performance or Volitional control phase

Performance or volitional control involves processes that occur *during* learning efforts and influence concentration and performance. Zimmerman (2002) distinguishes two categories of performance processes: self-control and self-observation (see Table 1).

The Self-reflection phase

Self-reflection involves processes that occur *after* learning efforts and influences a student's reactions to that experience (see Table 1). These self-reflections, in turn, influence forethought regarding subsequent learning efforts, thus completing the self-regulatory cycle (Zimmerman, 1998).

Self-judgement and self-reaction are closely associated with self-observation (Zimmerman, 2000). Self-judgement involves self-evaluating one's performance and attributing causal significance to the results. *Self-evaluation* refers to comparing self-monitored information with a standard or goal. Self-evaluations typically lead to attributions about the causal meaning of results, such as whether poor performance is due to one's limited ability or to insufficient effort. These attribution processes are pivotal to self-reflection because attributions of errors to ability compel students to react negatively and to give up trying to improve. Self-regulated students tend to attribute failure to correctable causes and attribute success to personal competence (Zimmerman, 1998).

In conclusion, and as indicated by literature, it appears that the ideal distance learner is one who applies self-regulation during learning and thereby ensures successful completion of academic modules.

Method
Subjects
The subjects involved in this study were an available study population of 143 second year tertiary distance learners registered for a Further Diploma in Instructional Psychology at a specific university in the North West province of South Africa. These learners attended the scheduled facilitation sessions on the days of testing and they all completed the surveys. On the basis of the academic achievement of the learners during a semester examination, they were divided into two groups of successful and non-successful learners, respectively. For the purposes of this study, in order to distinguish these two groups of learners who could clearly be described as successful and non-successful, respectively, successful learners were classified as those who obtained a score of 55% or more during the examination. The non-successful learners were those who obtained a score of 49% or less during the same examination. The learners who obtained scores between 50% and 54% were considered to be borderline cases that could be classified as either successful or non-successful and were therefore

omitted from the analysis. These two groups were then compared on all the self-regulation variables.

Table 1 Cyclical phases and sub-processes of self-regulation (Zimmerman, 2000:16)

	Cyclical self-regulatory phases	
	Performance/volitional	
Forethought	control	Self-reflection
Task analysis	Self-control	Self-judgement
- Goal setting	- Self-instruction	- Self-evaluation
- Strategic planning	- Attention focusing	- Causal
	- Imagery	attributions
	- Task strategies	
Self-motivational beliefs	Self-observation	Self-reactions
- Self-efficacy	- Self-recording	- Self-satisfaction/
- Outcome expectations	- Self-experimentation	effect
- Intrinsic interest/value		- Adaptive-
- Goal orientation		defensive

Instruments

Two instruments, the Motivated Strategies for Learning Questionnaire (MSLQ) and a self-developed questionnaire for self-regulated learning (Self-Regulated Learning Questionnaire — SRLQ) based on Zimmerman's (2000) model, were used to obtain data on self-regulated learning, cognitive learning strategies, and motivational variables.

The MSLQ is a self-report instrument designed by Pintrich, Smith and McKeachie (1989), from University of Michigan, to assess university students' motivational orientation and their use of different learning strategies. The MSLQ consists of two sections, a motivational section and a learning strategies section. The section on motivation assesses students' goals and value beliefs for a course, their beliefs about their skill to succeed in the course, and their anxiety about tests in the course. The learning strategy section assesses students' use of different cognitive and metacognitive strategies, and their management of different resources.

As the researchers, at the time of this study, were of the opinion that the MSLQ does not focus sufficiently on the measurement of self-regulated learning as defined by Zimmerman (2000), the SRLQ was used in conjunction with the MSLQ to obtain relevant data.

Subsequently, the following sub-scales (variables) of the MSLQ and the SRLQ, respectively, were identified and used in the study:

MSLQ: Intrinsic goal orientation ($\alpha = 0.86$),[1] extrinsic goal orientation ($\alpha = 0.72$), task value ($\alpha = 0.93$), self-efficacy ($\alpha = 0.96$), expectancy of success ($\alpha = 0.93$), and test anxiety ($\alpha = 0.92$). The following cognitive scales were used: rehearsal strategies ($\alpha = 0.71$), elaboration strategies ($\alpha = 0.92$), organisation strategies ($\alpha = 0.93$), and regulation strategies ($\alpha = 0.92$.)

SRLQ: Only three of the identified sub-scales were used, focusing on the first two phases of Zimmerman's self-regulation cycle: goal setting (forethought; $\alpha = 0.81$), self-observation (volitional control; $\alpha = 0.85$), and self-control (volitional control; $\alpha = 0.90$). A fourth variable, strategic planning ($\alpha = 0.96$), was formed by combining the planning strategies sub-scale of the MSLQ and a planning sub-scale of the SRLQ (forethought phase).

A further variable (study hours per day) was identified during the data analysis.

To determine the internal consistency and construct validity of the respective sub-scales, each sub-scale was subjected to a separate factor

---

1 The CORR procedure of the SAS package was used to calculate the correlation coefficients (alpha reliability) of the identified 15 variables.

analysis based on the principles as discussed by Clark and Watson (1995).

Data collection procedure

To optimize the chances of a high response rate, the researcher personally visited three of the five contact centres to administer the questionnaires. The researcher trained the centre managers of the two remaining centres to ensure standardised procedures for data collection at these centres. The questionnaires were completed by the subjects prior to the facilitation sessions.

The fact that attendance of contact sessions was not compulsory, together with the difficulties that these students experienced with transport, created certain problems. The researcher, for example, visited two centres on two previously scheduled testing days where there were only five and seven learners, respectively, in attendance. Thereafter, special advertisements were placed in prominent North West papers and special letters were posted to registered students requesting them to attend the subsequent facilitation sessions, explaining the relevance and importance of the study. Even after these efforts, only 143 learners attended and were available to participate in the study.

In most cases the home language of the subjects was either Tswana or Sesotho whilst the questionnaires were in English. Though all these learners indicated that English was their language of choice, they were encouraged to ask the administrators for clarification of terms rather than answer a question randomly, to enhance their understanding of what was expected of them.

At all the centres the subjects first completed a biographical questionnaire. Thereafter, the procedures for completion of the MSLQ were explained and demonstrated before subjects were requested to complete the questionnaire. The same procedure was followed with the SRLQ. Completion of all three questionnaires took between 50 and 70 minutes, depending on the centre and the number of subjects present.

Experimental design and statistical analysis of data

An *ex post facto* approach was used in this study since no manipulation of the variables occurred. The correlation between the independent variables and the dependent variable (see Table 2) was determined retrospectively.

The data were analysed with the aid of the SAS (SAS Institute Inc., 1996) and the Statistica packages (Statsoft, Inc., 2000). These programs provided descriptive statistics used to give an overview of the most important characteristics of the distribution, mean scores, and standard deviations of the independent variables, between the successful and non-successful subjects.

Thereafter a multiple regression analysis was performed to analyse the combined and individual contributions of the 15 independent variables towards the variance of the dependent variable. The effect sizes, f^2 (as calculated by Cohen, 1988) were used as criterion for practical significance (see Tables 3 and 4). A best subset regression analysis revealed those subsets of variables that were the best combination of predictors of academic performance of the two groups, respectively. Finally, a stepwise multiple regression analysis was performed to determine the order of importance of the identified predictors of academic performance of the two groups, respectively.

Discussion of results
Practical significance of differences between groups of successful and non-successful distance learners

As indicated by the data presented in Table 2, there appear to be definite differences between successful and non-successful distance learners regarding the application of the majority of the self-regulated learning variables, and many of these differences are of practical significance (see large effect sizes in Table 2).

It appears that the higher mean scores calculated for the group of successful distance learners for intrinsic goal orientation, task value, self-efficacy, planning, regulation, use of organisation and elaboration,

Bothma & Monteith

Table 2 Comparison of mean scores and standard deviations of variables that influence academic achievement of successful and non-successful distance learners

	Mean score		Standard deviation		Mean difference between groups 1 and 2	Effect size (d)
Variables	Non-successful learners	Successful learners	Non-successful learners	Successful learners		
Intrinsic goal orientation	3.67	5.52	1.55	1.24	1.85	1.19*
Extrinsic goal orientation	5.39	5.64	1.01	0.73	0.25	0.26
Task value	4.74	5.85	1.33	0.95	1.11	0.83*
Self-efficacy	3.67	5.06	1.50	1.10	1.39	0.93*
Expectancy for success	3.78	5.46	1.77	1.06	1.68	0.95*
Test anxiety	5.18	3.53	1.59	1.29	1.65	1.04*
Rehearsal strategies	4.85	4.84	0.91	0.78	0.01	0.01
Organisation strategies	3.73	5.49	1.75	1.35	1.76	1.00*
Elaboration strategies	4.04	5.60	1.75	1.38	1.56	0.89*
Planning	3.38	5.55	1.91	1.70	2.17	1.14*
Regulation	3.53	5.35	1.84	1.48	1.82	0.99*
Goal setting	2.94	3.72	0.87	0.75	0.78	0.90*
Self-observation	3.11	4.16	1.05	0.86	1.05	1.00*
Self-control	3.41	3.80	0.50	0.38	0.39	0.78*
Study hours per day	1.77	1.62	1.03	0.78	0.15	0.14

Small effect $d = 0.20$[2]   Medium effect $d = 0.50$ * Large effect $d = 0.80$

[2] Effect sizes (d) as indication of practical significance (as calculated by Cohen, 1988)

Table 3 Contribution of the best subset of predictors (R^2) to academic achievement of the group of successful distance learners
$R^2 = 0.4856$ ($R_a^2 = 0.4285$)

Variable (r)	Contribution to R^2	Step in analysis	Cumulative contribution to R^2	$C(p)$ value	F value	Effect sizes (f^2)
Organisation	0.2122	1	0.2122	14.3531	7.81	0.41*
Planning	0.1630	2	0.3752	7.7978	7.30	0.32
Intrinsic goal orientation	0.1105	3	0.4857	4.0000	5.80	0.21

Small effect $f^2 = 0.02$ Medium effect $f^2 = 0.15$ * Large effect $f^2 = 0.35$ $p < 0.01$

Table 4 Contribution of the best subset of predictors (R^2) to academic achievement of the group of non-successful distance learners
$R^2 = 0.3947$ ($R_a^2 = 0.3131$)

Variable (r)	Contribution to R^2	Step in analysis	Cumulative contribution to R^2	$C(p)$ value	F value	Effect sizes (f^2)
Expectancy for success	0.0425	1	0.0425	26.2447	2.57	0.07
Goal setting	0.1520	2	0.1945	15.1897	10.76	0.25
Elaboration	0.0498	3	0.2443	12.9152	3.69	0.08
Organisation	0.0534	4	0.2977	10.3288	4.18	0.09
Self-efficacy	0.0718	5	0.3695	6.1643	6.15	0.19
Study hours per day	0.0143	6	0.3838	6.9379	1.23	0.02
Regulation	0.0109	7	0.3947	8.0000	0.94	0.02

Small effect $f^2 = 0.02$ Medium effect $f^2 = 0.15$ * Large effect $f^2 = 0.35$ $p < 0.01$

expectancy for success, and goal setting as well as self-observation and self-control, could be an indication that the successful learners were more motivated to learn and applied more self-regulatory strategies than the non-successful learners. There is a great deal of evidence from literature that a high occurrence of these variables during learning can have a positive effect on learning outcomes. As stated by Zimmerman (2002), learners displaying a *learning goal orientation* tend to focus on learning progress rather than competitive outcomes and learn more effectively than learners focusing on performance outcomes, since they value the process of learning for its own merits. Furthermore, learners who are *intrinsically interested* in a task will persist in learning efforts, even in the absence of tangible rewards (Zimmerman, 2000). A key form of task analysis during the forethought phase of the self-regulation cycle involves the setting of goals. *Goal setting* refers to deciding upon specific outcomes of learning or performance, such as completing a major assignment in a specific time. Goals mobilize effort, increase persistence and lead to appropriate use of learning

strategies (Schunk, 2000; Garavalia & Gredler, 2002).

These goal-setting and strategic-planning processes are affected by learners' motivational beliefs, such as their self-efficacy beliefs, outcome expectations and goal orientations (Zimmerman, 2002; see Table 1). *Self-efficacy* refers to a learner's personal beliefs that he/she can successfully perform the activities required to obtain designated goals (Bandura, 1986; Schunk, 1994; 2000). Schunk (1985) reports that learners who maintain high levels of self-efficacy (as seems to be the case with the successful group of learners) expend greater effort and persist longer when studying and achieve better in learning than those learners who doubt their capabilities. High self-efficacy stimulates effort and persistence when problems are encountered, whilst low self-efficacy leads to doubts, avoidance behaviour and lack of effort (Schunk, 1985; Garavalia & Gredler, 2002).

The data analysis appears to reveal that the successful students set more challenging learning goals and demonstrated higher levels of self-efficacy than the non-successful students. The successful students

effectively planned, regulated and controlled their learning behaviour, motivations and cognitions in contrast to the non-successful students. Self-regulation processes, such as self-instruction, imagery, attention focusing, and task strategies, help students to focus on the task and optimise their effort. Self-observation or self-monitoring refers to one's tracking of specific aspects of one's performance, the conditions that surround it, and the effects that it produces. This is a vital self-regulatory process because it informs students about their progress (or lack of progress) towards goal attainment (Zimmerman, 2002). In turn, the non-successful students applied more rehearsal strategies during learning, were more extrinsically motivated and experienced more test anxiety regarding the learning task.

Effect of the independent variables on academic achievement

To determine the combined effect of the entire set of independent variables on the academic achievement of the successful and non-successful distance learners, respectively, a multiple regression analysis was performed with academic achievement as criterion. The multiple regression analysis revealed that the set of independent variables explained 76.39% ($R^2 = 0.7639$; $R_a^2 = 0.3861$) of the variance in academic achievement of the successful distance learners. Regarding the non-successful distance learners, the same set of variables explained only 56.33% ($R^2 = 0.5633$; $R_a^2 = 0.3450$) of the variance in their academic achievement.

Thereafter a best subset regression analysis (Kotz & Johnson, 1998) was performed to determine which subset of variables has the greatest influence on the academic achievement of the two groups of learners. The Cp value was used as criterion for identification of the best subset. The subset of variables with the smallest Cp value was used as the best subset of variables that predicted academic achievement. In the case of the non-successful learners, a combination of the smallest Cp value and the highest R^2 value was used as criterion. Tables 3 and 4 indicate the results yielded from the data analysis.

Table 3 illustrates that the best subset of predictors of academic achievement of the group of successful distance learners for this study consisted of three independent variables, namely, organisation, planning, and intrinsic goal orientation. These three variables contributed 48.56% ($R^2 = 0.4856$; $R_a^2 = 0.4285$) out of the possible 76.39% towards the academic achievement of the group of successful distance learners.

As indicated in Table 3, organisation was the first variable considered in the regression comparison. Organisation contributed 21.22% ($R^2 = 0.2122$) towards the academic achievement of the successful distance learners. This contribution is of practical significance (effect size: 0.41). The second variable considered was planning which contributed 16.30% ($R^2 = 0.1630$, cumulative contribution to $R^2 = 0.3752$) towards the academic achievement of the successful distance learners. On the grounds of the effect size ($d = 0.32$) for this variable, it is evident that the contribution of planning towards the achievement of these students is also of practical significance. The third variable was intrinsic goal orientation. This variable contributed 11.05% ($R^2 = 0.4857$, cumulative contribution to $R^2 = 0.4857$) towards the academic achievement of the group of successful distance learners. The contribution of intrinsic goal orientation towards the academic achievement is of average practical significance ($d = 0.21$).

Zimmerman (1998) classifies planning as a process that occurs during the forethought phase of self-regulation and is influenced by the student's intrinsic goal orientation. Furthermore, Zimmerman (1998) indicates that organisation is a self-control strategy which occurs during the volitional control phase of the self-regulation cycle and can be used to realise set learning goals. The student who uses cognitive strategies (such as elaboration and organisation) during learning finds it easier to store information in his/her long term memory for later retrieval (Weinstein, Husman & Dierking, 2000). From these statements it is evident that there is a relationship between the application of the forethought as well as the volitional control phases of self-regulation and the academic achievement of these distance learners.

Table 4 illustrates that the best subset of predictors of academic achievement of the group of non-successful distance learners consisted of seven independent variables, namely, expectancy for success, goal setting, elaboration, organisation, self-efficacy, study hours per day and regulation.

As indicated in Table 4, expectancy for success was the first variable to be considered in the regression comparison. This variable contributed 4.25% ($R^2 = 0.0425$) towards the academic achievement of the group of non-successful distance learners and, with an effect size of $d = 0.07$, is of negligible practical significance. The second variable considered for the comparison was goal setting which contributed 15.20% ($R^2 = 0.1520$, cumulative contribution to $R^2 = 0.1945$) towards the academic achievement of the non-successful distance learners. On the grounds of the effect size of $d = 0.25$ it can be inferred that the contribution of this variable was of average practical significance. The third variable read into the regression comparison was elaboration. Elaboration contributed 4.98% ($R^2 = 0.0498$, cumulative contribution to $R^2 = 0.2443$) towards the academic achievement of the non-successful students and, with an effect size of $d = 0.08$, is of negligible practical significance. Then organisation was considered in the comparison which contributed 5.34% ($R^2 = 0.0534$; $R_a^2 = 0.2977$) towards the academic achievement of the non-successful distance learners. This contribution is also of little practical significance ($d = 0.09$). The fifth variable was self-efficacy which contributed 7.18% ($R^2 = 0.0718$, cumulative contribution to $R^2 = 0.3695$) towards the academic achievement of the non-successful distance learners which indicates an average measure of practical significance ($d = 0.19$).

The sixth variable read into the regression comparison was study hours per day. Although this variable is not strictly a self-regulation variable, it was nonetheless identified from the biographical questionnaire as a variable that contributed towards the academic achievement of the non-successful distance learners. This variable contributed 1.43% ($R^2 = 0.0143$, cumulative contribution to $R^2 = 0.3838$) towards the academic achievement of the non-successful distance learners. This contribution was of negligible practical significance ($d = 0.02$). The seventh and last variable was regulation which contributed 1.09% ($R^2 = 0.0109$, cumulative contribution to $R^2 = 0.3947$) towards the academic achievement of the non-successful learners. This contribution is also of negligible practical significance ($d = 0.02$). From Table 4 it is evident that none of the contributions of the seven identified individual variables, which constituted the best subset of predictors of the academic achievement of the non-successful students, was highly practically significant. These seven variables contributed 39.47% ($R^2 = 0.3947$; $R_a^2 = 0.3131$) of the possible 56.33% of variance for the academic achievement of the group of non-successful distance learners.

Three of the variables mentioned by Zimmerman (1998) as being part of the forethought phase of the self-regulation cycle (expectancy for success, goal setting, and self-efficacy) were part of the best subset of predictors for the group of non-successful distance learners. As is evident from Table 4, the contributions of these three variables towards these students' academic achievement were negligibly practically significant.

Regulation is a variable identified by Zimmerman (1998) as part of the volitional control phase of self-regulation. This variable also forms part of the subset of best predictors of academic achievement for the non-successful distance learners. Since the contribution towards the academic achievement of this variable was also of negligible practical significance, it can be inferred that these distance learners might have achieved better had they applied regulation during their studying. Zimmerman (1998) explains that the student can only monitor his/her own learning progress if he/she applies regulation during his/her hours of study.

The analyses revealed that different self-regulation variables contribute to the academic performance of successful and non-successful distance learners, respectively. In comparison to the three vari-

ables (organisation, planning, and intrinsic goal orientation) which formed the best subset of predictor variables of the successful learners, the best subset of predictors of the non-successful learners consisted of seven variables (expectancy for success, goal setting, elaboration, organisation, self-efficacy, study hours per day, and regulation). Apart from organisation, which was present in both subsets, there were no other variables that occurred in both subsets. Therefore successful and non-successful distance learners were influenced by different variables of self-regulation.

Conclusions and recommendations

Within a traditional teaching-learning environment the student is guided by the instructor towards the acquisition of knowledge and the mastering of relevant skills (Jacobs & Gawe, 1996). The distance learner has to realise the same outcomes as the contact learner, but without the continuous guidance and assistance of an instructor. Therefore, it is of great importance that distance learners develop the ability to apply self-regulated learning skills during the study process in order to study independently and effectively (Paulsen, 1999). As also indicated in this research, optimal academic achievement and learning success can be related to the measure of self-regulation applied during the study process (Lindner & Harris, 1998).

According to Zimmerman (2002), it is essential to know the differences in the structure and function of self-regulatory processes between expert and novice learners in order to formulate intervention programmes for learners who display low levels of self-regulation. The results from this particular study indicate that the successful distance learner applies more self-regulated learning skills during the study process than the non-successful distance learner. This can in part be attributed to the fact that learners who self-regulate their learning actively and strategically strive towards the attainment of academic goals and manage to overcome learning obstacles by using a variety of available resources and an intrinsic motivational focus (Randi & Corno, 2000).

In South Africa, where there are thousands of students or potential students living and working in rural areas far from universities and colleges, distance learning is an essential means of providing opportunities for personal and professional development. Unfortunately, when these learners decide to register for a distance learning programme, the majority of them are not aware of the potential difficulties and hardships which are associated with studying at a distance and mostly in "isolation". Independent study, self-regulation and motivation are but a few of the essential ingredients for successful distance learning. As can be concluded from the findings of this study, non-successful distance learners need to be exposed to intervention programmes that will teach them to self-regulate their learning in order to enhance their academic performance.

Successful learning is the primary goal of every student. This research has indicated that those distance learners who were more self-regulating during learning, achieved greater learning success than those distance learners who were less self-regulating. Therefore, it is evident that distance learners should be guided by facilitators and sufficient teaching-learning materials, and media, to develop awareness of the importance of self-regulation during learning and the application thereof to achieve learning success at a distance.

Acknowledgements

References

Bandura A 1986. *Social foundations of thought and action: a social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Barron B 2002. Distant and distributed learners are two sides of the same coin. *Computers in Libraries*, January. [Online] Available url: http://www.infotoday.com

Bates AW 1995. *Technology, open learning and distance education*.

London: Routledge.

Cohen J 1988. *Statistical power analysis for the behavioural sciences*. 2nd edn. Hillsdale, NJ: Erlbaum.

Daniels T 2002. Using face-to-face tools for success in distance education [Electronic version]. *The Quarterly Review of Distance Education*, 3:321-326.

Dillon CL & Gunawardena CN 1992. Learner support in distance education: an evaluation of a state-wide telecommunications system [Electronic version]. *International Journal of Instructional Media*, 19:297-312.

Dwyer F & Li N 2000. Distance education complexities: questions to be answered [Electronic version]. *International Journal of Instructional Media*, 27:25-28.

Ertmer PA & Newby TJ 1996. The expert learner: strategic, self-regulated and reflective. *Instructional science*, 24:1-24.

Garavalia LS & Gredler ME 2002. An exploratory study of academic goal setting, achievement calibration and self-regulated learning. *Journal of Instructional Psychology*, 29:221-230.

Giannasi MJ & Berbel NAN 1999. Distance learning for information professionals via the internet. *FID review*, 1:88-92.

Gottschalk TH 1998. *Distance education: an overview. Guide # 1*. [Online] Available url: http://www.uidaho.edu/evo/dist1.htl

Gredler ME 1997. *Learning and Instruction: theory into practice*. 3rd edn. Upper Saddle River, NJ: Prentice Hall.

Hofer BK, Yu SL & Pintrich PR 1998. Teaching College learners to be Self-Regulated Learners. In: Schunk DH & Zimmerman BJ (eds). *Self-Regulated Learning. From Teaching to Self-Reflective Practice*. New York: The Guilford Press.

Jacobs M & Gawe N 1996. *Teaching-learning dynamics: a participative approach*. Johannesburg: Heinemann.

Klesius JP & Homan S 1997. *Distance education compared to traditional instruction: the learners' view*. [Online] Available url: http://globalvgw12.global.epnet.com/

Lindner RW & Harris BR 1998. Self-regulated learning in education majors. *Journal of General Education*, 47:63-78.

Martins JH, Loubser M & Van Wyk HdJ (eds) 1996. *Marketing research: a South African approach*. Pretoria: Unisa.

Mays T 2001. Revisiting the nature of distance education. Extracted from a paper presented at the *NADEOSA conference*, 28-29 August.

Paulsen I 1999. Learning at a distance. *FID review*, 1:131-132.

Pintrich PR, Smith DAF & McKeachie WJ 1989. *Manual for the use of the MSLQ*. Michigan, NCRIPTAL.

Randi J & Corno L 2000. Teacher innovations in self-regulated learning. In: Boekaerts M, Pintrich PR & Zeidner M (eds). *Handbook of self-regulation*. San Diego, CA: Academic Press.

Roberts JM 1997. *Distance education and the information highway*. [Online] Available url: http://www.icbc.org/doc/dist_ed.html

Sala N 2003. Hypermedia modules for distance education and virtual university: some examples. *Journal of Distance Education Technologies*, 1:78-95. [Online] Available url: EBSCOHost: Academic Search Elite.

SAS Institute Inc 1996. *The SAS System for Windows, release 6.12*. Cary, North Carolina.

Schunk DH 2000. *Learning theories: an educational perspective*. 3rd edn. Upper Saddle River: Merrill.

Schunk DH 1994. Goals and self-evaluative influence during children's mathematical skill acquisition. Paper presented at the annual meeting of the *American Educational Research Association*, New Orleans, April.

Schunk DH 1985. Self-efficacy and classroom learning. *Psychology in the school*, 22:208-223.

STATSOFT Inc 2000. *Statistica for Windows* (*computer program manual*). Tulsa.

Waghid Y 1996. Can distance education engender effective teacher education in South Africa? *South African Journal of Education*, 16:205-209.

Weinstein CE, Husman J & Dierking DR 2000. Self-regulation interventions with a focus on learning strategies. In: Boekaerts M, Pintrich PR & Zeidner M (eds). *Handbook of self-regulation*. New York: Academic Press.

Wheeler S 2002. Student perceptions of learning support in distance education. *The Quarterly Review of Distance Education*, 3:419-429. [Online] Available url: EBSCOHost: Academic Search Elite.

Winn W 2003. *Learning from the World-Wide Web*. [Online] Available url: http://faculty.washington,edu/billwinn/uga/uga.htm

Winne PH 1995. Inherent details in self-regulated learning. *Educational*

psychologist, 30:173-188.

Zheng L & Smaldino S 2003. Key instructional design elements for distance education. *The Quarterly Review of Distance Education*, 4:153-166. [Online] Available url: EBSCOHost: Academic Search Elite.

Zimmerman BJ & Martinez-Pons M 1992. Perceptions of efficacy and strategy use in the self-regulation of learning. In: Schunk DH & Meece JL (eds). *Learner perceptions in the classroom*. Hillsdale, New Jersey: Lawrence Erlbaum.

Zimmerman BJ 2002. Becoming a Self-Regulated Learner: an overview. *Theory into Practice*, 41:64-70. [Online] Available url: EBSCOHost: Academic Search Elite.

Zimmerman BJ 2000. Attaining self-regulation. A social cognitive perspective. In: Boekaerts, M, Pintrich PR & Zeidner M (eds).

Handbook of self-regulation. New York: Academic.

Zimmerman BJ 1998. Developing self-fulfilling cycles of academic regulation: an analysis of exemplary instructional models. In: Schunk DH & Zimmerman BJ (eds). *Self-regulated learning from teaching to self-reflective practice*. New York: Guilford.

Zimmerman BJ 1990. Self regulated learning and academic achievement: an overview. *Educational psychologist*, 25:3-17.

Zimmerman BJ 1989a. A social cognitive view of self regulated academic learning. *Journal of educational psychology*, 81:329-339.

Zimmerman BJ 1989b. Models of self-regulation: learning and academic achievement. In: Zimmerman BJ & Schunk DH (eds). *Self-regulation and academic achievement: theory, research and practice*. New York: Springer-Verlag.