

# APPLICATION OF E-LEARNING TECHNOLOGIES TO STUDY A SCHOOL SUBJECT

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## ABSTRACT

This paper reports on the introduction and use of e-learning technologies to help students study a school subject. The research intervention is located within a relatively resourced school in South Africa with students largely coming from one racial group. The choice of the school enabled the researchers to focus on investigating the effects of computer-based study methods on students skills of studying and their perceived learning experience without the necessity of controlling a lot of variables such as socio-economic status, language competence, and so on which have been shown by previous research in South Africa as impacting heavily on teaching and learning and student performance.

This paper describes how technology is used in similar schools as the sample school under investigation, how pedagogy has changed practices in the school and how study methods are used. Based on the results of the literature review an intervention of introducing free open source software to investigate study practices of school learners was introduced. The results of the intervention are reported.

## KEYWORDS

Study methods, mind mapping, learning experience, constructivism, school learners, computers.

## 1. INTRODUCTION

Student performance remains one single problem in the South African school system. Up to half the number of students who enter primary school do not sit for the final school examination that provides certification. Of these students who sit for the national examination only a small proportion qualify to continue their studies in higher education institutions. According to the South African National Development Plan, "... we have not yet overcome the inequities in educational provision created during the apartheid era. An enormous difference in capacity and resources exists in different areas of the country and sectors of society ... we have undergone serial curriculum changes at school level, which, while well-intended, have destabilized the pre-tertiary education system and placed great strain on teachers. Pressure placed on schools and education departments to meet quantitative performance targets is increasingly resulting in teachers spending a large proportion of their time drilling learners on how to pass examinations instead of developing learners' intellectual capacity" (CHE, 2014).

In order to enable school students to achieve other educational outcomes (e.g., critical thinking, problem solving and application of knowledge) emphasis should be placed on learning as opposed to mere drilling for examinations. Learners need the skills to know how to study a particular field of work and as such exposure to a variety of study methods is instructive. This paper describes the intervention made with a group of students to improve their study methods through introducing e-learning technologies. First, however, is the description of the theoretical framework guiding the intervention.

The theoretical framework informing the investigation is based on the literature of cognitive science and on the literature of the development and application of technology. The theoretical framework thus encompasses a focus on cognition and learning, study skills, and e-learning.

## **2. LITERATURE REVIEW**

In order to improve the educational outcomes of students at school, we considered the espoused benefits of e-learning in improving the study habits of school students. E-learning is content and instructional methods delivered on a computer (whether on CDROM, the Internet, or an intranet), and designed to build knowledge and skills related to individual or organizational goals (Clark, 2002). The American Society of Training and Development defines E-Learning as a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. Mallinson provides an expanded definition of e-learning as including the use of all digital resources, systems, computers, and electronic communication in the support of education (Mallinson, 2013). This study therefore explored the use of a software product in changing the study habits of a group of school students.

The software product used in the investigation had to support how students learn and mediate this process. We thus considered learning theory to inform the introduction of e-learning technologies for use by school learners for study purposes. Learners need to process the information they receive during the teaching encounter and make sense of it. To do this learners make use of cognition. Matlin (2005) describes cognition as a mental activity which includes the acquisition, storage, transformation and use of knowledge. Cognition can also be described as the mental processes of knowing which will include aspects such as awareness, perception, learning, memory, thinking, reasoning and judgment (Train, et al., 2007). These cognitive processes are at play when a learner studies a school subject. The pedagogic strategy we employed was to help learners think about the cognitive processes and strategies they use when studying. Employing such metacognitive strategies to the learning process has been found to enhance learning (Foster, Sawicki, Schaeffer and Zelinski, 2002; Matlin, 2005; Jaeger, 2007). Foster et. al. (2002) distinguishes between metacognitive and non-metacognitive learners. The main difference between these two types of learners is that metacognitive learners are aware of how they learn best and that they evaluate and regulate each learning experience. Non-metacognitive learners use monotonous learning skills.

Metacognitive learners use a variety of activities (e.g., cognitive maps) to evaluate their learning. The pedagogical strategy used in this investigation was to teach learners about using cognitive maps (mind maps) as a study method and to use e-learning technologies to support this process. According to Merritt (2008) teaching study skills to a learner is an essential part of the education process. Effective study skills are an outstanding characteristic of all high achieving students. Using effective study skills enable learners to adapt to various teaching methods and instructional approaches and thus enhance student performance.

Learners develop their own study strategies during schooling. Teachers need however to support learners and help them to learn independently. Exposure to various methods of studying therefore provides a learner with a repertoire of methods to use in alignment with their study preferences. The group of students used in the investigation were provided with the variants of the SQ3R study methods but specifically taught to use mind mapping. Mind mapping facilitates active and collaborative learning, enables the learner to make use of their full range of cortical skills, and facilitates the conceptualization of richer and broader associations that enhance learning (Budd, 2004; Smith, 2008).

## **3. RESEARCH METHODOLOGY**

The participants in this research study were learners in Grade 11 in the secondary school where the first author teach. All the learners that are participating have Business Studies as one of their choice subjects. A total of 93 Grade 11 learners (52 females and 41 males) took part in the research. Learners who took part in the investigation are predominantly from one racial group (table 1). Consent from both the principal of the school and the parents of the learners were sought before requesting learners to participate in the investigation.

Table 1. Composition of participants in the investigation.

Grade	White	Black	Coloured	Total
11	239	1	4	<b>244</b>

All learners in table 1 were taught how to use study methods and mind mapping whilst they were in grade 10. This cohort of students was randomly divided into an experimental and control groups. The experimental group was taught after school hours to use a free mind map software package (FreeMind) for a duration of ???. To espouse collaborative learning and metacognition, learners were provided with tasks of working in groups and to reflect about the methods and tools they use for studying.

The research design involved administering a pre- and post-test instrument on both experimental and control groups. The post-test was administered after introducing the use of e-learning technologies on the experimental group. Both pre- and post-tests made use of the Learning and Study Strategies Inventory – High School Version (LASSI-HS) (Weinstein & Palmer, 1990). The LASSI-HS is a 76-item self-report instrument constituted by 10 subscales (see table 2). The LASSI-HS has appropriate validity and reliability for use to determine the study methods of school learners (Tinsley, 2000; Everson, Weinstein & Laitusis, 2000). The data of the pre- and post-tests were analysed to provide an indication of whether the use of e-learning technologies had an impact on the study skills of the learners or not.

Table 2. Subscales of the LASSI-HS scale

Nr.	Subscale	Description
1	Attitude	Attitude measures the learners' attitude and interest in education and school.
2	Motivation	Students' diligence, self-discipline and willingness to work hard is measured with this subscale
3	Time Management	This scale examines the students' use of time and management principles.
4	Anxiety	Anxiety address the degree to which students worry about school and their performances.
5	Concentration	Concentration is the ability of a student to pay close attention to academic tasks.
6	Information Processing	This scale measures several aspects such as the use of mental imagery, verbal elaboration, comprehension, monitoring and reasoning.
7	Selecting main Ideas	The ability of the student to pick out important information for further study.
8	Study Aids	This is the scale that examines the degree to which students create or use support techniques or materials to help them learn and remember new information.
9	Self-testing	Self testing is the scale that measures the students' ability to review and prepare for classes.
10	Test-strategies	This scale focuses on students' approaches to preparing for and taking quizzes and tests.

#### 4. RESULTS OF STUDY

Tables 3 and 4 provides the results of the pre- and post-tests for the experimental and control groups.

Table 3. post-test LASSI-HS: experimental group.

	ATT	MOT	TMT	ANX	CON	INP	SMI	STA	SFT	TST
<b>Before the intervention</b>										
Mean	31.0	27.6	20.6	22.4	24.6	26.4	16.2	23.7	23.6	25.1
Mode	32	34	24	25	29	27	15	22	22	29
Median	32	27	21	23	26	27	15	24	22	26
<b>After the intervention</b>										
Mean	31.4	28.0	23.3	20.1	25.5	28.2	18.9	25.9	23.8	25.2
Mode	28	34	22	20	29	29	18	28	22	29
Median	32	27	25	20	26	28	18	26	22	26

Table 4. post-test LASSI-HS: control group.

	ATT	MOT	TMT	ANX	CON	INP	SMI	STA	SFT	TST
<b>Before the intervention</b>										
Mean	30.4	27.1	21.4	23.6	23.4	27.8	16.7	24.1	24.6	24.4
Mode	35	18	16	18	27	30	17	24	24	20
Median	32	27.5	21	22.5	25	28.5	17	24	24	25
<b>After the intervention</b>										
Mean	28.6	26.7	20.9	23.4	23.1	27.4	16.7	23.6	24.1	24.1
Mode	35	18	16	30	33	22	17	24	23	30
Median	30	26.5	21	22.5	25	28	17	24	24	25

Both these tables provide a better indication of the differences in the scores of the individual scales before and after the intervention. The central measures of tendency can be used to determine certain aspects regarding the experimental group. Before the intervention took place, the learners in the experimental group had a mean score of 26.4 regarding the information procession scale. After the intervention the mean score for the same scale was 28.24. The selection of main ideas scale of the LASSI-HS also increased from 16.28 to 18.88. The score on the use of study aids, such as computers, also increased from 23.72 to 25.88. Using the data from the control group, the mean from the information processing scale decreased from 27.8 to 27.4. The scale for the selection of main ideas indicated that the score also decreased from 17 to 16.4. Finally the scores for the use of study aids scale decreased from 24 to 23.6. Based on these results, it shows that there are slight increases regarding the central tendency measurements for the experimental group. The central tendency measurements regarding the control did not show any increases between the pre- and post-tests.

#### 5. CONCLUSION

Analysis of the results of the control group indicates no increases in measures of the ten subscales of the LASSI-HS. On the other hand, all the measures within the experimental group, except anxiety, show slight increases. These increases could be attributed to the intervention introduced in this investigation.

The use of structured approaches to inculcate improved study habits amongst school learners is therefore supported by the results of this study.

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