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Evaluating the Effectiveness of Elearning and Core Skills Interventions for South African Secondary School Learners

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Abstract

This case study investigates a multi-faceted initiative by the MMI (Metropolitan Momentum Initiative) Foundation for Grade 11 and matriculation learners designed both to improve the learners' mathematics, science, and English grades necessary for university admission, and to improve the learner's core skills in order to enable their transition from secondary school to university. These core skills, presented in an intensive five day workshop, include communication, problem solving and conflict resolution skills. This initiative was evaluated through the use of questionnaires and focus groups (to evaluate the learners' perceptions of the grade improvement programme), grade analysis (to determine the level of improvement that the grade improvement programme had on school grades), and interviews (to determine the programme participants' perceptions of the effectiveness of the core skills workshop). The results of these evaluations are presented and then discussed. The participants felt that the core skills workshop and eLearning programme were generally useful, with some challenges, and it was determined, through grade analysis, that the programme did help students increase their marks in the selected subjects significantly, although some students improved more than others.

Keywords: eLearning; intervention; core personal skills; South Africa; e-skills, case study

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Introduction

The MMI Foundation is devoted to helping disadvantaged students succeed in secondary school in order to gain admission to and remain in university. One of these initiatives, tutorial sessions, began approximately three years ago. This programme is funded by MMI Foundation and tutorials run every Sat-

urday on e- platform for six hours at various Universities in South Africa. These tutorials consist of a self-regulated eLearning session. The Durban-based group began with a group of Grade 11 learners from schools in disadvantaged areas; teachers at each of the schools in these areas, in compliance with the professional body's selection criteria, selected three learners from their school who had the best potential to achieve a final average grade of A in the South African subjects of English, physics, and mathematics (Reddy, 2003).

In order to help students overcome some of the personal issues arising from the transition from home/secondary school to university life, an intensive five day workshop was held for matriculation students in order to teach them core personal skills, such as communication and problem solving skills along with techniques to adapt to personal changes in their lives.

In this case study, we investigate the effectiveness of the tutorial sessions (both from a secondary school grade improvement and a student perspective) and the workshop (from a student perspective) using different methods of individual interviews and questionnaires, empirical analysis of grades, and a focus groups interview of all participating learners.

Background

Literature Review of eLearning Initiative

High mathematics and physics grades, along with an ability to communicate well in English, are a pre-requisite for most technical programmes at universities. However, the majority of South African school children have difficulty in achieving these criteria. In international assessments, a small majority, 10% of South African students in mathematics and 13% in science, score higher than the Low International Score (Reddy, 2003). Attempts to resolve this issue of low math/science scores is problematic because a combination of factors, rather than a simple single factor, has been identified.

Simkins (2011) describes South Africa public education as a low-quality mass system with standardized test results being uniformly poor. An example, in 1999 and 2003, the nation's pupils came last in the Trends in International Mathematics Study. Although teachers are required to deliver 22.5 and 27.5 hours of instruction per week, a 2005 Department of Education study discovered that the number of hours of instructions in the classroom averaged only sixteen hours due to early departure and little teaching on Fridays (Simkins, 2011). Of the 7 000 secondary schools in South Africa, 10% of these schools produce 60% of university-eligible pupils (Mouton, Louw, & Strydom, 2013). Other issues identified as plaguing the South African school system include poor teacher training, insufficient departmental support, lack of teaching resources, overcrowded classrooms, and administrative overload (Meyer & Warnich, 2010).

A number of possible solutions to these problems have been proposed, including instruction through eLearning. ELearning is a web-based or electronic system that allows knowledge to be provided to learners without regard to time or geographical restrictions (Sun, Tsai, & Finger 2008). By providing consistent delivery of expertly-planned material at a student's own pace, it enables students to pursue their learning outside the traditional school infrastructure and hours (Lee, 2005). Through the provision of multi-media, students receive a richness of instruction through eLearning that is not often provided in traditional teaching. By allowing simulated learning, students are provided with the opportunity of having new learning material first presented to them and then apply it in a practical manner repeatedly until they are successful. After successfully completing a unit, the students are assessed on their understanding of this material (Lee, 2005). Each e-learner has access to the same resources and materials as the other and provides more effective individualized instruction (Wu, Tennyson, & Hsia, 2010) It provides an environment for low-performing and high-performing students to learn through alternative methods of

delivery and personalised instruction. E-Learning has evolved from standardized packages of content to one that can be creatively customized to suit individual preferences and learning styles. In this way E-learners can feel more in control of their learning and learning environment (Downes, 2005).

The importance of ELearning as a tool of learning has been identified in relation to its measure of effectiveness (Lee, 2005). In order to evaluate the effectiveness of teaching methods, Kroesbergen and Luit studied educational pedagogies, including peer and self-instruction, and found that self-instruction was the most effective method for learning (Downes, 2005; Kroesbergen & Luit, 2003). Computer-aided instruction, in turn, was found to be the most effective within the various forms of self-instruction (Xin & Jitendra, 1999). As the basis of eLearning, computer-aided instruction provides individualised instruction which enables students to take charge of their learning and to proceed at their own pace (Lee, 2005).

Self-regulated learning is a subset of eLearning where individual pupils have control over their eLearning (Lynch & Dembo, 2004). A definition of self-regulated learning might be learning efforts that manages and directs complex learning activities. This type of learning involves three parts of cognitive strategy use, meta-cognitive processing, and motivational beliefs (Kaufmann, 2004). In a self-regulated learning environment, students are in control of their own learning by selecting and setting their goals and by using individual strategies to monitor and control the various aspects which influence the learning process and evaluating their own actions (Järvelä, Näykki, Laru, & Luokkanen, 2007; Lee, 2005).

Some studies indicate that the cognitive self-regulation strategy of organizing and transforming, as a core part of self-regulated learning, serves as a significant predictor of students' course grades in mathematics and other technical subjects of secondary school (Nota, Soresi, & Zimmerman, 2004). Successful students in an online course will typically use self-regulated learning strategies with a statistically significant performance improvement (Yukselturk & Bulut, 2007). Studies have demonstrated that in conditions where students have more control over their learning result in larger learning gains than where students learn under instructor-led conditions (Cavus & Ibrahim, 2007; Gao, 2003).

However, this is not to say that self-regulated learning is advantageous for all students, given different learning styles. Some students experience difficulty adjusting to the structure of online courses and in managing their time (Marino, Eager, & Draxler, 2000). The absence of an instructor, along with more responsibility of the student to effectively engage in learning activities, will often create difficulties for some students, especially those students with low self-regulatory skills (Dabbagh & Kitsantas, 2005). Dependent students, who are less self-regulated and need frequent direction from a physically present instructor, may feel frustrated using an online course. These frustrations may be reduced if this online course is combined with regular opportunities for face-to-face instructor interaction (Rovai & Jordan, 2004).

Ozkan (2005) identified factors in eLearning effectiveness such as system quality, content quality, and students' perceptions of the programme's effectiveness. Chu (2008), in his study of Chinese university students, found that prior IT experience and their competence affected their eLearning effectiveness. Menchaca and Bekele (2008) identified e-learning effectiveness with factors of human perceptions and competences, course design, institutional features, and technology aspects. E-Learning effectiveness was evaluated by Johnson et al (2009) as composed of different variables such as technology aspects, students' characteristics, and students' metacognitive abilities. Ordenez (2014) evaluated multiple models designed to measure the effectiveness of eLearning in different countries. The most common factors within these models were technological infrastructure, institutional support, student satisfaction, and determination of the degree of knowledge transfer through eLearning. The role of the Internet mediates the former need for peer

support in learning (Ordenez, 2014). According to, Tsai, and Finger (2008), there are thirteen factors, within various dimensions (instructor, learner, design, environmental, course, and technological), which contribute to e-learner satisfaction. The learner dimension includes learner's anxiety, internet self-efficacy, and their attitude toward computers. The instructor dimension includes instructor response times and their attitude toward eLearning. The design of eLearning contains its perceived usefulness and ease of use among students. Technology would encompass technological quality and Internet quality. The course dimension consists of course flexibility and the environmental dimension looks at assessment diversity and student's perceived interaction with others (Sun, Tsai, & Finger 2008).

Measuring e-learner satisfaction is critical to determine the effectiveness of eLearning and to ensure that pupils continue on with their eLearning (Ozkan, 2005). Measurement of this satisfaction has been accomplished through pre and post test experimentation, focus groups, questionnaires, and interviews (Lee, 2005).

Literature Review of Life skills Workshop

The University of Cape Town in South Africa designed and ran a number of life skills workshops for communities (Rooth, 2002). These workshops focused on various themes (Assertiveness, Communication, Change Management, Racism, Goal Setting, Health Management, Motivation, Self-Concept Enhancement, Stress Management, Team Building, Time Management, Developing Empathy and Understanding) which would be selected and adapted to the student group's needs. These workshops were based on experiential learning and on in-group interactive processes. Experiential learning is rooted in learning from direct experience and reflecting on those experiences. Students of these workshops are encouraged to become actively involved through the use of storytelling, role-play, music, and art in order to increase participation and to incorporate different learning styles. Rather than focus on the end-product of problem-solving, students were encouraged to look at the process of problem-solving which involves unleashing creativity, encouraging lateral thinking, and develop methods to enhance creativity to discover solutions to problems. The majority of students were from disadvantaged areas and included health workers, community workers, teachers, and potential future facilitators. Using questionnaires to evaluate the post-event effectiveness of the workshop, the results seem to indicate that the workshop enabled the students to have a stronger sense of control over their immediate environment, the ability to make changes when necessary, and a stronger ability to devise solutions to problems as they arose. The focus of problems in the environment in the students' minds shifted from those dismissed as "out of their control" to those which should be considered as they may have a feasible solution. (Rooth, 2002)

Life skills can be classified as behavioral (sharing), cognitive (optimal decision-making), interpersonal (effective communication), or intrapersonal (goal setting). Many over these skills can be developed through sports or other participatory activities. Team-building activities where students are encouraged to enhance communication, to know each members' strengths and weaknesses, to set goals and to share dreams, and to evaluate these goals for their feasibility are conducted. Any roadblocks to achieving their feasible goal are identified and, using a problem-solving strategy, solutions to resolve these difficulties are found. The art of managing emotions is demonstrated as a way to relax and remain in control of the situation (Theokas, Danish, Hodge, Heke & Forneris, 2008).

Interventions

Self-Regulated ELearning

This intervention consisted of a series of self-regulated e-Learning tutorials in mathematics, English, and physics for a group of select secondary school students. This intervention was funded by the MMI Foundation and operated through the KZN e-Skills CoLab in Durban. These tutorials operated for six hours every Saturday during term times at a South African university. In compliance with the professional body's selection criteria, teachers at each of the schools within a large radius of this university selected three Grade 11 learners from their school who had the best potential to achieve a final average grade of A in the South African subjects of English, physics, and mathematics.

A pilot project for this programme began with traditional instruction in these subjects using textbooks but the end results were not encouraging. Consequently, the project then adopted an online learning platform, Sivayula (for mathematics and physics) and Potential Unlocked (for English), which operated on laptops provided by the funding body. An administrator, who manages administrative and logistic issues, and a mentor, who is present in the classrooms at all times, was supplied by this funding body. The e-Learning platform provided instruction using texts and figures, videos, and simulations; this instruction allows students to learn at their own pace. An online tutor is available for students to ask questions on the material and to receive answers. Regular online quizzes assess students periodically on the material that they learnt.

Core Skills Workshop

The Core Skills Workshop was an intensive five day workshop for Grade 12 (matriculation) students that focused on developing their skills in communication, building relationships, networking, conflict handling, change and resilience, self-esteem, personal values, problem solving, and decision making. Utilising Goleman's 4 box model, the relationship between self-awareness and social awareness with self-management and relationship management was demonstrated and explored. Different methods were used to acquire different skills in this workshop. An example, role-playing was used to demonstrate how to handle conflict; changes in a dance routine were used to demonstrate how to incorporate and adapt changes in one's life (Skills for Life, 2013).

The content of these workshops were developed using various input sources, such as expert advice, reflective learning from past workshop experience, et al. One of these sources were the results of interviews from first and second year tertiary students who advised on the relevance of the content. This workshop was conducted utilising the experiential learning approach which incorporated students' strengths of participation, dancing, and acting and entailed engagement between students and tutors. Use was made of Tension Release Exercises, such as yoga, which were introduced as a self-help tool to help students deal with stress. These exercises were appreciated towards the end of the day after a full day of workshops. In terms of role-playing and games that would engage the student, the students were told of the games rule before the start of game in terms of expected behaviors in this learning environment. A Facebook page was developed for this core skills workshop in order to provide an equal platform for all to communicate interactively in a form that is familiar to students (Skills for Life, 2013).

A core and consistent thread in the programme was the encouragement of accomplishing the students' goals and protecting their dreams, in spite of the many envisaged challenges that will come across their paths. Also, the workshop re-enforced and promoted of attitudes and behaviors that will lead to success of its students (Skills for Life, 2013).

Objectives

This case study had several objectives. Each objective had the same goal: to evaluate the effectiveness of the eLearning programme and core skills workshop to ensure that the students were both academically and personally prepared for university life. From the perspective of the funders, they wished to know if their eLearning initiative was effective in their original goal: improving students' mathematic, physics, and English scores at their respective secondary school in order to qualify them for university entrance. Another objective in regards to the eLearning program was to determine, from the students' perspective, if this programme helped them to achieve their goals and in determining what aspects of this programme might be improved for future students. The objective of the core skills workshop was to prepare the grade 12 students for the envisaged challenges they would be facing in their transition from a high school environment to a tertiary education environment.

Study Procedures

In order to evaluate the eLearning programme, from two different perspectives, and the core skills workshop, different research methods were considered until the most suitable ones were chosen and employed. An initial pilot study of students in the eLearning programme, which the researchers did not participate in, had given some indications of students' perceptions of the programme but the researchers wished to explore their perceptions of the programme in more depth and using more themes. As the number of the students was quite small (around 30), a questionnaire method would likely result in too much of a bias and it would be unable to explore our themes in depth. Only a certain amount of time was given to us by the programme sponsors to ensure that their programme operation was not interrupted. Using an individual interview method would take too much time – more time than was allocated to us. Consequently, it was decided to select the focus group method as being best able to collect individual viewpoints from a small group of students. A focus group approach was used by Ozkan (2009) with 20 students to obtain and enhance students' viewpoints on an eLearning programme. In regards to grade improvement vis-à-vis the learning intervention, a few different methods were considered. A quasi-experimental approach, with test and control groups to reduce any biases within groups, with measurement of improvement in grades for the test groups was viewed as infeasible due to the difficulty in determining and accessing a control group. Another problem with the quasi-experimental approach is that design is useful, in studies such as conducted by Lee (2005), to measure goal-achievement within a tight time frame. However, this programme served as a supplementary to year-long secondary school programmes; if a quasi-experimental approach was used to measure the programme's effectiveness, there would be difficult in differentiating the influence of the intervention with the influence of secondary school teaching in the same subjects (Lee, 2005). An empirical analysis of Grade 11 school grades of the students, relative to their grade 10 individual subject baseline, was selected as the most feasible given the resources available. This analysis objectively evaluated any grade difference at different levels of granularity: overall, grades as per subject, grades as per subject per particular term. Because the core skills workshop focused on personal improvement strategies, which are difficult to measure objectively, an interview approach of the students was used to gather their perceptions on the effectiveness of the programme in improving their life skills.

Pilot Survey of Student Perceptions of Programme's Effectiveness

At the beginning of 2013, the programme sponsors conducted a pilot survey of these students in order to measure certain aspects of the effectiveness of the programme. The survey was designed by the programme coordinators and it was composed of ten themed quantitative, close-ended, and

Likert scaled questions and several open-ended questions that allowed comments. The themes of the survey focused on the value of the session, the venue, and the helpfulness of the peer mentor. The questionnaire was distributed to all of the students during one of their Saturday class sessions and collected once completed that day. The results were then analysed using frequency analysis of the close-ended, Likert scale questions with the responses to open-ended questions added as supplementary results. A few of the questions with their results are given in Table 1.

Table 1. Some results of pilot survey (Ally, Millham, Thakur, & Malan, 2013)

Question	Always (%)	Mostly (%)	Sometimes (%)
The venue was well organised	92	4	4
The facilitator gave assistance when needed	58	25	8
The facilitator seemed sensitive to and concerned about student Progress	54	38	8
The session was of value	33	33	25

Some student comments include a desire to take their laptop, which is available to them only during the intervention session, home to catch up on exercises and to wear T-shirts rather than school uniforms (Ally, Millham, Thakur, & Malan, 2013).

Student Perceptions of Self-Regulated Learning

Given the inconclusiveness of the results of this pilot survey and the wide deviation of the grades, our research team decided that these results warranted a more comprehensive investigation. This investigation would further explore, in terms of focus group interview questions, the components of the programme with themes including their perceptions on the eLearning system's software, content, structure, assessments, and educational benefits and on the facilities with suggestions for improvement (Ally, Millham, Thakur, & Malan, 2013). Part of this investigation, in the form of interview questions, was modeled on Sun, Tsai, and Finger's (2008) thirteen factors of eLearning satisfaction described above.

These themes, with their sub-themes, included:

- | | |
|-------------------------------------|---|
| 1.1. Programme | 1.3.5.Tasks |
| 1.1.1.Administration and Management | 1.3.6.Resources |
| 1.2. Learning Environment | 1.4. Delivery Platform |
| 1.2.1.Facilities | 1.4.1.Flexibility |
| 1.2.2.Technology | 1.4.2.Customization |
| 1.3. Learning Resources | 1.4.3.Support |
| 1.3.1.Content | 1.5. Social |
| 1.3.2.Assessment | 1.5.1.Peer-to-peer interaction and engagement |
| 1.3.3.Activities | 1.5.2.Enjoyment |
| 1.3.4.Feedback | |

Two researchers developed a set of open-ended questions and sub-questions, based on the themes above, which would investigate these matters more in-depth. During the last session of the school year, each student in the programme received a paper which listed these questions and provided space for their responses. As the questions were read out by the researchers, students were encouraged to come forward to a central microphone, which recorded their replies, to provide their own individual responses and perspectives to the question asked. If the students were unwilling to come forward, they could respond to the question by writing their individual responses to the

question on the paper provided. At the end of the session, all of the papers were collected. The individual answers, on paper along with the recorded speech, were transcribed. A coding scheme, partially based on the themes above and on the variety of responses, is still being developed. The responses will be coded and analyzed using the qualitative research tool, NVivo. The full set of results is still not available.

Grade Analysis of Self-Regulated Learning

To complement this focus study, an examination of the assessment results was performed. Our approach is a comparative analysis, by term and grade range, of secondary school grades achieved by the students enrolled in the programme before, during, and after the eLearning intervention programme. This analysis was motivated by several previous efforts. As the schools chose the best three students from their school, comparison of grades achieved by this group with a similar control group was difficult; consequently, it was decided to compare their subsequent secondary school grades in these subjects, on a term basis, throughout their Grade 11 year with their final Grade 10 grades, just before they entered the programme, as a baseline comparison in order to determine the effectiveness of the eLearning intervention.

As required by this programme, each school that a student attended was required to send their final grade 10 marks in English, Science, and Mathematics before admission into the programme and then submit these same subject marks, at the end of each term, to the programme coordinator throughout their Grade 11 year. The anonymized marks were used by the researcher, in their comparative analysis, to determine the effectiveness of the programme in terms of grade improvement.

Our approach measures the secondary school grades, categorized by grade groups A-F, by terms (South African half semesters). Grade grouping was performed to make analysis of marks easier. Average scores and standard deviation for each subject per term is used to ensure that grade grouping did not obscure results. Descriptive statistics was used to measure grade improvement of the program students relative to their Grade 10 grade baseline. Twenty-six students completed the program with available grades.

Our results were hampered by a number of factors:

- The number of students who attended these sessions and who reported their school marks varied from term to term, which may have skewed the results.
- A number of students (approximately 6) attended the program throughout the year but after writing their final exams in December, their grades were still not submitted to the program coordinator so their results could not be analyzed. In addition, not all grades for the previous terms of all students were submitted so data for different subjects in terms is not available. Better data collection procedures need to be implemented and enforced.
- As the preliminary results of our focus interview revealed, a number of students suffered from Internet outages, laptop problems, and login issues which prevented them from utilizing the eLearning facilities.
- Some of the students indicated, in our focus group interview, that they never used laptops before so it took some time for them to adjust and readjust to use them [10]. An example, only eight of the students in the programme had some basic prior computer usage, with just one student having an email account.
- The length of travel also likely played a role. A number of students had to travel three hours each way to reach the university for a six hour tutorial. Often, after they arrived from their long journey, they would find that due to Internet outage or laptop problems, the tutorial was no longer viable and they had to travel the three hours back with no learning gained (Ally, Millham, Thakur, & Malan, 2013).

Core Skills Workshop

In order to evaluate the effectiveness of the 5 day core skill workshops, students of this workshop were interviewed individually at the end of the workshop in order to determine the effectiveness of the programme as well as how the programme could be improved. The workshop coordinators developed a list of open-ended questions which workshop students were encouraged to answer. Each willing student was interviewed using this list of questions and their responses were recorded. The students' individual responses were categorized and then compared to determine if at least the majority of students found these workshops helpful.

Results

Focus Group Results

Some of the comments of the students who participated in the programme are included below.

Improvement

“I have improved on my marks (math, English, science) and overall confidence and I was not getting more than 60% but now I'm getting over 65% to 70% because of this programme and I'm looking forward to get 80% at the end of the year.”

“The programme benefitted me in a way that helped me understand my mistakes and also helped in understanding some contents of the work that were a bit difficult by continuously doing assessments until I understood the work.”

“My marks I received in the first term was not very good, but with the help of this programme I managed to get excellent results I believe I can improve if I can get a little help”

ELearning

“This programme made me love physics which was the subject I hated most because I thought it was hard”

“Some online videos assisted me because there were some chapters of physics that I didn't hear well in school but watching the videos assisted me”

“There are videos, online help, and tutor to help me understand better”

“Online tutor is there and it very helpful”

“It was very simple to use”

“Time was not allocated but was monitored which made it less pressuring as we could work at our own comfortable pace”

“no not the same because in school we are writing with a pen but here we are just typing on the computer and here you get your result of a done work, the moment you submit each and every question”

“Doing the activities over the internet was interesting because you do an exercise and it got marked in the same time and there is a graph showing your progress”

“About the assessment it was good to do it because when use finish those assessments they ask you to do you will be provided but given you feedback

- And when you have feedback you see where were you wrong

- And I can say it easy to follow it because you should know what are you really suppose to do”

Programme

“This is a good programme and my friend can join it. They pay our fees, including transport and food. We learn many things using e-learning which makes it easy.”

“here, the programme is useful and helpful you gain many things by practice and you increase your knowledge and you get correction of your work.”

“I can tell anyone that it is an honor to come”

“The environment was great except the noise from the stadium”

Student background

“The fact that I come from a poor background being given this opportunity to change it motivated me to work harder towards a better life for me and my family, it’s a once in a lifetime opportunity and I am thankful to be chosen to embark on this journey”

“We use laptops which is unusual for the place where I am living. I do not want to lose this kind of opportunity!”

“I was satisfied though wearing a uniform even on weekends was a bit tricky and also the money problem was challenging situation because my mother sometimes has to borrow some money in order for me to come here because she’s jobless”

Challenges

“I spend a lot of time with computers therefore the eLearning system was easy for me to use, but with many other students they had to learn how to use the laptops in the first place”

“our laptop were having network problem”

“The technical support was okay, but during the first two terms we had power problems and during the second last two terms we had power problem with connectivity which really set us back in our work”

“The computer facilities was having a problem on network and battery and the charges”

“The network problems were running on and off”

“We started late on the second term and we had to pick up the most important topics”

“The campus is well mannered but it is too far away from my home so I have to travel and take taxis 3 times before I get here so get here late. And I leave my home at about 6 o’clock in the morning to cover 9 o’clock here.”

Students’ recommendations

“Some lessons I learnt is that I need to pull up my socks to get some good results.”

“Some of us are able to access the Internet outside of the campus and it would have been better if we were able to take the laptops and use it in our own time or spare time to better our learning.”

(Ally, Millham, Thakur, & Malan, 2013).

This feedback indicates that the programme was successful in improving students’ grades in secondary school and in providing effective feedback that enabled the students to learn from their mistakes. The comments also indicate that many students were unfamiliar with how to use a

computer (and the subsequent eLearning systems), the eLearning systems suffered from network connectivity issues (which was vital for their operation), and that some students had to spend three hours one-way commuting to the venue.

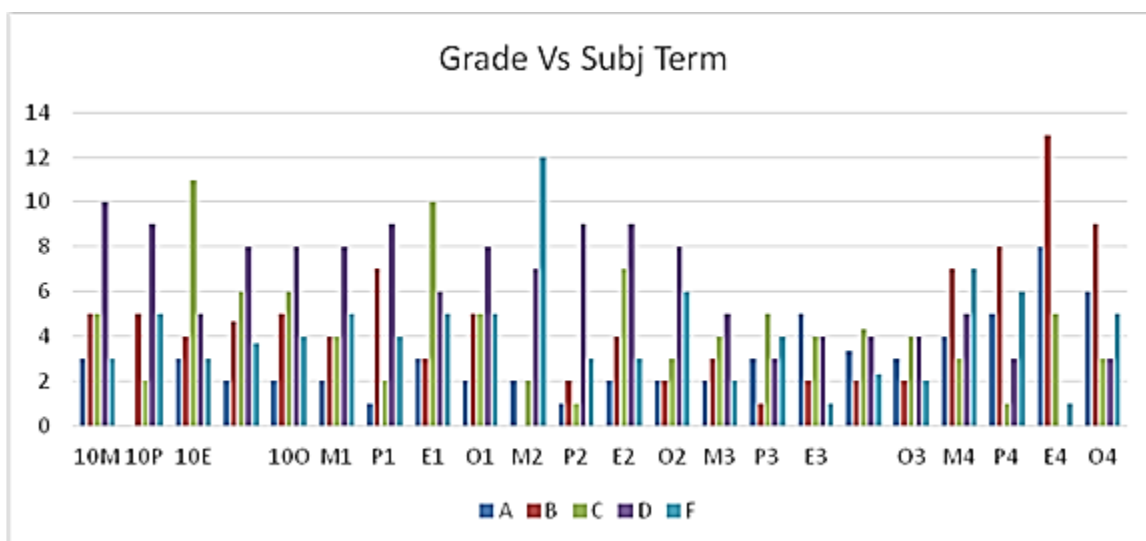
Grade Analysis Results

Our results indicate that the intervention did play a significant role in improving student marks.

Table 2: Average and Standard Deviation (Millham, Thakur, & Malan, 2014)

	10-T1	11-T1	11-T2	11-T3	11-T4
Avg Subj	60%	57%	52%	64%	65%
Std Dev	0.13	0.16	0.14	0.16	0.15

As seen in Table 2, the subject grades for all present students in the subjects of physics, mathematics, and science are averaged in order to determine grade improvement along with a calculation of standard deviation in order to determine improvement variance amongst this group of students. There is a rise in the average subject grade from 58% in Grade 10 to 65% at the end of Gr 11 with a subsequent slight increase in the standard deviation from Grade 10 to the final term of Grade 11. These figures suggest that the majority of students did benefit to some extent by this program but some students did better than others (Millham, Thakur, & Malan, 2014).



Legend: {Number1} {Letter} {Number1} - {Number2}
GradeYear(M)ath/(P)hysics/(E)nglish TermNumber

Figure 1 : Distribution of Grades (Millham, Thakur, & Malan, 2014)

Figure 1 details the number of students achieving a grade group by subject per term. In regards to the Grade 10 base of an average of Ds in math and physics with a C in English, this program details, in Figure 1, a steady improvement in these subjects' marks throughout the third term. The dip in marks during Term 2 could be attributed from the sudden change in South African math and physics curriculum from OBE (Outcome-Based Education) to CAPS which created a lot of confusion and difficulty for secondary school students, in the second term of Grade 11, which shows high failure rates in mathematics and physics. One subject that shows the most grade improvement throughout all of the terms was English. Although the reason for improvement in this particular subject warrants further investigation, one possible reason is that the tutorial material was all in English and the students, most for whom English is a second language, would have

been forced to learn additional English incidentally in order to progress through the program (Millham, Thakur, & Malan, 2014).

Table 3: student numbers by grade (GR) by term (T) (Millham, 2014)

Gr	Gr10-T4	Gr11-T3	Gr11-T4
A	2	3	6
B	5	2	9
C	6	4	3
D	8	4	3
F	4	1	5

As indicated in Table 3, when you look at the number of students achieving an A or B grade, the number increased 31% from Grade 10 to 11 (final term). The number of students achieving a C dropped by 12% and the number of students who achieved a D dropped by 19%. The number of students that failed dropped by 1 person or less than 1% (Millham, Thakur, & Malan, 2014).

Any analysis of student performance in this program must consider the lack of complete marks for all students who completed the programme which makes a full and detailed analysis of their grade performance difficult. This program, viewed in light of secondary school scores of students who stayed throughout the program, suggests that the number of students that achieved higher grades of A and B, relative to their Grade 10 grades, was significantly increased. In addition, the number of students achieving an average grade of C or D seems to have decreased quite significantly. The number of failure grades remained roughly the same (Milham, 2014).

The provision of this eLearning program seems to have been effective to high-potential students, who were scoring below their potential and who were given learning resources that were unavailable to them before. It also appears to be quite effective for borderline students who seem to have improved their mark significantly (Millham, 2014).

Core Skills Workshop Results

Interviews with workshop students indicated that these workshops were highly effective and enabled the students to acquire the skills outlined in the workshop. However, some of the students wished that the workshop have a deeper investigation of issues surrounding one’s self such as self-awareness, identity, self-awareness, self-esteem, and confidence. Other advice included beginning this workshop with Grade 11 students, rather than Grade 12, and follow a building block approach in their learning method.

Recommendations

Student Perceptions of ELearning Intervention

Some recommendations, based on our findings from the focus group interview, are as follows:

- Develop and promote an online discussion forum to facilitate discussion and collaboration
- Conduct regular sessions on self-regulated learning
- Ensure consistency in curriculum between online material and offline teaching
- Implement learning analytics strategies
- Identify and address difficulties, progress, participation rates of students
- No explicit intervention from outside the system
- Take home devices (implemented for 2014)

- Headphones for students to listen to videos without disturbing others
- Possibly different venue: noise from stadium
- Address network outages
- Survey students on food preferences
- In addition, the following needs to be explained at beginning and clearly reinforced:
 - The concept and objectives of eLearning
 - Role of tutor and coordinator
 - Goals and purposes of programme

As those students who achieved an A or B combined average in the subjects of mathematics, English, and physics will continue on with the program in Gr 12 and a new group of students from Gr 11 have begun this program this year, opportunities are presented for both a longitudinal study of the original group as to their secondary school performance (with their matriculation results) and their perceptions of the program, as it changes in response to problems encountered earlier on (lack of wireless in many instances). In addition, the new group provides fresh opportunities to determine their degree of improvement with the newly-adapted program.

Core Skills Workshop

Some of the recommendations for this workshop include:

Have the mentors of these students, who may be part of another programme with these students, attend these workshops to ensure that these core skills are taken forward

Use these workshops to further develop the relationship between students and their mentors

Run these workshops over the December holidays for Grade 11's and run a refresher course for Grade 12's at the same time. Thus, any school-workshop clash should not occur.

Future Directions

This project, due to its lengthy continuous nature, offers the possibility of a longitudinal case study of students and determining changes in student perceptions of the e-Learning programme and core skills workshop and in grade changes over a period of time. As the first students enter matriculation year, it can be determined if their grades continue to improve and what percentage of them qualify for university admission and of this percentage, what percentage would attend university. Several recommendations for improvement are given for both the eLearning programme and core skills workshop; it would be interesting to note the effect on students, measured using the same original methods, as some or all of these recommendations are implemented.

In the wider sphere, this programme and workshop could be rolled out to a wider audience of students across South Africa. This intervention would hopefully help, even in part, to address some of the problems of overcrowding, lack of resources, and lack of individual attention that these students encounter.

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Biographies



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Colin (Surendra) Thakur is Director at the KZN e-Skills CoLab which is tasked with e-skills education in general, and particularly on the e-enablement of government services for effective service delivery. He conceptualized and introduced InvoTech, an innovation incubator at DUT. Colin Thakur was the Chairman, Vice-Chair and National Treasurer for the years in worked with the KZN Computer Society of South Africa. He served on the Inaugural Complaints and Compliance Committee (CCC) of ICASA. Colin was commissioned by the IEC to undertake an international study of electronic voting (e-voting) practices completed in 2012 called “Electronic Voting – the cross-national experience.” Colin delivered 6 key notes on this topic, wrote five papers and was an international observer in the Zambian election. He will observe two e-voting elections