Using different Research Paradigms to test Self-Directed Learning readiness in 4th year Information Systems students

Roelien GOEDE
School of IT, North-West University,
Vanderbijlpark, 1935, South Africa

and

Estelle TAYLOR
School of Computer Science, Statistics and Mathematics, North-West University,
Potchefstroom, 2520, South Africa

ABSTRACT

Self-directed learning is a concept introduced by Malcolm Knowles in 1975. Key to this concept is moving the responsibility of learning away from the teacher to the learner. The learner should take control of the learning experience and the teacher should only facilitate this process. However, self-directedness in a learner develops in stages. Learners need to be guided to become more self-directed over time. In order to guide learners the lecturer or facilitator should understand the level of self-directedness also referred to as the readiness for self-directed learning of the students. This paper reports on the process of understanding the readiness for self-directed learning of 4th year Information Systems students. Methods representing the positivistic and interpretive research paradigms are applied and compared to achieve this goal.

Keywords: Self-directed Learning, Self-directed Learning Readiness, Mixed Methods Research, Research Paradigms.

1. INTRODUCTION

The aim of this paper is to report on the Self-directed Learning (SDL) readiness of Information Systems (IS) students. In order to prepare students as life-long learners, one needs to develop their SDL skills. If the SDL skills of individual learners are understood it is possible to develop study material suitable to develop these skills. Blended learning where traditional face-to-face teaching is enhanced by electronic material provides the opportunity to provide different learning experiences for learners on different levels of self-directedness. Methods from two different research paradigms are used to gain a better understanding of the SDL readiness of the students.

This paper contributes in the understanding of SDL readiness of 4th year IS students. It also contributes to the discussion on using mixed methods in IS education research. The paper starts with a motivation of the study followed by a brief literature review of SDL. The empirical part of the study is introduced with a short discussion of different research paradigms. This is followed by reports on the positivistic and interpretive studies. The results of the studies are compared from a paradigmatic perspective. The paper concludes with reflections of the SDL readiness of the students and the suitability of the research methods used.

2. MOTIVATION FOR RESEARCH

Many IS lecturers complain that their 4th year students cannot think for themselves and do not know how to solve problems. As lecturers we are often amazed by our students' knowledge of the latest electronic gadgets, but the same students do not know where to start to investigate the problems we give them. This problem may be related to the fact that we give our students problems to solve for which they do not feel ownership. They are only attempting to solve the problem because the lecturer is telling them to solve it. Should we then rather give our students more control of their learning environment? Should they gather their own learning material? Should they decide how their progress will be evaluated? Should they decide what to study and how to study new IS technology? This might seem like extremes but in the fast changing world of Information and Communication Technology (ICT) we have an obligation to our students to equip them with life-long learning skills. The question investigated by this paper is: Are our students ready for self-directed learning?

In South Africa the National Qualification Framework (NQF) of the South African Qualification Authority (SAQA) puts 4th year (honours) study on level 7. In their description of level 7 under problem solving the skills required by the learner includes the ability to:

> "[...] identify, analyse, critically reflect on and address complex problems, applying evidence-based solutions and theory driven arguments." [11].

Further in terms of management of learning, the ability to:

> "[...] identify, evaluate and address accurately his or her learning needs in a self-directed manner and to facilitate collaborative learning processes." [11].

In order to demonstrate these skills our students should be intrinsically motivated to learn and to solve problems to achieve this learning process. In this respect it is the responsibility of educators of this level to equip learners with SDL skills. This can only be done effectively if educators understand their learners' SDL readiness.

3. RESEARCH METHODOLOGY

The term "research" as used in this paper corresponds to the description given by Mingers [9] as:

"A construct that specifies a general set of philosophical assumptions covering, for example, ontology (what is assumed to exist), epistemology (the nature of valid knowledge), ethics or axiology (what is valued or considered right), and methodology."

Three major research paradigms are discussed in IS literature: Positivism, Interpretivism and Critical Social Theory (CST) [8]. The aim of methods used from a positivist paradigm is to measure aspects of reality, often referred to as variables [1]. Positivistic questionnaires are developed to be reusable in different environments to measure specific variables. Quite often the same measurement tool (questionnaire) is used in very diverse situations. Interpretive studies, on the other hand focuses on specific situations. The researcher is transformed from objective observer to subjective learner, who aims to understand the situation from the point of view of the participants in the study [3]. In CST studies the aim of the researcher is to identify oppressing structures in the problem environment and to facilitate change in order to emancipate the oppressed.

Recently there is a trend in combining methods from different paradigms in one project. The main advantage of such an approach is that methods from different paradigms provide different perspectives on the problem environment [9]. In other words we use different methods from different paradigms to better understand different aspects of the reality in our problem situation. A mixed method approach was followed in investigating the readiness for SDL of the 4th year IS students at a university in South Africa.

As this paper focuses on the investigation of the readiness for SDL of the students, a CST study is not applicable as it is not the aim of the research team to influence the SDL readiness in this phase of the project. When confronted with the choice between using a positivistic SDL readiness tool and an interpretive case study, this research team decided to perform both types on a pilot group of 4th year IS students, in order to get the best possible understanding of the SDL readiness of these students.

The positivistic tool of Guglielmino was used [5]. This tool is available at cost from the SDLR website. An interpretive questionnaire was also developed from SDL readiness literature, incorporating literature on positivistic readiness tests. Students were asked open ended questions to explain their perceptions, fears and aspirations on SDL. Before the detail of the empirical work is discussed, a brief literature review of SDL is provided to guide the reader.

4. SELF-DIRECTED LEARNING

Few people have ever defined self-directed learning with precision [4]. Different terms are used interchangeable with self-directed learning, for example individualized instruction, prescriptive learning and contract learning [10]. One possible definition is that self-directed learning takes place when the learner takes control and accepts the freedom to learn what he or she view as important [2]. Another definition is that self-directed learning is a process in which learners take the initiative for analysis and diagnosis of their learning needs, formulation of personally relevant learning goals, identification of how to achieve them, and reflection on their achievement [7]. For the purpose of this research self-directed learning will be defined as learning where the learners control the process with the guidance of a facilitator, including the analysis of learning needs, formulation of goals, and decisions on how to achieve these goals.

According to Grow the goal of the educational process is to produce self-directed, lifelong learners [4]. Knowles believes that self-directed learning is the best way to learn [7]. He states:

"[I] don't think it is healthy – or even humane – for a person to be kept permanently dependent upon a system or upon another person".

Self-direction is partly a personality trait, and the degree of control the learner is willing to accept depends on their attitude, abilities, and personality characteristics [4]. Self-directed learning is also unfamiliar to most students [10]. Many students entering into a new situation feel the need for a structured plan and teachers who are in charge, and they become anxious when this is absent [7]. Teachers also find it difficult to change from being a teacher to being a facilitator of learning [4,7].

Stages of self-directed learning

Grow developed the Staged Self-Directed Learning (SSDL) model [4]. According to this model, there are 4 stages to self-directed learning. During stage 1 the student is a dependent learner who has to be taught by lectures, drilling, and coaching. The stage 2 learner is interested and can be taught by inspired lectures, guided discussion, and goal-setting. During stage 3 the student is ready to explore, as long as he or she has a good guide. The student can be taught by way of discussions, seminars, and group projects. In the final stage, stage 4, the student is self-directed, the teacher is a consultant, and the teacher uses internships, dissertations, and study groups to teach.

Preparing students to become more self-directed

The good news concerning self-directed learning is that it can be learned [4]. It is very important that teaching is matched to the self-directed learning readiness of the students. What is 'good teaching' for a student in one stage of development may not be 'good teaching' for another student in another stage of development. Good teaching does two things: it matches the student's stage of self-direction, and it empowers the student to progress towards greater self-direction [4]. When the teaching style is not matched to the student's degree of self-direction, problems arise. The students can be prepared for the next stages by gradually giving them more freedom and responsibilities. During stage 2 it is important to begin training students in basic skills such as goal setting, as part of preparing the students to becoming more self-directed. Students need to, at this stage, recognize their different personality types, life-goals, and styles of learning [4]. The students have to be sold on the advantages of self-directed learning [10].

Measuring the students' readiness for self-directed learning

To be able to match the teaching to the students' self-directedness, and guide the students through the relevant stages, it is of course very important to measure the readiness of the students for self-directed learning. The Self-Directed Learning Readiness Scale (SDLRS) was developed in 1977 by Lucy

Guglielmino, and has since been tested and revised. The self-scoring form, called the Learning Preference Assessment (LPA) was developed in 1991. Based on numerous literature reviews the SDLRS / LPA has for some time been the most valid and widely used quantitative instrument in the study of self-directed learning. Although there has been some criticism of the SDLRS / LPA [2], the vast majority of studies have supported the reliability and validity of the instrument [2]. As the SDLRS is the most widely used instrument, it was decided to use it in this study, in combination with an interpretive study.

The following section reports on the empirical part of the study. A discussion of the positivistic study is followed by a discussion of the interpretive study.

5. MEASURING SDL READINESS POSITIVISTICLY

The discussion of the positivistic readiness test of the 4th year IS student starts with a brief introduction on the background of the students. This is followed by sections on data collection and analysis, and findings.

Background information

In South Africa most Bachelor's degrees are completed in three years. A follow-up fourth year degree, called an Honour's degree, is done in preparation for Master's study. The students investigated here are Honour's students and have therefore completed a Bachelor's degree. Most of these students completed their degrees at other universities from the one where they are enrolled for their IS Honour's degree. The students' backgrounds are vastly diverse from an academic and social perspective. Some students studied previously at traditional academic state subsidised universities, while others are from technical state subsidised universities and other still are from privately managed universities who present courses accredit with mainly British universities.

Their preparation to deal with module content, in this case Data Mining, differ substantially. It is therefore required to present module content to individual students differently.

Data mining is presented as a year module. For the first five months students had to do assignments as preparation for lecturers. This was done to ensure that students have a solid foundation in basis data mining skills. After five months the students had to propose topics in data mining they wanted to study using SDL techniques. It was at this time that the students completed two SDL readiness questionnaires, one positivistic and one interpretive questionnaire.

Data gathering and analysis

The SDLRS of Guglielmino was used from the SDLRS website [12]. The questionnaire was completed by 17 students. The students completed the questionnaire on the Internet and their answers were then downloaded together with the descriptive statistical analysis and results.

Findings

The SDLRS measure the current level of readiness for self-directed learning. According to Guglielmino the average score for adults completing the questionnaire is 214, as can be seen in figure 1 [6]. The standard deviation is 25.59.
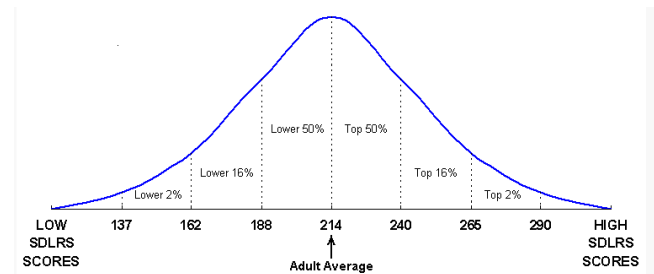

Figure 1 SDLRS scores [12]

The group that participated in this research had an above average mean (221 compared to the average of 214), as can be seen in table 1. The standard deviation is 22.11. The maximum is 266, which is high above average, and the minimum 189, which is below average.

Mean	221.0588235
Standard deviation	22.10619423
Minimum	189
Maximum	266
Range	77

Table 1 Group statistics

In table 2 the different levels of self-directed learning [6] can be seen in column 1. In columns 2 and 3 the results for this group can be seen. There were no students with a low readiness for self-directed learning. There were 3 students (17.65%) with a below average readiness for self-directed learning, while 9 students (52.94%) had an average readiness. There were 3 students (17.65%) with above average readiness, and 2 (11.76%) with a high readiness. This means that 82.35% of the students scored average and above average.

Score	Level of readiness	Number of students	% of students
58-176	Low	0	0
177-201	Below average	3	17.65
202-226	Average	9	52.94
227-251	Above average	3	17.65
252-290	High	2	11.76

Table 2 Statistical results

People with high SDLRS scores usually prefer to determine their learning needs and plan and implement their own learning. People with below average scores prefer very structured learning options. If the scores of students are known, the lecturer can adapt teaching to the readiness of the students. In the group that participated in this research, the lecturer will have to allow for the fact that all the students are not on the same level of readiness for self-directed learning, and the variance is high (varies from below average to high). Steps will have to be taken to guide the students with low scores, while not frustrating those with high scores.

6. MEASURING SDL READINESS INTERPRETIVLY

This section reports on the interpretive part of the empirical work in terms of data collection and analysis, and findings.

Data collection and Analysis

The same group of students completed interpretive questionnaires on SDL readiness, although 24 students completed the questionnaire compared to the 17 in the previous section. The questions were compiled from SDL literature incorporating questions on aspects found in positivistic questionnaires.
The results of only 5 of the questions are discussed here to illustrate the understanding achieved from interpretive analysis. Content analysis was used and codes were identified to describe the answers of the students.
The first question presented in this paper was:
> "What was your first reaction to the change of the module? Positive / Negative and why?"

As described earlier the first part of the module was presented using a lecturer centred model and it was changed to a SDL model. Codes were developed for (number of responses):
- Anxious mixed (2);
- Mixed (gave positive and negative reasons) (3);
- Negative (enjoyed previous methods) (2)
- Negative (against teamwork) (2)
- Negative (time management) (2)
- Positive (13).

From these one may group codes together. All the negatives add up to about 6 students, mixed 5, and positives 13. To illustrate the riches of information gathered a few of the answers and their codes are given here:

Anxious: "Never have I done this before! Scared and excited. Scared because of this huge change. Excited because of this huge change. This is a good opportunity to see if I can learn independent of any course material and study guide. I can choose these myself."

Negative (time management): "Negative, because it seemed like a lot of work to be done in a short period of time. And also the confusion of where to start, how to start, and to look for"

Negative (enjoyed previous methods): "Negative. Is easy to just settle at one's comfort zone, lecture coming prepared, lecturing and I just sit there and do what she told me."

Positive: "Positive because we are now applying the concepts more practical to the field in a real world than having assignments from the textbook only which are pre–prepared questions from a certain environment and difficult to imagine"

From this it is clear that special guidance on time management and teamwork should be provided to students. In a blended learning environment students can choose how much guidance they use in terms of how many optional resources on non-content related topics they study.

Another question was: "Do you view yourself as a curious person?" All the students except one answered positively. Only one student answered negatively to a question on their ability to evaluate their own examination performance. Only one student indicated that he thinks that he will not pass the module stating the following:
> "No, to be honest the time I spend on my studies is too minimal. My responsibilities at home where not permitting me to concentrate on my school work. As a father I had to give full support at home. This worked against me at all costs."

The final question reported on in this section was: "Do you do a lot of research on your hobbies? Explain." After coding, 9 students indicated that they often don't do research on hobbies while 13 indicated that they do. Two explained that they would rather form interest groups to investigate their interests.

Findings

Most of the students were positive towards the idea of SDL. Those who were negative mainly expressed time management, negative teamwork experiences, and resistance to change as motivation. All of this can be addressed by providing reading material to the students on the electronic learning management system.

Students view themselves as curious but only 13 of the 24 would actively research a topic associated with their hobbies.

A very encouraging result is that almost all the students are able to predict their mark or evaluate their success in examination papers. This might be due to the fact that all of them completed a Bachelor's degree successfully prior to enrolling for this module.

7. COMPARISON IN FINDINGS FROM DIFFERENT METHODS

The specific scores for the individual students are available for each question in the positivistic questionnaire. However the motivation for the selection of the option is unclear. It is the motivation of the few negative or low SDL readiness students that may assist the lecturer in providing solutions that may also assist other students who might not have been able to articulate their feelings.

For interest sake the answer on the question on the reaction of the student to the change towards SDL of the module given by the student with the lowest score on Guglielmino's SDLRC was:
> "My first reaction to the change of the module was negative. For me, it was a challenge that I was not sure I could be up to. Generally students are lazy. So self-directed learning could be useless for some students because of the time management and the commitment of the students. Not seeing a lecturer or getting explanation from him/her could affect the performance of the student learning."

On the hobby research the answer was:

> "It is very seldom. I must admit. I don't even remember if I did it once."

Both methods of investigation identified this student as somebody with a low level of SDL readiness. The interpretive answers might provide more insight on how to guide him/her to improved SDL skills.

Further analysis will be done to compare the results of specific students for related questions in the questionnaires.

8. CONCLUSION

The aim of this paper was to investigate the readiness for SDL of 4th year IS students. It was decided to do two studies in parallel. The students completed the SDLRS of Guglielmino, which is a positivistic measurement tool. The average score of the students is slightly above average which may be contributed to the fact that all of them have completed a Bachelor's degree successfully. The students also completed an interpretive questionnaire. Only a small number of the questions were reported on in this paper, but it demonstrated the richness of information contained in these answers. Specific fears and negative sentiments towards SDL could be expressed by students and could be understood by the lecturer. These may now be addressed by the development of a blended learning environment accommodating different levels of SDL capabilities of students.

Interpretive data analysis is time consuming and it is difficult to get an instant overall view of the concept that was investigated when compared to positivistic data analysis. It does however provide a better understanding of specific participant's motivation for their answers. The authors of this paper support the view of Mingers [9] that when methods from more than one paradigm are applied to the same problem a greater richness of understanding can be achieved.

9. REFERENCES

[1] A.L Berh, Empirical research methods for the human sciences: An introductory text for students of education, psychology and the social sciences. Pretoria: Butterworths. 1983.

[2] M. Fisher, J. King & G. Tague, Development of a self-directed learning readiness scale for nursing education. *Nurse Education Today*, 21, 2001. pp516-525.

[3] B.G. Glaser & A.L. Strauss, The discovery of grounded theory: Strategies for qualitative research. New York, N.Y.: Aldine de Gruyter. 1967.

[4] G.O. Grow, Teaching learners to be self-directed. *Adult Education Quarterly*, 41(3). 1991. pp125-149.

[5] L.M. Guglielmino, Development of the self-directed learning readiness scale. Athens: University of Georgia. (Dissertation -PhD). 1977. 135p.

[6] P. Guglielmino & L. Guglielmino. General information. http://www.guglielmino734.com/newpage1.htm Date of access: 15 Oct. 2011.

[7] M.S. Knowles, Self-directed learning: A guide for learners and teachers. Englewood Cliffs: Prentice Hall/Cambridge. 1975. 135p.

[8] H.K. Klein & M.D. Myers. A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly, Vol. 23, No1, 1999. pp 67-94.

[9] J. Mingers, Combining IS research methods: Towards a pluralist methodology. Information systems research Vol. 12, No.3, 2001. pp240-259.

[10] G.M. Piskurich, Self-directed learning: a practical guide to design, development, and implementation. California: Jossey-Bass. 1993. 359p.

[11] SAQA, South African Qualification Authority. *Level descriptors for the South African National Qualifications Framework.* http://www.saqa.org.za/show.asp?include=focus/ld.htm Date of access: 13 Sept. 2011.

[12] SDLRS website. http://www.lpasdlrs.com/main.php Date of access: 15 Oct. 2011.