Enhancing E-Learning at the Polytechnic of Namibia

An Interactive Qualifying Project report completed in partial fulfillment of the Bachelor of Science degree at Worcester Polytechnic Institute

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ABSTRACT

In our project, sponsored by the Centre for Teaching and Learning, we helped increase e-learning awareness and adoption at the Polytechnic of Namibia. Through surveys, interviews, and observations we identified factors that inhibited its successful implementation. We accomplished our goals by creating pamphlets and posters, designing a new theme for the e-learning website, and offering information sessions about e-learning. We also formed guidelines for mobile and social network integration, and support mechanisms for the future of the university's e-learning system.

EXECUTIVE SUMMARY

The goal of this project was to increase awareness and accessibility of e-learning at the Polytechnic of Namibia, as well as to enhance collaborative features and to explore the integration of mobile technology. We worked closely with Maurice Nkusi, Head of Instructional Technology at the Centre for Teaching and Learning (CTL) at the Polytechnic of Namibia, to develop strategies for increasing the use of e-learning and improving the functionality of the e-learning system. Mr. Nkusi was the only CTL staff member managing the e-learning system at the university, and therefore was unable to accomplish all of the many goals he had for e-learning at the Polytechnic. We structured and completed many tasks to aid his enthusiasm for e-learning technologies and the benefits they have in higher education institutions. We held information sessions on e-learning and created marketing materials to promote e-learning on campus for the present and future. We also branded the e-learning site to make it more identifiable and recognizable to students and faculty—a step towards increasing enthusiasm and awareness. We also explored the integration of SMS and other mobile technologies to increase the accessibility of e-learning on a campus that had limited access to computers.

Background

Our first step in the project was to conduct extensive research on e-learning and teaching methodologies in general. We researched teaching methods that involve e-learning, how to train faculty to fully understand new systems, transitions between learning management systems, and SMS integration.

Although e-learning use at universities is not a new technology, it has become a de facto standard for dissemination of course materials (Nor, Razak, & Aziz, 2010, p. 53). We researched many features that improve teaching methods at the university level. Collaborative learning is a valuable educational tool that immensely improves the cognition of class materials because of its interactive nature. E-learning readily allows this collaboration in an environment where students can easily share ideas and work together on content. Administering assessments online is also an important feature of e-learning coursework, although we found much debate over the effectiveness, fairness, and the overall value of online assessments.

When it comes to learning management system transitions, one of the most important aspects is training users, especially faculty members. Training is vital for a successful software

transition, and is something towards which a university must devote ample time. In order to assess possible training methods for the Polytechnic of Namibia, we researched case studies and talked with IT administrators about successful software training strategies at other universities.

The first case we examined was MyWPI, where we spoke with Jessica Caron and Thomas Collins, both of whom work for the Academic Technology Center (ATC) at Worcester Polytechnic Institute on the MyWPI team. We discussed successful training and support tactics for WPI's Blackboard software, including an online helpdesk, informational pamphlets, office hours, and classroom visits. While each of these strategies worked well at WPI, we needed to explore the feasibility of each option at the Polytechnic. We also spoke with Cheryl Elwell, Director of Academic Technology Services at Clark University in Worcester, MA. Clark University transitioned from Blackboard to Moodle in 2008, and therefore has experienced training faculty members in the use of a new learning management system. They utilized various training methods, including online reference modules, training workshops, and one-on-one training. Each of these tactics contributed positively to the training experience, and offered further insight into possible training methods for the Polytechnic.

Another important aspect of our project was exploring SMS integration in learning management systems. Due to the limitations of SMS technology, we determined that the most practical use would be for distributing class notifications and announcements. This is an extremely effective method of distributing short messages to a large group of students, especially in places where student access to computers and Internet may be limited. We researched two different methods of SMS distribution: utilizing social networks such as Facebook and Twitter, or utilizing a system such as FrontlineSMS to distribute SMS messages directly from the e-learning servers. We used our research to analyze the difference in these methods, and how each might benefit e-learning at the Polytechnic.

Methodology

In order to accomplish our project goals, we first created a survey and familiarized ourselves with the Polytechnic, specifically with regard to the accessibility of computers and Internet, the most popular means of communication, and general opinions of e-learning on campus. This brought us to the core of the problem—the Polytechnic community was largely unaware of Chisimba and e-learning in general, and many that were aware of it thought that it was only used for English courses. The best way to address this problem was through good marketing. We created two pamphlets (one

for students and one for lecturers) that advertised the beneficial features of e-learning, especially those involving collaboration. The next step was to reach out to the community in a more direct way, through information sessions. These sessions would again highlight the benefits of e-learning, and how they can contribute to a positive educational experience. To promote this session, we created an invitational poster, along with a template that could be reused by the CTL to advertise future e-learning events. As a means for general promotion of e-learning, we also created a banner-style poster that advertised the e-learning website, including the URL of the site.

While we worked on advertising, we also worked on branding the site. By aligning the e-learning site with the Polytechnic's overall theme, it was more attractive and felt more comfortable to students and lecturers. In order to brand the system, we created a unique skin for the site, a new name, and an original logo. The new skin (also called a theme) maintained visual continuity with the Polytechnic brand for an aesthetically pleasing and functional design. Following the completion of skin, we selected a new name for their version of Chisimba, dubbed "MyPoly" by the CTL. We took the name and visual cues from the design to create a logo for the site, featured at the top of every page in the e-learning site and on all marketing materials.

Another one of our goals was to explore SMS integration into the e-learning system, since almost all students own SMS-capable phones, but many do not have regular access to computers with Internet. We determined that using SMS for short notifications and announcements was the most effective use of the technology. We looked into two specific methods for SMS distribution: integration with social networks or using a GSM modem to send messages directly from the e-learning server to mobile phones. Due to the additional costs and upkeep associated with a GSM modem, our analysis showed that it would be easier for the Polytechnic to integrate the system with a social network, most likely either Facebook or Twitter. Although Facebook is the most popular social network, Twitter is already integrated into Chisimba, so we explored ways that we could use Twitter's SMS capabilities to distribute messages to students.

We also determined that many lecturers were not using e-learning because they were not fully aware of how to use it. Mr. Nkusi had created video tutorials, but we decided that written tutorials would also be useful as a supplement. We divided an existing user help document into smaller, more navigable sections, each of which explained one feature. We adapted the help documents to reflect the most current version of Chisimba and our new MyPoly branding. This new system of help documentation made it easier for lecturers to quickly find the help they needed regarding frequently asked questions and common tasks.

Results

One of our most significant observations at the Polytechnic of Namibia was that students and faculty were severely uninformed about e-learning in general. Much of this was due to the small number of courses using e-learning, though inadequate access to computers and Internet was also a substantial factor. Since only 29% of the students had access to the Internet at their residence and it was difficult to find computers on campus, it was important to allow them to access the site in other ways, namely using mobile devices. We also determined that slow Internet speed was an opposing factor to effective use of e-learning. By 2012, Windhoek will be connected to an undersea Internet cable, which will provide the city with significantly faster, more reliable Internet access. The increased Internet capacity will lower prices and allow a greater number of people to have Internet access at their homes, enabling more students to use the e-learning platform while off campus.

We also determined that the Centre for Teaching and Learning (CTL) was considerably understaffed; there were only four staff members, of which only one (Maurice Nkusi) worked directly with e-learning. Because of this, many of the project ideas envisioned by Mr. Nkusi and us were hindered by the limited staff and resources. Our presence at the CTL, however, enabled the Centre to accomplish many tasks that could not previously fit into their work timeline due to their limited staff.

While using MyPoly on the student Wi-Fi network, we identified a specific script in the code that was accessing information on a Google server, instead of on the local Chisimba server on campus. As a result, every time Chisimba loaded the computer had to access a site outside of the Polytechnic network, which meant the entire loading process was limited by the time taken to retrieve an unnecessary external resource. This caused a 20-40 second delay in loading time on the student network. We isolated the issue in the code, and developed a solution for the problem. Through research we discovered that the Chisimba development community was already aware of the issue, but we still gave instructions to localize the script in the meantime, before the new version of the software was released. Although small, this improvement increased the actual functionality of MyPoly—a crucial fix.

We determined that limited access to computers on campus was one of the major roadblocks to e-learning adoption and use. We recommended that the Polytechnic of Namibia take further steps to increase the student-to-computer ratio, which was 5-to-1. The Polytechnic had already developed strategies to increase this ratio, such as offering computers to students at

discounted prices, but they will not see a significant increase in the use of e-learning until the ratio is more even. We also recommended that they talk to MTC and Leo, the two major cell phone providers, about possible 3G Internet discounts to students. This way, more students could afford to access e-learning from their home computer, laptop, or mobile phone.

Many students, in both the surveys and in conversations with us, indicated that they would like to see SMS integration in the e-learning system at the Polytechnic. In order to accomplish this, we recommended that the lecturers be encouraged to make Twitter accounts for their classes. This way, the students can follow their courses on Twitter and receive SMS notifications whenever the lecturer posts an important announcement. As another option, we recommended that they adapt the existing SMS notification system on campus to be used for class notifications.

Since approximately 78% of students use Facebook at the Polytechnic, it would also be useful for the CTL to integrate Facebook into MyPoly. We were unable to develop a Facebook application during our time at the Polytechnic because Facebook was blocked by network filters for most of the day due to bandwidth issues. This block would also prevent students from using any application we developed while using the campus network. However, Facebook is expected to be unblocked once the high-speed Internet is available in 2012. If the Polytechnic can develop a Facebook application, it will be even more convenient for the students to receive announcements and look at class calendars, because the information would be on a website that they already visit regularly during their time on the Internet.

We also recommended increased support and training programs through the CTL, and though they did not have the resources for full-time staff devoted entirely for support, they could increase support in other ways. Mr. Nkusi said that is more often students, not lecturers, who call him to ask for help using the e-learning system. We therefore recommended that the CTL organize a student help desk staffed by IT students from the Polytechnic. This could be operated at a lower cost to the CTL, while providing effective support to students and giving IT students the opportunity to work in a real support environment. With students able to receive helpful support when they need it, they will develop a comfortable relationship with the software that will foster the long term growth of MyPoly.

Conclusion

Our work at the Polytechnic of Namibia will significantly increase the value of e-learning on campus, and will increase the attractiveness and visibility of e-learning in the near future. The e-

learning site, MyPoly, has a new, more attractive look and new name, and students and faculty will be more aware of its existence. We also improved and supplemented the support and training methods for the e-learning site—an important step towards increasing faculty comfort with the system, and hence their overall use of the system. The use and awareness of MyPoly and the impact of e-learning on the educational environment at the Polytechnic of Namibia will increase dramatically over the next couple of years as a result of our work at the Polytechnic, our recommendations for the future, and the work of future IQPs at the CTL. This will allow the Polytechnic to continue evolving with cutting-edge technology and use the latest educational strategies to maintain their status a prestigious, modern university. Our many accomplishments in promoting e-learning at the Polytechnic of Namibia can contribute new ideas to the Chisimba open-source project and positively influence e-learning adoption at developing universities and learning institutions around the world.

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For his excellent work in coding the new skin for Chisimba

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CHAPTER 1: INTRODUCTION

The Polytechnic of Namibia is an institution of higher education in the center of Windhoek, Namibia. Founded in 1994, it is a medium-sized school with an enrollment of 11,500 students as of 2010. The Rector, Dr. Tjama Tjivikua, says that the university is "driven by the belief that development… is based on knowledge and knowledge management" (Polytechnic of Namibia, 2011). Tjivikua also stresses that the Polytechnic places an emphasis on innovation for teaching and learning (Polytechnic of Namibia, 2011). Recently, the Centre for Teaching and Learning (CTL) has begun the transition to a new learning management system, which they hope will increase the use of e-learning technologies on campus. However, with limited student and lecturer access to computers, e-learning technologies have been growing at a less than ideal rate. Increasing awareness and accessibility of this new system will be beneficial to its success in advancing learning through technology.

A learning management system is an online collaborative framework that allows students and educators to organize classwork, complete assignments, and hold discussions pertaining to specific courses. Over the past five years, the Polytechnic of Namibia has implemented several different learning management systems in an attempt to keep up with an ever-changing technological environment. In 2007, the Polytechnic replaced their existing system, called Moodle, with KEWL (Knowledge Environment for Web-based Learning), which is now being phased out in favor of a new system called Chisimba (Kangandji, 2008, 180). Chisimba is the newer version of KEWL, and they hope that it will more adequately meet their growing needs. Chisimba is an open-source system (a free, collaborative, non-proprietary software project) developed at thirteen different South African universities as part of the African Virtual Open Initiatives Resources (AVOIR) project. It allows IT administrators to easily customize the software to their needs using interchangeable, simple to install modules and free modification of the source code. The Polytechnic implemented Chisimba because it is a newer, more capable version of KEWL, which allows the instructors to more fully use technology to teach their courses.

There are always many obstacles to overcome when implementing new software. People are often uncomfortable with new and different technology. The Polytechnic of Namibia therefore needed to discover ways to make the software attractive to faculty and students. In addition, they needed to ensure that Chisimba was easy to use so that lecturers and students could take advantage

of the system with little to no training. Among the issues we considered were the slow Internet access available on the campus and the uneven 5-to-1 student to computer ratio (Polytechnic of Namibia, 2009). Many students rely on mobile technologies such as text messaging (SMS); therefore we also considered making Chisimba accessible through the use of cell phones and other mobile devices.

Part of our project was to evaluate the current progress of e-learning implementation on campus. We assessed user reactions to a software transition and explored methods to make the system more familiar to students. Finally, we examined how effectively the Chisimba system fulfills the expectations of the Centre for Teaching and Learning and the university as a whole.

In order to create a thorough understanding of the problem at hand, we conducted extensive research relating to educational technologies, with a focus on learning management systems, including the Chisimba system. We also researched the effectiveness and possible challenges with educational technologies such as Blackboard (MyWPI), the learning management system used at our university, Worcester Polytechnic Institute (WPI). Additionally, we researched Clark University's recent transition from Blackboard to Moodle. We evaluated the challenges that come along with education software transitions by using their Moodle transition as an example of effective transition strategies. This gave us a thorough understanding of systems that are already in use at universities, and the challenges associated with the original implementation of those systems. We also researched universities that are comparable to the Polytechnic of Namibia, which helped us proactively mitigate some of the issues we might have encountered while implementing Chisimba on their campus.

In addition to the technological aspect of this project, we evaluated the educational theories behind learning management systems in general. These topics helped us understand student and faculty attitudes towards learning management systems and technology in the classroom. More importantly, it helped us piece together the science behind what makes e-learning so effective. Researching and understanding these topics assisted us in analyzing the learning management system at the Polytechnic of Namibia and improving its usage on campus.

Since part of our project identified points of friction in the transition from KEWL to Chisimba, we worked to alleviate these problems through means of support and creating awareness. We made further recommendations to continue smoothing the process after our project's completion. We gauged their experiences with KEWL and e-learning in general by surveying and interviewing lecturers, students, and Information Technology (IT) faculty who work with the

systems. We assessed the usability of Chisimba, which highlighted problems relating to ease-of-use, mitigating frustration, and lack of adoption.

While this project focused specifically on the community at the Polytechnic of Namibia, the results can be applied to academic communities in general, using the Polytechnic as an example. The results will directly impact the Polytechnic as they make their transition, but they will also provide valuable insight to Chisimba's open source community, whose product is still young, and whose user base and feedback pool are still limited.

CHAPTER 2: LITERATURE REVIEW

The use of web technologies for social and educational communication in academic communities is a growing topic that has important implications in the area of teaching and learning. Through our literature review, we conducted research related to every aspect of our project and also identified gaps where our project's results could contribute most significantly. In this section, we review major topics of research and the important conclusions they uncovered. First, we analyzed applications of e-learning for novel approaches to traditional pedagogies as a foundation for proceeding sections of the literature review. Second, we reviewed the literature from the specific areas of our focus and compiled relevant results including related case studies. The section concludes by discussing current and possible applications of SMS in learning management systems as outlined by other experts.

2.1 Teaching Methodologies That Involve E-Learning

E-Learning via the use of Learning Management System (LMS) technologies is not new to universities, and it has become a de facto standard for dissemination of course materials (Nor, Razak, & Aziz, 2010, p. 53). As the Polytechnic of Namibia continues to grow as a university, increasing awareness and usage of e-learning will greatly benefit them because it brings a completely new set of tools to the classroom. Extensive research has been conducted to understand effective methodologies behind e-learning, both for distance learning and as a supplement to on-campus courses. In the following section, we will discuss various aspects of e-learning and online learning technologies.

2.1.1 Collaborative Learning

Scholars have widely agreed upon the fact that group-learning pedagogy is more effective than individual learning techniques (Gunderson & Moore, 2011, p. 34; Papanikolaou & Boubouka, 2010, p. 138). In an effective group, new knowledge is constructed by collaboration rather than by a one-way process, in which only the teacher transmits information to the students (Benbunan-Fich & Hiltz, 2003, p. 299). While it is easy to fall back on individual learning styles for e-learning, collaboration, when used correctly, can be used to greatly improve the cognition of materials (Franceschi, Lee & Hines, 2008, p. 5). Nor Fariza Mohd Nor, a language studies lecturer,

acknowledges this as a traditional approach to online learning that "relies on the lecturer and student interactions in class," but should be used as a "supplement" (Nor, Razak, & Aziz, 2010, p. 53). Online collaboration can be a useful tool to expand knowledge, especially for shy learners who may not be keen to ask questions and verbally interact in class. Additionally, online collaboration is asynchronous, meaning that it is persistent and can be accessed at any time (Nor, Razak, & Aziz, 2010, p. 53), which is beneficial because it allows students to learn at their own pace and on their own time.

Among the most popular forms of online student collaboration is the discussion forum tool. Discussion-based learning addresses the need for students to recycle the information to better understand it, which in turn addresses discussion pedagogy very directly. Nor identifies three categories of student interaction in discussion forums: contributing, seeking input, and monitoring. Students will spend most of the time monitoring, where they are simply scanning and absorbing the material posted by other students. When they find content engaging, they may choose to make a contribution. Seeking input is less likely, but still very important to students who may need support from other class members (Nor, Razak, & Aziz, 2010, pp. 53-58).

If there are many other forms of collaboration, including virtual worlds and project-based learning, why are discussion forums so popular? Technically speaking, they are easy to implement. They are conventionally text-based which makes them more manageable to search and create content. Like a blank piece of paper, discussion forums have no rigid information structure and thus can be adapted to any context. This means they do not force order, format, content, size, and so forth. Their "threading" capability makes them particularly useful for the scaffolding of student ideas and discussions. Threading is the process of branching conversations into sub-conversations, called threads, as the conversation grows into different topics. Discussion forums are also self-generating when students are engaged. The instructor's presence is not required (although recommended) to generate new discourse because any member can initiate a discussion. They also provide an effective way for instructors to unconventionally assess both students' level of understanding and input effort. When students do begin generating new ideas with minimal teacher intervention, it is clear that cognition has occurred, and perhaps just as important, the students are engaged. As mentioned previously, they carry the same benefits as other collaborative tools, bringing support to the shy students and to those with alternatively-paced learning styles (Nor, Razak, & Aziz, 2010, p. 53).

Some educators believe discussion forums are simply not enough to truly facilitate group collaboration. Among these are the advocates of virtual worlds (VWs)—graphical environments that simulate physical presence through Internet presence. They argue that "[t]he lack of face-to-face interactions among participants limits the user's ability to distinguish other users," (Franceschi, Lee & Hines, 2008, p. 1) and that they "emphasize individual learning rather than group learning" (Franceschi et al., 2008, p. 2). The video game industry has pioneered virtual worlds, and they have captured players' interests to a borderline addictive state. This level of engagement seen in video games is not often achieved in educational environments, especially for extended periods of time. With these virtual worlds, however, it may be possible for educators to pioneer VWs again in the educational sector. Second Life, a popular open culture VW is used for this purpose by universities like Harvard and organizations like National Oceanographic and Atmospheric Administration (NOAA) (Franceschi et al., 2008, pp. 1-3).

2.1.2 Administering Assessments

Another major use of learning management systems is administering assessments. In the literature, there is a lot of debate over the effectiveness, fairness, and the overall value of online assessments. To faculty, the most disconcerting hurdle is cheating (Gehringer, 2010, p. 1); how do they maintain an academic honesty policy? What Gehringer argues is that we must approach online assessments differently than traditional in-class examinations. Because of their online format, he suggests that both online and text resources need not be restricted, and should not be restricted because there is no effective way to monitor them (and the implication is that academic honesty would not be an effective solution). According to Gehringer, acknowledging and allowing available resources, or what he coins "open-book open-Web" is not a bad thing at all (p. 1). Nearly all other types of assignments are increasingly integrated into the Internet, and the textbook has always been available. It is only exams that are traditionally closed book, but is this a valid assessment of knowledge? Once in the professional world, graduates will always have the Internet and texts to look up information, so allowing them to do so during tests is potentially a more accurate assessment than closing off all reference materials (Gehringer, 2010, p. 1).

Online testing may also seem appealing because of its apparent ease of grading. Often, it is quite the opposite, however. The objective grading done by the computer system only works with drill and practice pedagogy (specifically multiple choice) (Kolås, 2010, 42) and only causes problems with grading where answers are particular and dependent on formatting, spelling, and other pedantic

issues that do not reflect cognition. However, there are some great benefits to the administrative details. Looking first at multiple-choice quizzes, grading can be done quickly, providing immediate feedback and reducing instructor and teaching assistant workload (this can be especially suited for self-learning, where cheating is a non-issue). Additionally, multiple-choice can provide valuable insight to instructors and accreditors on the information retention rate of specific course topics.

2.2 Training Faculty Members in the Use of New Systems

One important aspect for the Polytechnic of Namibia to consider during the transition from KEWL to Chisimba is how to effectively train the lecturers, staff members, and other faculty to make effective use of the features Chisimba offers. Our main strategy was to utilize online learning materials and practice accounts on an isolated training system, but we also explored other methods of software training. The best way to find effective training methods is to look at case studies of successful training strategies at other universities.

2.2.1 Case Studies

Worcester Polytechnic Institute (WPI) currently uses Blackboard (branded as MyWPI) as their learning management system. Blackboard is an established proprietary LMS currently in use by 57.1% of schools using any LMS technology (Green, 2010, p. 1). During a February 2011 meeting at WPI, the MyWPI support team explained that they have a training system in place that uses an online helpdesk, along with pamphlets explaining specific features of the software. This is an effective strategy for WPI, but we expected that it needed adjustment based on the needs of the Polytechnic of Namibia. The MyWPI team also holds office hours when professors can walk into the Academic Technology Center (ATC) and get help with any aspect of MyWPI they do not fully understand. The ATC is highly visible in its location just inside the library entrance, so their office hours are clearly visible in a high traffic area, and therefore fairly popular. The team is also flexible and will go to classrooms to help professors with last minute problems (Jessica Caron, personal communication, February 6, 2011). Both open office hours and classroom visits would be effective training and support methods, especially if the Centre for Teaching and Learning at the Polytechnic of Namibia were visible and in a noticeable location.

Until 2008, Clark University also used Blackboard, but recently transitioned to a version of Moodle they call CICADA (Cheryl Elwell, personal communication, February 10, 2011). When they

began training faculty on Moodle, they implemented several different training strategies, including online resources that were generally used for reference. They also held workshops where IT staff "translated" between Blackboard and Moodle, so that faculty would know how to use the same features they had been using in the previous system. Some faculty members preferred one-on-one training, and IT staff members accommodated them by individually meeting with those faculty members to teach them how to use Moodle (Elwell, 2011).

The Polytechnic of Namibia implemented several different training methods when it first made the transition from Moodle to KEWL in 2007. For faculty members who were familiar with learning management systems, two hours of training sessions were conducted to learn the "ins and outs" of KEWL. Faculty with little to no e-learning or computer experience underwent a two-month training program (Kangandji, 2008). Kangandji asked faculty members different open-ended questions about support, and many requested better technical support and better connectivity (2008). Despite these issues, however, a majority of faculty members agreed that their courses would benefit from course management systems overall (Kangandji, 2008). With this already positive outlook, the faculty and staff were more willing to make this transition.

A study by Glenda Morgan revealed that faculty members are sometimes hesitant about new course management software because they believe they will have less control over the course. Her study also found that if some faculty members discuss the technology and speak highly of it, others will follow their lead and begin to use the software (2003). It is beneficial to show faculty members that Chisimba can indeed increase their control over a course. By doing so, they might be willing to share this information with other faculty members, which should lead to a more successful integration. Morgan also studied training and discovered that "[t]he most successful training offered is that delivered as close to the faculty as possible, on a small scale and including real examples rather than abstract or dummy courses" (2003). The Polytechnic implemented this kind of training to allow the lecturers to more easily understand Chisimba's uses and purposes.

At the schools Morgan surveyed, the faculty members typically use features of the course management systems that allow them to post syllabi, course materials, and announcements. They use discussion boards, grading tools, and assessment features less frequently, and many think those features typically need improvement. While some professors actually implemented the course management system in order to use an online quiz feature or the grade book, few are actually satisfied with how those features work (Morgan, 2003). Chisimba's additional features are expected to increase professor satisfaction, which should result in an increased utilization of the system.

Improving the interactive features of Chisimba will broaden the system beyond the task of posting lecture notes, and lead into the more social realm of collaborative learning—one of the main goals of the CTL.

2.2.2 Analysis of Case Studies

Based on the information in the case studies, we found that significant emphasis should be placed on training lecturers in the use of Chisimba, since the lecturers' use of the system will dictate the success of the new implementation. It was useful to have several different training methods so that faculty members were able to choose the methods that work best for them. As shown at other universities, ongoing training, as opposed to one-time only training is more effective at increasing faculty comfort with the system during the software transition.

Although formal means of training prove to be very successful, informal, and more personal approaches are also viable options. Various options were available, including establishing a system for office hours at the CTL or in an easily accessible location on campus. Currently, there are not enough CTL staff members to support this strategy, but it may be possible in the future. This service could eliminate hassle to the user by ensuring that support is nearby. A study done in New Zealand emphasizes the importance of a personable and willing staff member to answer questions for the faculty in need. Faculty commented that they would be more willing to accept the LMS if they were not belittled when they inquire about a simple or complex issue (Hegarty, 2005, p. 14). In this study by Hegarty, it was also emphasized that professors may forget information presented to them regarding LMS technology at large formal sessions. Many faculty members also felt that one-on-one or small group assistance was more beneficial in the long run (2005).

In addition to face-to-face interaction, there are other beneficial options for assistance. Jessica Caron, the Instructional Technology Specialist at WPI and a member of the MyWPI team, discussed the usefulness of creating an online help desk that is accessible to all LMS users. She stated that the creation of this database for MyWPI has yielded a substantial time return investment since it is the most easily accessible form of assistance that faculty and students can receive. Caron also stressed the importance of assistance via phone line. She will even visit the faculty member if a solution is not met over the phone (Caron, personal communication, February 3, 2011). Faculty members will be more willing to fully learn the features of the LMS if the training and help staff are easily accessible (Hegarty, 2005, p. 14)

2.3 Transitioning Between Two Systems

In addition to training lecturers to use new software, the Polytechnic of Namibia needed to give the lecturers time to adapt to the changing software. There is a subtle difference between using new software and using different software, and both of these situations need to be addressed in training and support methods. It was important to teach the lecturers about useful features in Chisimba and how many of the features were similar to those in KEWL.

A report done on adopting course management systems in developing countries suggests that when two systems are being used, they should be combined together (Wambui, 2009). While this advice refers to using two separate systems together, it could also be useful advice for transitioning. If lecturers use KEWL and slowly blend their use with Chisimba before transitioning fully, it could cause a smoother transition. It was also a good idea to make a slower transition that can blend aspects instead of an abrupt change.

Clark University transitioned from Blackboard to Moodle because of increasing financial constraints with Blackboard and faculty dissatisfaction. When they transitioned from Blackboard to Moodle, they began by implementing a training platform the summer before the first semester they would be using Moodle. For the 2008-2009 academic year, faculty members could choose to use Blackboard or Moodle for courses. In 2009, faculty members were required to use Moodle as a learning management system (Elwell, 2011).

2.4 Use of Text Messaging (SMS) In Learning Management Systems

The integration of mobile technology with e-learning has become so important that it has earned its own name: m-learning (Trifonova, 2003, p. 1). M-learning is a rapidly growing concept, especially in developing countries where access to computers may be limited, but cell phones with SMS capability are common. The integration of SMS can increase the effectiveness and accessibility of a learning management system by allowing students to have some level of interaction with the system without having constant Internet access.

2.4.1 Challenges Associated With Using SMS

The major challenge associated with utilizing SMS technology is the limit on the number of characters allowed per message (160). This character limit is a result of technological limitations in the channels mobile phones use to send and receive text messages. This restricts the detail of

content that can be transmitted via SMS, which can be a difficult obstacle to overcome if the sender needs to convey a large amount of information. Messages must be concise and sometimes use abbreviated language to fit all of the content within the character limit. Although these limitations exist, SMS can still be used in certain ways to enhance a learning management system.

2.4.2 Practical Uses for SMS in Learning Management Systems

Sending notifications and alerts is the most practical way to utilize SMS in a learning management system because of the one-way nature of the process (Thomas Collins of MyWPI Team, personal communication, February 6, 2011). The server would send out a specific message to the phone numbers associated with the members of the class, and those class members would know to check the website for a new posted assignment or set of lecture notes, for example. The students would not need to reply to these messages, so a system of handling replies would be unnecessary. When email is not widely used by students (especially while at home), SMS provides a better way to contact and alert them of any new assignments, updates to assignments, or general class announcements. With an overwhelming percentage of students carrying SMS-capable phones at the Polytechnic of Namibia (Nkusi, 2011), an SMS notification and alert system could prove to be a valuable supplement to existing e-learning tools.

In *The Twitter-Generation Encounters the Classroom* (2010), David S. McDonald talks about the so-called Text Questioning System (TQS) developed by the Atlanta-based company FanDriveMedia that has been testing it at Georgia State University since early 2010. This system allows students to text message questions for the lecturer to a specific number corresponding to the class, and those questions are stored in a class wiki where students and the lecturer can answer questions and interact with the class community. The questions can even scroll across a projector screen live, as they are coming in during class lecture. This type of technology was originally developed for use in sporting arenas to display spectator's text messages on in-stadium screens, but it was adapted to suit education applications (Valdes, 2010). This type of system could greatly increase the social aspect of student interaction through e-learning, though development of such a system from scratch could be difficult.

2.4.3 Methods of Distributing SMS Messages Using Chisimba

Another challenge that surfaces with SMS integration is selecting a scalable technology to dispatch text messages to students. Chisimba servers can send messages directly through a GSM modem or a cell phone connected to the server, requiring specific software and/or drivers to interface with respective hardware components. To this end, the Head of Instructional Technology at the CTL, Maurice Nkusi, suggested a platform called FrontlineSMS. Another method that does not require hardware utilizes the SMS capabilities of social networking services like Twitter and Facebook, which specialize in large scale distribution of SMS messages. In either case, customization is necessary to give Chisimba the capability to communicate with the SMS service.

FrontlineSMS is a free, open-source program that interfaces with a GSM modem or cell phone attached to a computer to send and receive text messages with large groups of people in a convenient user interface. FrontlineSMS can store student phone numbers, and also save all incoming and outgoing text messages on the server (FrontlineSMS, 2011). Chisimba is capable of working as a client for FrontlineSMS, so this was considered as a viable solution to the problem. This would require the development of a Chisimba module that communicates with FrontlineSMS in some way. The Polytechnic would also need to purchase a GSM modem or a cell phone, along with a text-messaging plan for this system to function properly.

Both aforementioned social networks, Facebook and Twitter, already integrate SMS into their websites. Twitter is a micro-blogging site built entirely around the framework of text messaging. "Tweets" (the short status updates that populate the Twitter website) are limited to 140 characters so that they can fit in a single text message that is readable on a mobile phone. Twitter users can subscribe to other specific users and receive text messages every time that user "tweets." Using Twitter to distribute alerts and notifications from Chisimba is a potentially simpler solution than something like FrontlineSMS, because it places the load of sending and receiving messages on an external server, rather than on the Chisimba servers themselves. It also eliminates the need to purchase additional hardware. Twitter has an application programming interface (API) available, which is an interface for programmers to allow software to communicate with other software. Chisimba already has a feature that integrates with Twitter and allows users to send out tweets from the system. The lecturer could create a Twitter account for a specific class, and the students in that class can follow that account to receive the lecturer's updates on their mobile phones.

Facebook is also an option for distributing SMS notifications. Facebook uses SMS to alert users when other Facebook users send them messages, write on their walls, and many other types of interactions. The Polytechnic could develop a Facebook application that interfaces with Chisimba to send SMS notifications to the class. This would also require the development of a Chisimba module that communicates with the Facebook API. Using Facebook as an SMS distribution system is potentially more complicated than using FrontlineSMS or Twitter, because it would require the additional development of some sort of Facebook application. Although Facebook does integrate SMS in its system, it is not software based purely on SMS, like FrontlineSMS or Twitter.

The decision between either using an external service or using the Chisimba servers themselves to distribute text messages was a matter of choice for the Polytechnic of Namibia. A service like FrontlineSMS, installed on the Chisimba servers, could have offered the Polytechnic more control over the system and more opportunities to customize the notification system as they like. However, it also required the purchase of hardware and monthly payments for an SMS plan. External services like Twitter and Facebook offer the Polytechnic less control over the system, but also take the load off of the Chisimba servers for physically sending messages, and can be used at no cost to the university. Because of these advantages, we chose to pursue the use of social networks and existing SMS notification technology, instead of FrontlineSMS, to distribute SMS notifications.

2.4.4 Conclusions on SMS

Our research into SMS technologies shows that there are many innovative ways of integrating with learning management systems and other e-learning platforms that have not been explored. We have detailed a framework pertaining to what *could* be done with SMS in learning management systems, rather than what *has* been done. The lack of resources relating to SMS as an e-learning notification and announcement systems proves that exploring SMS integration is a worthwhile and innovative direction. In our execution of the project, we bridged this gap with a comprehensive analysis of the options available to integrate into the new system.

2.5 Literature Review Conclusions

After extensive research, we developed a strong grasp on the concepts and ideas behind this learning management transition, and applied our background knowledge to solving the various problems involved such as easing the transition and making the system more available to both

students and lecturers. The literature outlined above provided a solid basis for our study, while leaving gaps sufficient to incorporate original ideas and concepts.

CHAPTER 3: METHODOLOGY

The goal of our project was to increase the awareness, accessibility, and use of the Chisimba system at the Polytechnic of Namibia as a collaborative learning tool, and to explore ways to implement mobile technology into the learning management system. In order to accomplish our goals, we established ways to increase awareness of Chisimba on campus and determined what faculty and students needed from the system. We also ensured that users understood what Chisimba could accomplish and how it could be used, in addition to posting lecture notes, as it was most commonly used before. We researched various applications of mobile technology by exploring ways to integrate SMS into the Chisimba system. We familiarized ourselves with the Polytechnic's version of Chisimba to better understand how we could accomplish our objectives. We also evaluated the current training for faculty on the collaborative and interactive features of the software. In the following section, we describe the strategies that have accomplished these goals.

3.1 In-Field Background Evaluation and Observations

During our first week onsite we familiarized ourselves with the campus, culture, and technologies available at the Polytechnic. We had time before we arrived in Namibia to use training Chisimba accounts, but we had not experienced the technology infrastructure and training programs that supported Chisimba. This site assessment allowed us to observe the system in action and gain some hands-on experience. We toured the computer labs around campus and the library, which together provide the majority of access to the e-learning servers. In our first few days using the Polytechnic Internet we found that Internet speed was a major roadblock to accessing e-learning servers. We met the CTL staff members, and acquired a sense for the limited resources available to support the Polytechnic's growing e-learning system. We also met with the Student Representative Council (SRC) to discuss e-learning at the Polytechnic and were surprised to hear about the lack of awareness and understanding. This round of research and observations gave us an introductory basis for the project and was completed by the end of the first week at the Polytechnic of Namibia.

3.1.1 Student Survey

Observations worked well for gaining a general understanding, but we also needed a more concrete, qualitative metric for measuring a baseline of public opinions and e-learning accessibility.

In conjunction with observations, we conducted student surveys to gauge the Polytechnic community's opinions of both KEWL and Chisimba, and where they wanted to see improvements. You can find the student survey in *Appendix A: Student Survey*. Specifically, we observed the reaction to the transition between KEWL and Chisimba, learned the limitations of Chisimba, and assessed the feasibility of new technologies being introduced. The survey also provided information on basic demographics, general technology use on campus, and the most common forms of social and academic communication at the Polytechnic.

We collected this data through surveys administered to students in the Communications department. We primarily received responses from paper submissions, though we received online submissions as well. The online survey was accessed through the Student Intranet page and on the e-learning homepage. For the paper survey, we printed three hundred copies to distribute to specific classes. We distributed them to thirteen different English classes in the Communications department, which we selected based on a master schedule we received from the Writing Center. We chose to use English classes because they represented a diverse group of students from many different majors and different years of study. We felt that this diversity offered the most accurate sample for our survey. The survey was simple, and took each student ten to fifteen minutes to complete. The survey covered three general topics: access to technology, communication methods, and overall opinions of e-learning. The results helped us understand the scope of e-learning adoption on campus, and helped us determine the best way to connect the lecturers with the students in order to increase collaborative learning through Chisimba.

3.1.2 Faculty Interviews and Surveys

Surveys gave us a broad sense of students' opinions on e-learning and how we could make improvements, but only provided a coarse level of detail because of their standardized nature. To achieve finer granularity, we decided to conduct interviews with lecturers. We developed questions asking about their opinions and usage of KEWL and Chisimba, as well as basic demographics. See *Appendix B: Faculty Interview and Survey Format* for the interview and survey format. We asked about the number of courses for which they use e-learning, which features they like, the ease of use of each system, and what support and training methods they would utilize. We performed these interviews by visiting lecturers in their offices in teams of two during times that they were not teaching, with one interviewer having an open discussion with the interviewee while the other took notes, occasionally asking questions to satisfy the standard interview criteria and keep the meeting on track.

For those lecturers who did not have time to participate in an interview, we directed them towards the online faculty survey, which contained the same questions and format as the interview. Although the interviews provided more detailed information and allowed for discussion with the lecturers, the surveys also produced valuable data, which we combined for analysis. The results of the faculty interviews and surveys helped give us a general idea of faculty attitudes towards e-learning, and what can be improved so that faculty are more inclined to utilize e-learning for their courses.

3.1.3 In-Field Observations Conclusion

By the end of this stage, we had obtained a clear understanding of the problem as it was defined by the community. At this point we reevaluated our project goals based on the findings, because students and faculty had different ideas about which changes and improvements to Chisimba were most necessary. This included the new realization that a substantial focus was necessary to increase the awareness of e-learning on campus.

3.2 E-Learning Support

Establishing effective support was an important task for meeting our goals, and we did so using several successful models from LMS administrators and case studies from support staff at other universities (Jessica Caron and Thomas Collins, personal communication, February 6, 2011; Cheryl Elwell, personal communication, February 10, 2011). From the lecturer interviews and surveys, and based on observations from the staff at the CTL, we suggested a broad spectrum of support methods. These topics included anything from how to upload a syllabus to how to use the discussion board effectively. Additionally, we selected some topics that addressed our sponsor's goals to increase the use of more advanced features of Chisimba, such as wiki pages and other collaboration tools. Once topics were chosen, we decided the most effective means of support for both student and faculty were to create help documents to put on the e-learning site.

3.2.1 Online Helpdesk

For more detailed help, we designed an online helpdesk as a part of the Staff Intranet website, which is available to all lecturers. It has the capacity to host the video tutorials that had already been made available through the CTL, along with step-by-step text and screenshot tutorials

that we created to guide users through tasks. Helpdesk articles are organized in a format that is friendly to question-based browsing for immediate troubleshooting, as well as topic-based browsing for users who are interested in a self-guided tour of the new system. This helps lecturers learn how to use certain features at their own pace and in a learning style that suits them best.

We were given an eighty-two page document that was already created by the Chisimba community with step-by-step instructions of many features along with accompanying screenshots. We heavily modified this document and separated it into smaller, more manageable sections to post online. We kept most of the content the same but made changes where needed to specifically reflect the Polytechnic's version of Chisimba. The document was a few versions behind, so some instructions needed to be revamped, and all of the screenshots needed to be replaced to reflect the unique look of the Polytechnic's version of Chisimba (with the new skin, discussed later in this report). We then converted the documents into HTML format so they would be part of the website and hyperlinked to one another, taking advantage of their digital format for an experience that was easier to navigate, rather than an eighty page digital book. This also prevented the user from needing to download the large files, which would be bandwidth intensive and potentially time consuming. We posted these sections online along with the video tutorials and catalogued them by chapter, making it easy for users to quickly find information on any necessary help topic. We also placed a link to these online resources unobtrusively in the header of every Chisimba page, which makes it easily and immediately accessible to anyone who has difficulty while using the system.

At a technical level, we did more than post html documents on a website. It would have been unsustainable to do so for a few reasons. First, helpdesk navigation was expected to change as it developed, so hand writing navigation menus or a table of contents into each document would have been a poor decision. We also expected that more help documents would be created by the CTL in the future, so our system had to accommodate that. Additionally, the help documents' designs may eventually change to keep up with Chisimba and other websites at the Polytechnic. If the design were drawn individually into each document, changing it would be impossibly tedious.

Our solutions involved designing a basic system to serve these help documents. When an administrator wants to add a new document to the help desk, he or she only needs to specify a generic layout and the text in the document. The details are handled by the system, making it adaptable and sustainable.

3.3 Designing a Chisimba Skin

Our first step in branding the e-learning site was to develop a unique skin for Chisimba. A skin is a theme for a website that includes the colors, backgrounds, buttons, and the overall look and feel of the site. The previously used skin was one of the default options in the Chisimba software, so developing a unique skin makes the site more consistent with other Polytechnic sites, while still giving it, and the e-learning department, a unique identity. There were three stages to designing the skin:

1. Identify a general theme for the skin at a conceptual level.
2. Design sample "mockups" of the skin in an image editor.
3. Bring the samples to life with code.

3.3.1 Design Constraints

At a conceptual level, we had a few design constraints to keep in mind: consistency, flexibility, and usability. The first constraint, and also one of the original reasons we developed a skin, required the design to be unique but also consistent with the Polytechnic's already established brand. This was accomplished by incorporating similar shapes and colors to those found in Polytechnic pamphlets, promotional materials, letterheads, and of course, websites. Very early on, we chose a color pallet directly from the Polytechnic's website. *Appendix C: Design Elements* features the six main colors we selected, which include the prominent shades of royal blue and sunny yellow used in the logo, a deep blue for dense textual elements, a slightly darker banana yellow to contrast the deep blue and offset the sunny yellow, and some lighter shades of blue used for shapes, backgrounds, and non-critical elements. Any other colors in the design were some shade of these six swatches.

The new design also had to be flexible. E-learning websites fall into a class of software that have a broad spectrum of functional requirements, and with such diversity, any skin design must be versatile enough to handle an unlimited number of different scenarios. As an example, Chisimba must act as an instant messaging client, a video player, an online assessment tool, and a grade book, and each has next to nothing in common with the others. Regardless of this challenge, the skin needed to elegantly tie all the features together and leave room for new features to be easily introduced in the future. We accomplished this through clever and precise design, paying close attention to each element's placement in the space around it and how each element would react to

smaller and larger sizes, different content mediums, various operating system and browser platforms, and many different page layouts. One trick to this was to keep all the bold colors and shapes in the header, and outside the main viewing area where there could be guaranteed consistency across pages without sacrificing usability. In contrast, the content area of pages (everything below the header and navigation menus) made more subtle use of design elements by lessening their opacity, size, and quantity.

The third constraint was usability, because even with a beautiful skin, the main goal of MyPoly was still to teach and learn. If users could not easily accomplish e-learning tasks, then the design would have been a failure. Mostly, this meant testing the software to verify that it was free of any major problems that would cause confusion or interruptions in functionality (commonly referred to as "bugs" among programmers). Additionally, there were some design decisions that increased the usability of the site. Clean layout was critical to showing the relationship between items on the page, and to show the divisions and order of specific content. Mostly, we emphasized these relations with alignment, spacing, sizes, weights, and colors. One prime example of this was the four steps lecturers followed when creating a new course. We used a logical "breadcrumb" style diagram to show the lecturer what step they are currently on, and what each of the four course creation steps were. This careful attention to a user-friendly interface made the site more approachable to less experienced users.

3.3.2 Developing Design Elements

With these three constraints in mind, we brainstormed some designs that would still be visually exciting, while meeting the parameters. Since we used identical colors and fonts to maintain consistency to the Polytechnic brand, we exercised more creativity choosing other design elements. We developed a series of overlaying plates and connected strokes that together formed shapes that abstractly represented circuit boards. Their uniformly angled shapes and hard, calculated edges made the design appear both technical and mathematic, which expresses the school's brand well. We also created circular shapes, coined "radials" using several non-uniform circles, which could be used for more intense graphics that required high levels of engagement and excitement. See *Appendix C: Design Elements* for samples of the radials, circuits, and all other critical design elements. The website was not suited for radials because of their visual aggressiveness, but they were especially useful for the poster and the covers of the pamphlets to demonstrate energy and action. We used the poster

and pamphlets as a sort of conceptual sketchpad for potential design elements we would later incorporate into the website skin.

3.3.3 Design Mockup and Coding

We created a final skin design using Adobe Illustrator, based on many of the design elements from the poster and pamphlets. This type of final design is often called a mockup because it is a picture or drawing that mimics what the final skin should look like, but does not function as the skin would because it is only a visual representation. The mockup is shown below in Figure 1.

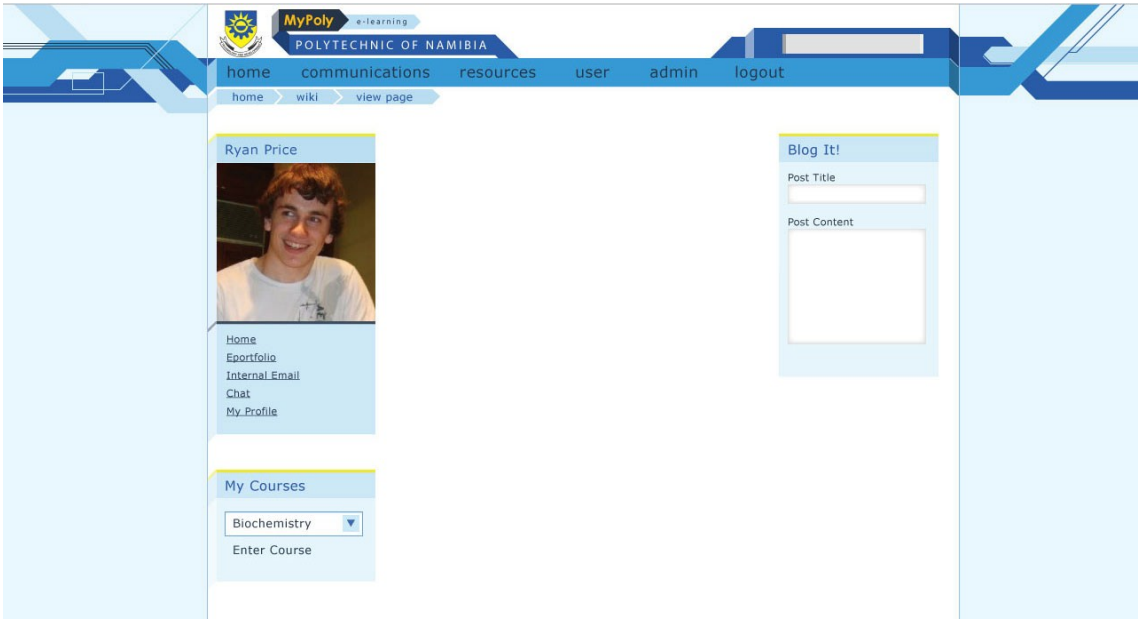


Figure 1: Skin Mockup

Once the final mockup was completed, the design was ready to be converted into a functional skin, which required programming the design to something the computer could understand. In our office, Mr. Nkusi configured a development server (also called a testing server) that was nearly identical to the production server (the server currently hosting MyPoly). Because it was completely isolated and disconnected from the production server, we were able to freely modify and test MyPoly in our development environment without making any changes to the production website until the skin was ready to be deployed.

3.3.4 Additional Details on Skin Development

In Chisimba, skins are comprised of two languages: HTML and CSS. HTML specifies the layout of a page, including text areas, tables, headings, labels, and content subsections. CSS complements HTML by specifying the design of a page, including colors, fonts, text-sizes, backgrounds, mouse-over and mouse-click effects, and margin sizes. At the most basic level, Chisimba uses HTML as a template; we specified placeholders throughout the HTML document for the server to fill with content for each page. After the HTML is constructed, CSS styles are applied to the webpage to give it the look and feel that distinguishes it from other skins. A collection of CSS styles, called a style sheets, act as lists of design rules that target specific elements on the page. For example, a designer may specify a rule that states that all paragraphs with the identifier 'important' should be bold. The majority of skin modifications were done through the CSS style sheets, but there was a very limited amount of HTML modifications that could be made. This gave us only half the customization we had hoped for, and posed definite limitations in what was possible in the skin customizations. However, we worked around these issues and produced an appealing skin that will improve the e-learning experience for all MyPoly users.

3.3.5 Testing the Skin

Once the skin went live on the e-learning training site (a secondary site used for training purposes), we began the crucial step of testing the new skin for problems and bugs. We navigated the entire site, and systematically mimicked common tasks that students and lecturers would normally perform on the site. In the process, the testing team discovered and documented bugs in a collaborative Google Doc, with links to the specific page and a description of the particular problem. After multiple major and minor bugs were documented, the development team marked issues as either addressed or dismissed. Issues were marked "addressed" once the problem was solved, and marked "dismissed" if the issue was deemed either unimportant or unrelated to the skin. This system of cataloguing and marking bugs was an effective way to stay organized and ensure that bugs did not slip by unaddressed. After our first round of bug testing, we submitted an updated version of the skin to the training site, where we performed a second round of bug testing. After this second round of testing and a third version of the skin, it was ready to go live on the main e-learning production site.

3.3.6 Skin Implementation

Once the testing phase was complete, the skin was ready for implementation on the main production site. The third and final iteration of the skin went live on the site on April 29, 2011. From that point forward our Chisimba skin, called "Circuit" was the default skin on the MyPoly website (elearning.polytechnic.edu.na). The new skin helped to redefine and rebrand the Polytechnic's e-learning site as MyPoly, hopefully generating a level of excitement and a feeling of newness to the e-learning environment.

3.4 Marketing and Branding

During our initial observations at the Polytechnic, we discovered that Chisimba is not well-known on campus. Many students saw its predecessor, KEWL, as a system only for English classes, and many had not heard of Chisimba at all. Students were also skeptical about their lack of consistent access to the Internet, and how e-learning could really improve their learning experience. As a result, we decided that increasing awareness and understanding of e-learning on campus was the biggest issue in our project. We accomplished this through various methods: branding the e-learning site, creating a unique logo, distributing posters and pamphlets, and holding an E-Learning Information Session.

3.4.1 Creating a Name for the E-Learning Site

The first step in branding the e-learning system at the Polytechnic was to create a unique name, similar to how WPI branded Blackboard as MyWPI and Clark branded Moodle as CICADA The name of the e-learning software, "Chisimba," was not unique enough or identifiable enough with the Polytechnic of Namibia, so we wanted something new. After discussing the idea with Mr. Nkusi, we decided on the name "MyPoly." Although simple, we felt that this name would identify well with students, and would be fairly easy to market and advertise.

3.4.2 MyPoly Logo

Using the name MyPoly in collaboration with our custom skin, we developed a logo to serve as the icon of the e-learning site for brand identity. A logo is the most important element for brand identity because it attaches a symbolic representation to the e-learning system. This logo appears on the e-learning production site when students and lecturers log in to the system, as well as on all

promotional materials associated with e-learning and the CTL (see Figure 8 in Results and Analysis section 4.6.4 for the logo).

3.4.3 Posters

Upon our arrival, many students were not even aware of Chisimba, or e-learning at all on campus. Posters are an effective way to increase the visibility and awareness of e-learning to the majority of students on campus, many of whom do not have regular Internet access. By advertising the Polytechnic's version of Chisimba, the campus is more aware of its existence and features. One way to accomplish this was to place posters on notice boards around campus to advertise e-learning at the Polytechnic. We created posters after finalizing all branding information and had copies printed to be placed in high traffic buildings and locations on campus. We decided on an eye-catching design with a simple message accompanied by the logo to promote the e-learning site. The poster contained the new name for the e-learning site and a short blurb about e-learning. It sampled from the Polytechnic color pallet and included designs that were consistent with marketing material that were used by the school. See Figure 11 in Section 4.6.4 for the poster we created. Even if students were not necessarily aware of what e-learning was, the posters at least planted an idea in their minds and possibly prompted some curiosity.

3.4.4 E-Learning Information Session

Another tactic we employed for increasing student awareness of e-learning on campus was to hold an open informational session. In this session, Mr. Nkusi gave a presentation that outlined Chisimba, its features, and how it could improve the learning experience at the Polytechnic. Our group also shared our experiences with e-learning at WPI, and how it contributes to our university learning experience. The goal of the session was to connect with other students and help them understand the ideas and concepts of e-learning, though it generated much more faculty interest.

We promoted this session by creating an advertisement poster that we placed on notice boards around campus. The goal of this poster was to grab the attention of students and encourage them to attend the informational session. We began designing the poster with simplicity in mind, trying to convey our message with as little text as possible. We emphasized the title provided by Mr. Nkusi: "E-Learning is for Learning." Also, we made sure the date, time, and location were obvious and visible. For this purpose, we determined that an A4 letter-sized flyer was the most appropriate

size. We printed copies of the flyer and posted it around campus during the week the information session was to take place. After using the poster for this event, we created a generic poster template that could be modified in Microsoft Word. It could be used for promoting other e-learning events and announcements since its design matches the MyPoly skin. To see the poster, see Figure 9 in Section 4.6.3.

3.5 Mobile Access

The first step before implementing mobile technology on the Polytechnic campus was gauging the interest from both students and lecturers. The best way to accomplish this was through interviews and results from our survey. It made the most sense to conduct separate surveys and interviews for lecturers and students, as questions asked were different.

As part of our survey to students, we included questions related to SMS technologies, and how students felt it could improve their learning experience and their level of interaction with Chisimba. Another important aspect of the survey was to determine how many students actually have cell phones that they carry with them, and how often they use text messaging to communicate. We were already aware that mobile phones and SMS were prevalent in Windhoek, but it was important to determine the actual level of mobile phone ownership among students, and the capabilities of those phones. If only a small percentage of students had mobile phones, or if text-messaging costs were too high, using SMS for notifications would not be practical. As we needed to find the best way to send out notifications and announcements, it was important to ask these questions, in addition to similar questions about computers. We decided that if the results of the survey proved that SMS technologies were beneficial, it would become a major contribution to the accessibility and usability of MyPoly.

3.6 Safeguarding Data

For the protection of participants, all data associated with human subjects, including but not limited to surveys, interviews, logs, and workshops, was kept strictly confidential unless otherwise authorized by the participant. Participants were informed of their right to privacy through a verbal statement of confidentiality that was required to use collected data in any part of the study. Access to this information was limited to the four project group members, sponsoring supervisors, and advisors, who all agreed to keep this information confidential. Records of this data were stored

digitally, with necessary protection mechanisms to prevent unwanted access and nonconsensual use of data, including storage only on password-protected devices, and obfuscation via encrypted storage and transmission. Any physical copies of data were destroyed upon digital transcription. For data that was published or shared with other parties, it was stripped of all uniquely identifying information that had any potential to link a participant to the data he or she had provided.

3.7 Timetable

We utilized a timetable throughout all stages of our project to keep a high level sense of deadlines, but there was a great deal of change between what you see in this final report, and the far denser timetable that we started with. At the proposal stage, the timetable suggested a seven week implementation complete with initial and exit surveys, a host of pilot programs to attack every issue preventing e-learning, and a wide collection of implementation ideas that all seemed to fit conveniently into eight weeks. This ambition has driven us to produce an impressive array of deliverables, but there were many lower priority items that had to be pruned from the project for the sake of time. This is a perfect projection for most backburner ideas at the CTL: great ideas with not enough resources for completion, stressing again the constant need for extra help at the CTL. Those ideas that did not make the final cut were organized into a recommendation, with the intention of a follow up project team moving forward with them. See Table 1 for the eight week schedule as it was carried out.

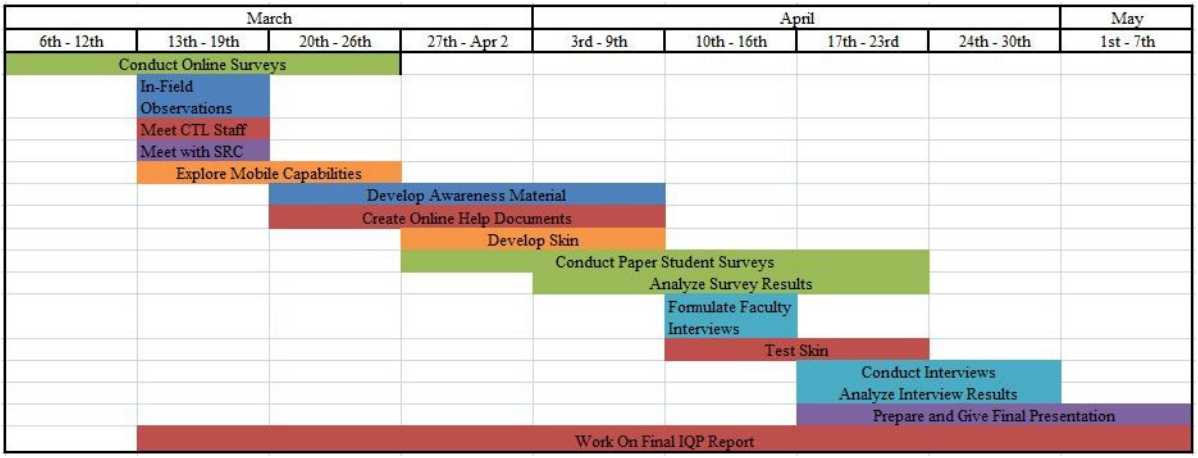


Table 1: Timetable

3.8 Methodology Conclusion

Before we arrived at the Polytechnic, the major goals of this project were to smooth the transition from KEWL to Chisimba and to promote the use of more advanced LMS features including SMS technology, course collaboration, and online assessments. Upon arrival, our goals were adjusted to reflect our initial observations, and in our time on campus we dedicated a large portion of the time doing further research to identify the largest factors against e-learning adoption through surveys and interviews. The results gave us direction for piloting schemes to increase adoption, as well as giving the CTL the same direction to conduct similar programs in the long term. We placed a strong emphasis on creating awareness and higher levels of participation in e-learning and its importance to university-style learning, and much less to the transition itself, which was already underway. We also focused on how mobile technology could help the students access the system. With such a small window of time for project completion (eight weeks), the number and nature of objectives was ambitious, but feasible to complete during the allotted time.

CHAPTER 4: RESULTS AND ANALYSIS

This chapter highlights our primary results during our time at the Polytechnic of Namibia. These findings reveal the e-learning issues about which we were unaware prior to our arrival. The biggest issues were the speed and reliability of the Internet, the difficulty students faced to access computers on campus, the need for more staff in the Centre for Teaching and Learning, and the attitude both lecturers and students had regarding e-learning.

4.1 Initial Observations and Assessments

Our meetings early on with the CTL and SRC helped us discover that our project's scope was significantly larger than we had expected. It was very informative to hear the opinions of the staff working directly with e-learning and the opinions of the students who were actually using it (or not using it). Maurice Nkusi, Head of Instructional Technology at the CTL, and Dr. Michael Tjivikua, CTL Director, showed tremendous enthusiasm for the impact that e-learning could have on the Polytechnic. We learned that about 4,000 students and 68 courses were registered on the e-learning site. With an enrollment of 11,500, this means approximately 35% of students at the Polytechnic are registered in Chisimba through one or more of their courses—a solid start, but a number that the CTL wishes to increase in the near future.

The students, however, had different views on e-learning. While speaking with the SRC, we were surprised to hear that some students were unaware of Chisimba, or at least did not associate Chisimba with its name. Others thought the previous system, KEWL, was only used for English courses. After explaining to them the potential benefits of e-learning, they still did not seem convinced. Some of them felt that any means of learning or communication through technology was uninteresting and difficult to access. These conversations also indicated that there were bigger problems with implementing e-learning at the Polytechnic; student awareness of e-learning, limited access to computers, and slow Internet speeds were significant obstacles that needed to be addressed before substantial progress was going to be made.

4.2 Network Infrastructure

Once at the Polytechnic, it became apparent that the issues with the network infrastructure would have a major impact on our project. The speed, reliability, and availability of the wireless

networks on campus are all significant issues that affect the use of e-learning. If students cannot access the Internet in a timely way, then access to the e-learning site is drastically hindered and becomes less of a priority for students who need to use Internet time for other activities.

The slow speed of the student Wi-Fi network was a serious hurdle in effectively accessing e-learning tools, and making them attractive to student users. During our first week at the Polytechnic, we had access to the student network and were considerably hindered by the slow speed and inability to load web pages. The Chisimba site did load most of the time, though loading speed was unpredictable. Sometimes the site took upwards of twenty seconds to completely load the main page. In our second week at the Polytechnic, we obtained access to the faculty network (both wired and wireless). We were astonished by the disparity in Internet speeds between the two networks. The Chisimba site, as well as the rest of the Internet, loaded relatively quickly on the faculty network. Staff members at the CTL all use the faculty network, and thus were unaware of loading time problems for students using the Chisimba site. We did some investigation into site loading times, and will discuss these findings later in this section.

The IT department at the Polytechnic is aware of network infrastructure problems on campus. They already block bandwidth-intensive services like Facebook and Twitter during most of the day to alleviate the load on the network. However, the difference in speed between the faculty and student Wi-Fi networks appears to be simply an issue of load. There are 11,500 students, and only about 300 faculty members. While not everyone is using the Wi-Fi at the same time, there are always more students than faculty using the network. As a result, network speeds on the student network suffer significantly, while the faculty network remains relatively fast. This is very likely a point of frustration for those students who have laptops and access Wi-Fi on campus, and a clear obstacle to effectively accessing e-learning online.

Another issue with network infrastructure was the overall reliability and predictability of the network. In our time on the Polytechnic network, we experienced random outages and day-to-day unpredictability of Internet access. If Internet access is unpredictable, students cannot always access e-learning resources, and may not be able to complete assignments or read announcements. Both the issues with reliability and speed will improve as the network hardware at the Polytechnic improves, but it will take time.

Our main concern with the network at the Polytechnic of Namibia was the slow loading time of the Chisimba site on the student network. Unless students could access e-learning at reasonably high speeds, e-learning would not take off. Consequently, Chisimba's performance on the

student network was a critical issue, and we proceeded to identify bottlenecks. Because performance problems were only demonstrated by the student network, we were able to isolate the problem to some interaction with the Internet. We found that each time the Chisimba site loaded, it was also loading JavaScript code from an external website (ajax.googleapis.com). When we isolated this particular file, we found that it often took upwards of twenty seconds to load from the external site. That length of loading time is unacceptable for software that is hosted locally on the Polytechnic servers. To confirm that this was in fact the file that was slowing the site, we blocked access to that web address. As expected, the site loaded instantly, albeit without any actual functionality because of the missing code. Loading the external code was a function built into Chisimba itself, and not something that the Polytechnic had implemented or was even aware of.

4.3 Availability of Computers

During our stay at the Polytechnic of Namibia, we visited a majority of the public access computer labs on campus, mostly in the library. Most of them were filled to capacity, occasionally with more than one student per computer. At the Polytechnic, it is necessary to reserve time in the Internet cafés to get time on the computers with Internet access. With limited time on the Internet, the students are not interested in using their time for e-learning if it is not completely necessary for their courses. Mr. Nkusi gave us access to the Polytechnic of Namibia Strategic Plan-3 (PSP-3), a third edition document that outlines the goals of the Polytechnic between the years of 2009 and 2013. It states that there is currently a 5-to-1 student to computer ratio on campus (approximately 14%), and that they hope to increase the number of students with laptops to 60% by 2013 (Polytechnic of Namibia, 2009). Laptops will increase the ratio, and the amount of time that students have to interact with computer, the Internet, and thus e-learning.

4.4 Understaffing at the CTL

With such ambitions regarding e-learning, the Centre for Teaching and Learning is seemingly shorthanded. They are staffed by Dr. Michael Tjivikua, Director, Maurice Nkusi, Head of Instructional Technology, Jotam Muuondjo, Project Officer, and Jemima N. Hipondoka, Coordinator. Maurice Nkusi is the only CTL staff member working directly with the e-learning servers, and with a campus as large as the Polytechnic's, he is doing the job of twenty. In the process of carrying out this research, we spent time working on CTL projects that could benefit from our

available manpower. It was important to our project because it gave us a hands-on perspective of the work that is done at the CTL, and where improvements needed to be made. We were able to help with the overload of work facing Mr. Nkusi. While our presence at the CTL enabled the Centre to accomplish many tasks that could not previously fit into their work timeline, there are even more great ideas left as recommendations for future project teams.

4.5 General Attitudes Towards E-Learning

With a low percentage of courses using Chisimba, we found a lack of participation in the e-learning program among lecturers. We realized that until faculty showed more enthusiasm for the system, student usage would remain lower than desired. The relationship could be easily correlated; the more lecturers used the site, the more students would follow suit, initially because of course requirements, but eventually as a preference over solely lecture learning. Increasing faculty participation had thus proven to be another major focus of our project. In the PSP-3, it says that by 2013 "all programmes will be enhanced and supported by e-learning, with the goal to offer 40% of the courses on-line" (Polytechnic of Namibia, 2009). With the enthusiasm of the CTL, the help we provided, and the possibility of future projects within the CTL, this ambition is definitely possible.

4.6 Marketing and Branding

One of the most effective ways of increasing awareness of e-learning on campus is through marketing and branding of the e-learning site. In the following sections, we will outline the techniques we employed to market e-learning on campus.

4.6.1 Creating a New Skin

For e-learning to be adopted on campus, it has to have a brand. Looking 'good' has many facets. It has to look aesthetically pleasing, because aesthetics are the baseline for the impression of the entire system, and e-learning at the Polytechnic. It also has to feel smoothly integrated with the rest of the school's websites and learning materials or it will feel forced. After the first impressions imparted by its aesthetics, the design needs to be functional, meaning students and faculty must be able to easily and comfortably use the system. The old skin accomplished this usability, but did not have much focus on aesthetics. Our new skin started with this usability as a baseline, and built upon it to develop an attractive design to interface with the campus.

The skin that was in place before, called "Refractions," was one of five default skins, meaning it came preinstalled on Chisimba. Using a default template was necessary for the CTL because they were too understaffed to find time for creating a skin. There are major drawbacks to default skins, however. Everyone uses them because they're easy and free to install. Default skins are designed to suit any needs, and a broad spectrum of functional requirements, so they look very generic and have little defined identity associated with them; thus, it would be hard to build a brand around the old skin. Using a default skin has some advantages too. First, they require no additional work to install or create. They are already available when the system is installed, and for a quick deployment, work well. As a temporary solution, this was a big help to the CTL. Additionally, default skins are guaranteed to work well because they are designed by the developers of the system, and are tested to work with all the same functional requirements of the system as a whole. You can see the old, default skin in Figure 2, and the new, redesigned skin in Figure 3.

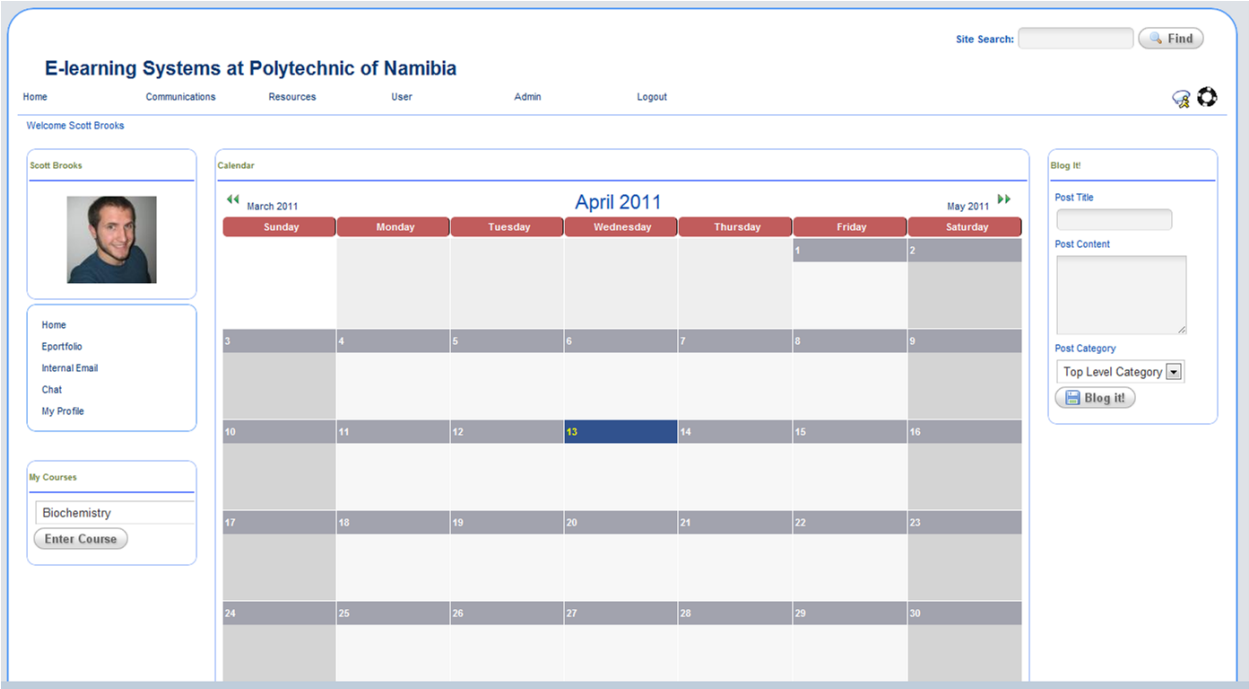


Figure 2: Before: Screenshot of the original Chisimba login page.

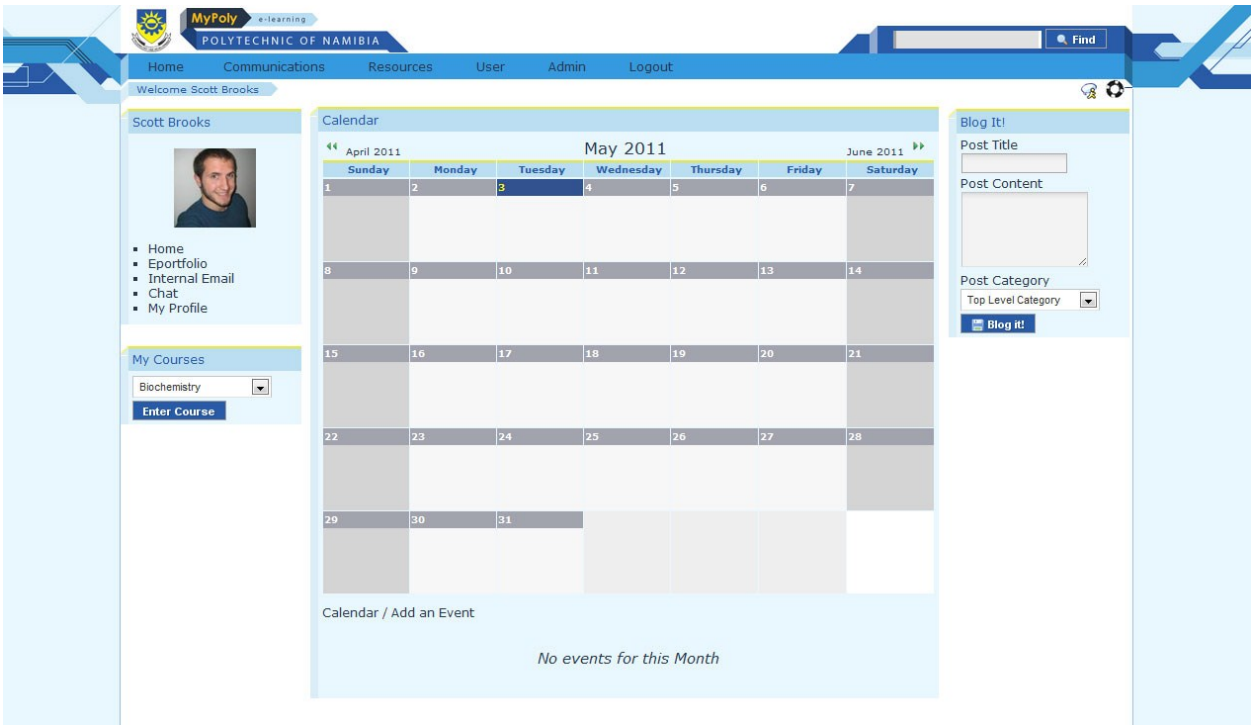


Figure 3: After: Screenshot of the new MyPoly login page with the skin we created.

In designing our skin, we wanted to maintain the same level of stability as one of the default options, but we needed it to also match the Polytechnic's brand, as well as have its own brand. In the Methodology section, we discussed the design requirements that constrained the look of the final skin, and the decisions we made to make an effective design within those practical limitations. Refer to Section 3.3 for a full synopsis of the design process. To achieve the desired aesthetics, we used an identical color pallet, similar font choices including Verdana and Century Gothic, and generally similar design cues to the Polytechnic's brand. Then, to distinguish the e-learning brand, we designed a new series of elements (shown in *Appendix C: Design Elements*) that looks mathematical, scientific, and technological, exactly like the Polytechnic's curriculum. Hence, the design meets functional requirements and usability requirements because it is clean and well formatted with consistent styles and intuitive navigation. Overall, the new skin will bring new popularity and excitement to e-learning.

4.6.2 Help Documentation

Mr. Nkusi also provided us with a long document of text tutorials and screenshots for an older version of Chisimba. We decided it would be very beneficial to the CTL and to faculty support

if we updated the document for the current version and separated the sections into chapters to post on the Chisimba homepage and on the Staff Intranet page. The original document was 82 pages long, so expecting lecturers to read it would be asking too much, especially with their already overburdened schedules. We also could then make it searchable, which would allow lecturers to more easily access help documents for difficult topics. A sample of one of the documents is provided below in Figure 4.

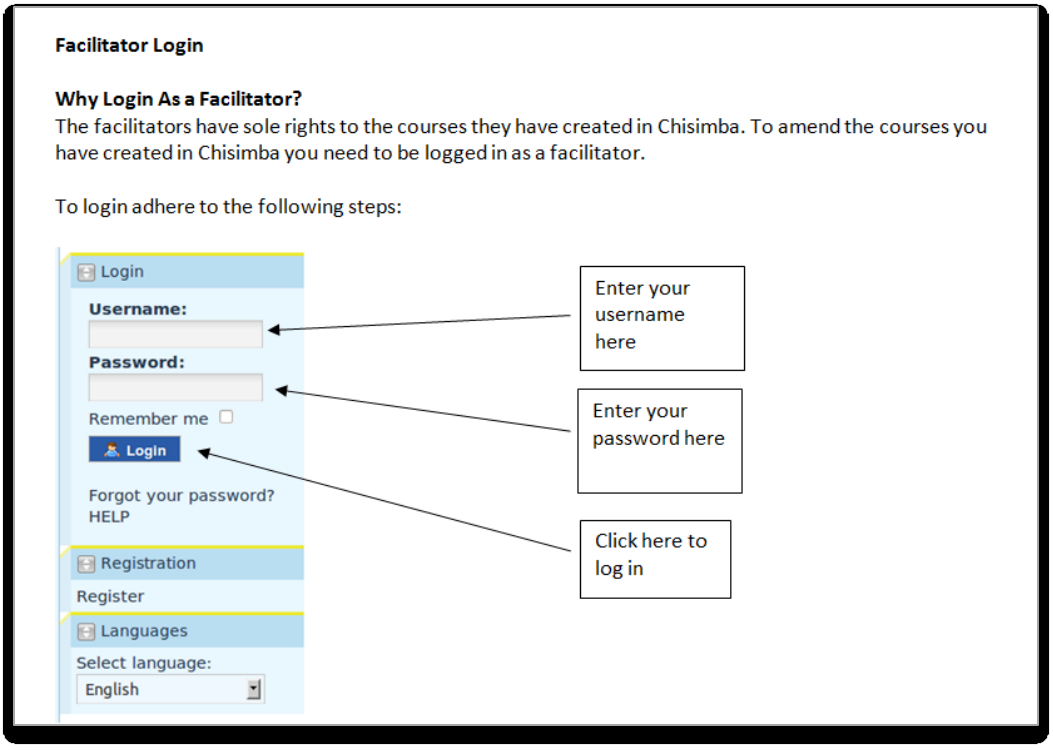


Figure 4: Example of a help document

4.6.2 Faculty and Student Pamphlets

To move closer to our goal, we first designed a pamphlet targeted towards lecturers that highlighted important features of Chisimba, accompanied by short descriptions, to spark interest in e-learning. These features included chat rooms, calendar, lecture notes, external links, wikis, discussion forums, assessments, and blogging tools. Each blurb contained two to three sentences, first describing the feature's capabilities, and then explaining its usefulness. The product was designed to ultimately lead readers to further help resources online, and to CTL workshops for beginner instruction. We designed the cover to be aesthetically pleasing to catch the reader's attention. It is boldly designed with the Polytechnic's general pallet of colors. On the inside, we

created a subtle background design, consistent with other Polytechnic marketing materials that made it visually appealing and effective at conveying information. See Figure 5 for the front, back, and inside flap of the faculty pamphlet and Figure 6 for the inside of the pamphlet.

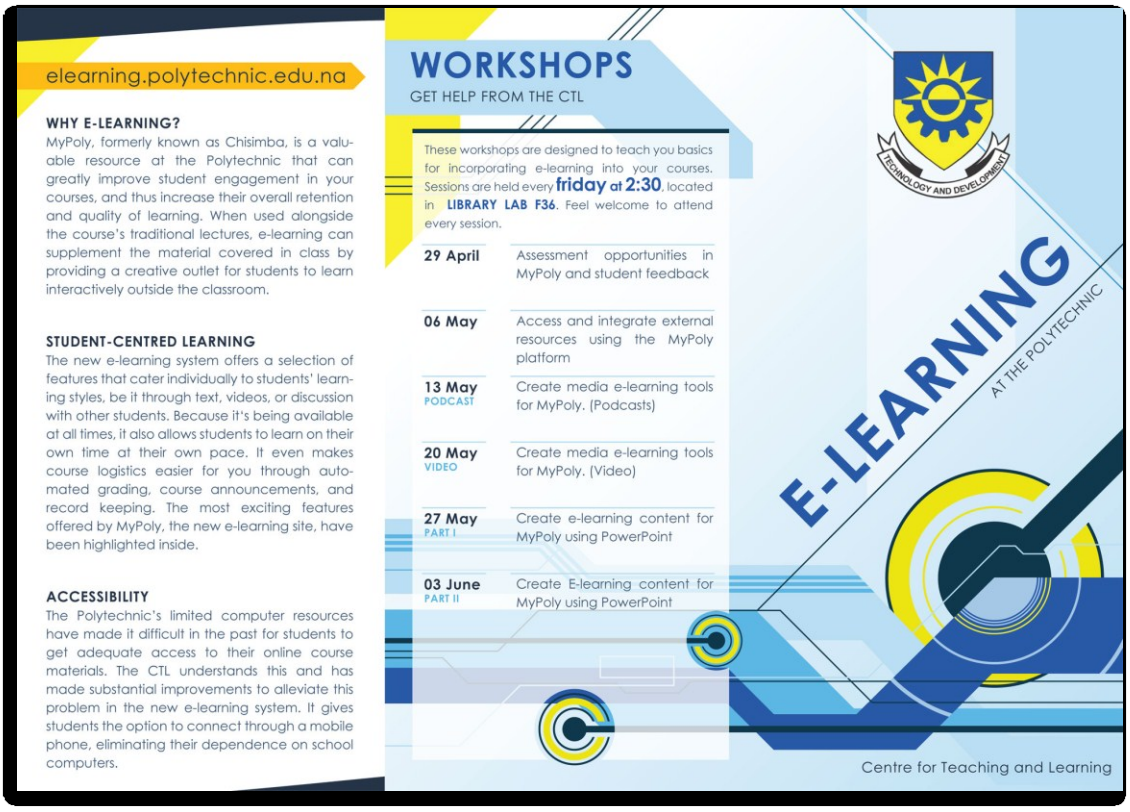


Figure 5: Outside of Faculty E-Learning Pamphlet

Figure 6: Inside of Faculty E-Learning Pamphlet

We made a special effort to distribute these pamphlets to lecturers, so they would take advantage of more features and explore the use of e-learning to enhance their courses. The pamphlet will be available to the rest of the campus in the IT offices and the Student Affairs building where many pamphlets are already distributed.

We created a similar pamphlet for students, with the goal of promoting the benefits of e-learning and MyPoly. The front and back of this pamphlet can be seen below in Figure 7 and Figure 8.

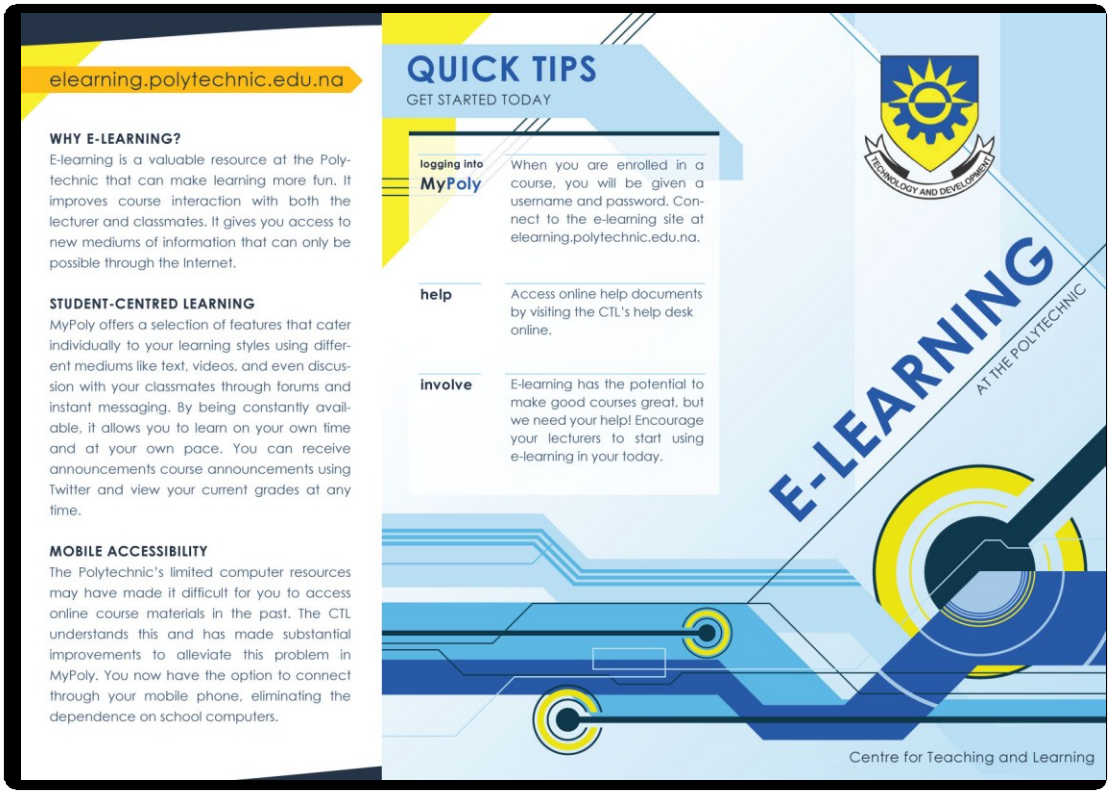


Figure 7: Outside of Student E-Learning Pamphlet

Figure 8: Inside of Student E-Learning Pamphlet

4.6.3 E-Learning Information Session

The SRC was very open to the idea of an E-Learning Information Session to the student body. They agreed to help us promote it, and suggested that we make advertising posters to promote the session around campus. With the passion of the CTL staff, and the willingness of the SRC, creating awareness of e-learning proved to be a feasible yet daunting goal. The final poster is shown in Figure 9 below.

Figure 9: E-Learning Information Session Poster

Because of a lack of communication between lecturers and their students, the session we conducted only assembled lecturers who were interested in learning more information on e-learning in the United States. Dr. Tjivikua introduced us to the audience and also the topic of the session. We then presented for thirty minutes. We covered many topics including where we are from, our experiences with MyWPI, and specific features of that particular system. We wanted to spark their interest in specific collaborative features that our professors commonly use—especially the ones we

found most beneficial, such as discussion boards and class capture. They had many question to follow our presentation, mostly regarding our reactions to the features. The lecturers that attended were very interested in our universities' high participation in e-learning, and we felt that the session was an overall success, even though we were not able to speak to any students.

4.6.4 Site Branding and Logo

As part of our campaign to spread awareness of Chisimba, we had to create a memorable image on campus. We branded Chisimba by creating a new name and an original logo. In collaboration with the CTL, we named the Polytechnic's version of Chisimba "MyPoly" to make the e-learning system more identifiable to the lecturers and students. We then created a recognizable logo shown in Figure 10 for use on the e-learning site and in all documents referring to MyPoly. The logo follows the Polytechnic's color pallet and the theme of the skin we created for the site.

Figure 10: MyPoly Logo

To create awareness of MyPoly, we created a banner to put in high traffic academic buildings and the student center. The banner is very simple with the main focus as the logo and without a lot of content to promote the site without overwhelming the viewer. If students were not necessarily aware of what e-learning was, the banner at least planted an idea in their minds and possibly prompted some curiosity about the concept. It also promotes the CTL and contains the URL for the e-learning site where they can login to MyPoly. The banner is displayed below in Figure 11.

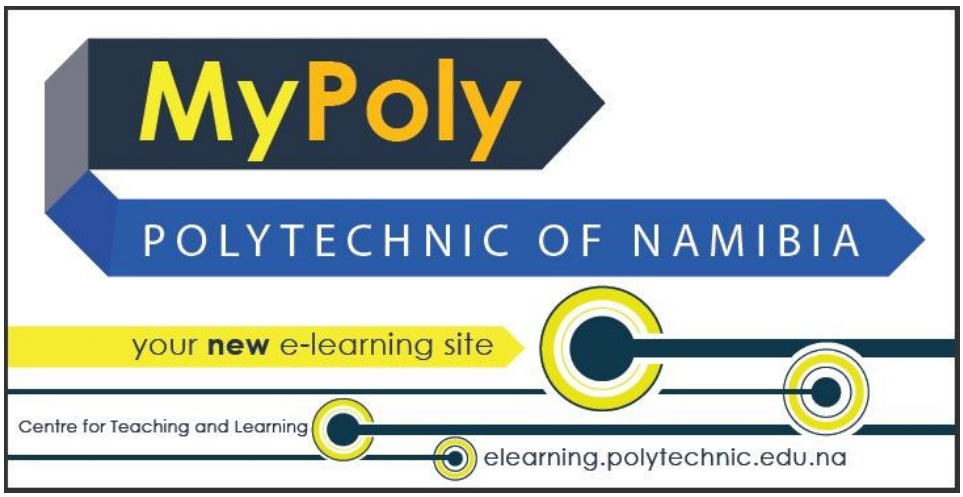


Figure 11: Marketing banner for MyPoly

4.7 Student and Faculty Surveys

One of the key objectives of our project was distributing surveys to students and faculty for the purpose of assessing the opinions of e-learning at the Polytechnic. We designed the survey and posted it online on the staff and student intranet page and in an e-mail to all lecturers, expecting to get responses and results immediately. Unfortunately, the response to the surveys fell far short of our original goals. We received six total student responses, and only eleven faculty responses. The main issue was that students and faculty were not using their limited Internet time to complete a survey that did not necessarily affect them. Also, many students were likely unaware that the survey even existed, because of the lack of Internet availability. We tried increasing its visibility by putting a link directly on the Chisimba homepage, but this did little to increase the response rate. The lackluster response rate prompted us to use alternate survey distribution methods—tangible paper surveys, to be specific. The decision to pursue paper surveys for students greatly increased the response rate, and allowed us to analyze a much larger amount of data for relevant results.

4.7.1 Student Survey

We successfully received 260 student responses by distributing the paper survey to thirteen classes in the Communications department, and from some online surveys. Through the results, we gained significant insight regarding the scope of e-learning use at the Polytechnic and ways to improve it. We covered three major topics in the student survey: the students' access to computers and Internet, primary forms of communication, and overall opinions of e-learning.

The results reflecting the availability of technology to the students were expected, but very eye-opening to Mr. Nkusi and Dr. Tjivikua. The results from this important topic are displayed in graphs below.

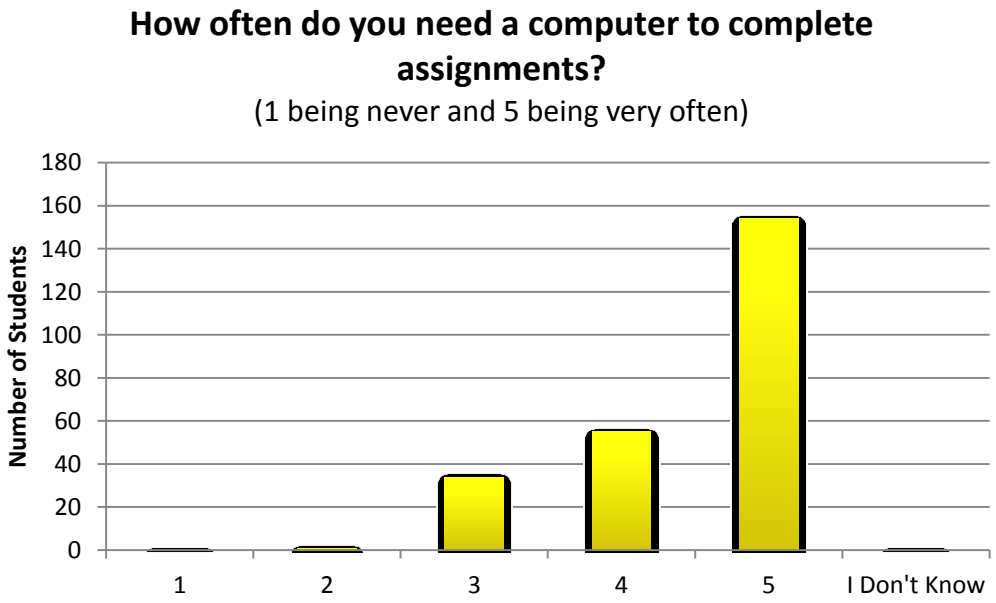


Figure 12: Computer use needed for assignments

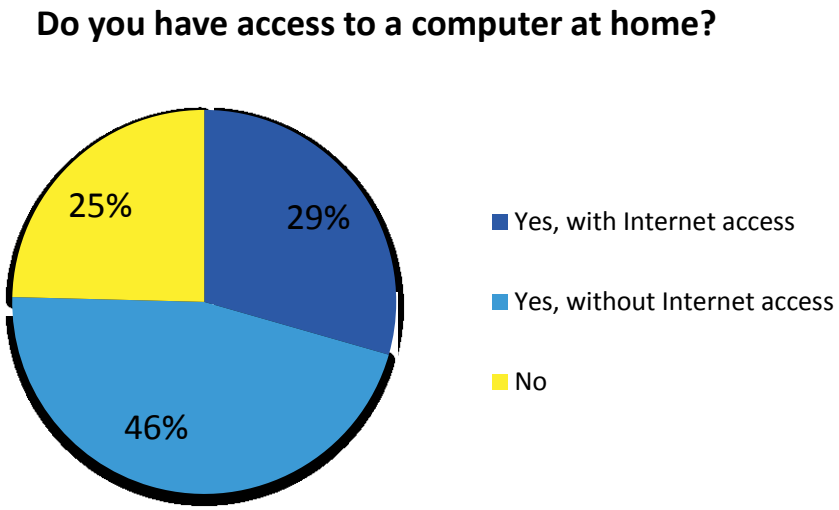


Figure 13: Students' access to computers at home

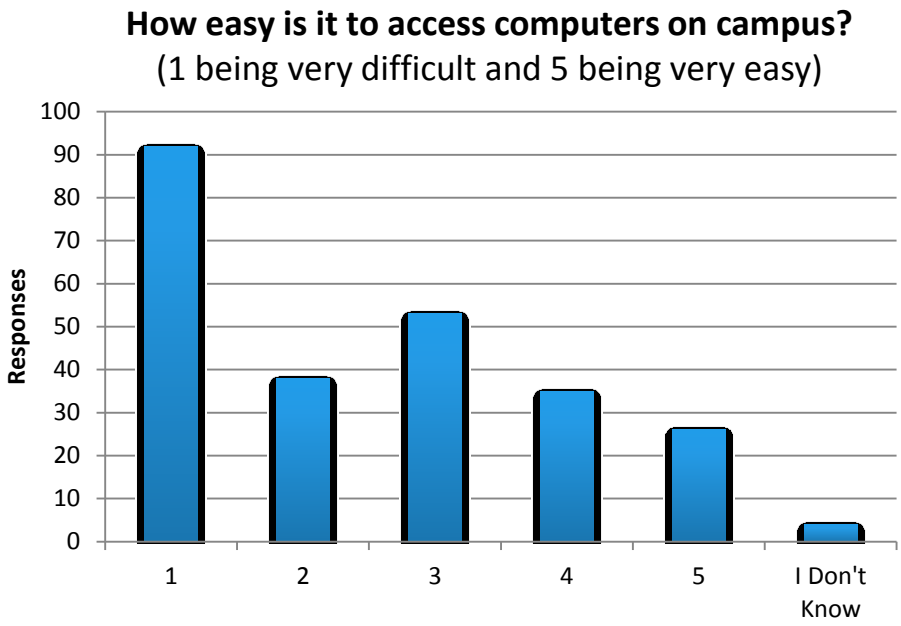


Figure 14: Ease of access to computers on campus

From Figure 12 it is very evident that students need computers to complete their class assignments. One-hundred and fifty-four students, or 63 % of the responses, expressed that they very often need a computer to complete assignments. As shown in Figure 13 and Figure 14, it is often difficult to access computers at all, so completing assignments could often be a difficult task. Although 75 % of students have access to a computer at home, 71% of all students do not have access to Internet at their homes at all. This will greatly affect the number of students that utilize the e-learning site outside of school. Figure 14 shows that even for the 71% that do not have access to Internet at home, it is also very difficult for a majority of the students to gain access to the Internet Cafes that are available on campus. Overall, 130 students thought finding computers on campus was difficult, and only 61 students thought it was easy. We expected this graph to be skewed towards the difficult side due to the 5-to-1 student to computer ratio, but the survey results confirmed our expectations. The graphs above show that access to computers and Internet is one of the biggest roadblocks in e-learning adoption.

Understanding the primary means of communication used by students was an important aspect to consider while increasing e-learning adoption. In this topic, our main goal through the survey was to find more available and convenient means for communicating to the students. We

thought mobile or social network integrations could tie in adequately with e-learning. The following graphs aided our views on the students' most popular means of communication.

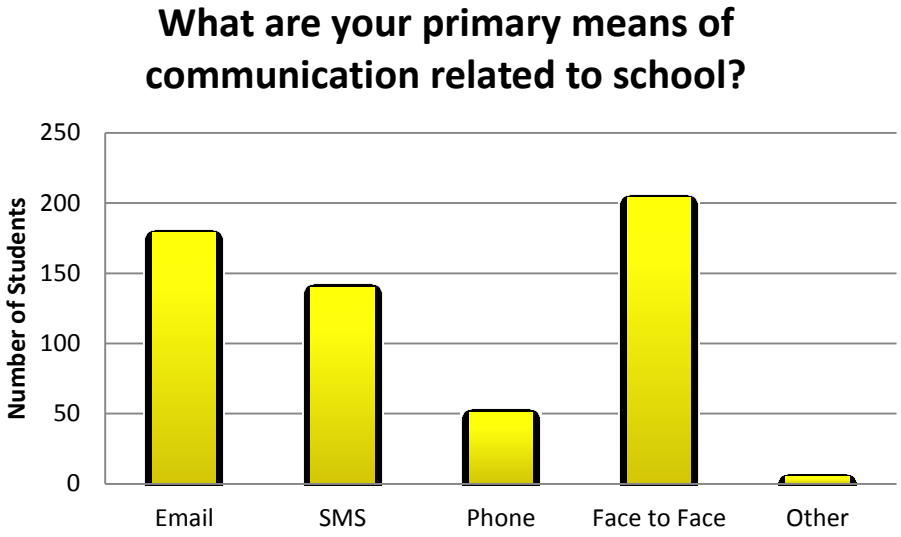


Figure 15: Students' primary means of school-related communication

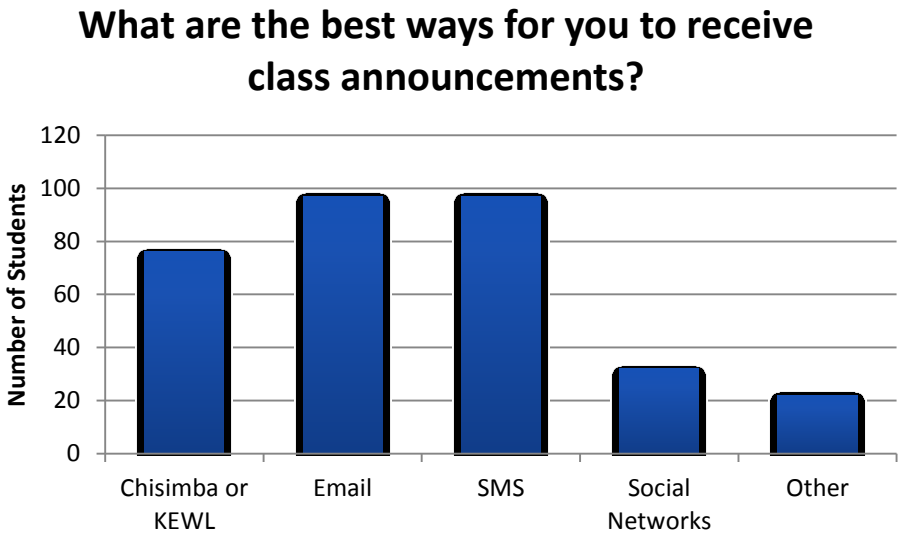


Figure 16: Student preferences for class announcements

As you can see from Figure 15, students mostly used face-to-face communication related to school work—with SMS and e-mail not far behind. Since a good majority of the communication is done through e-mail, we knew that switching the communication path to the e-learning system was also within reach. Figure 16 also supports this idea. Although e-mail and SMS were the favorites for

receiving class announcements, e-learning sites were close behind. Knowing these statistics, we wanted to increase accessibility of the e-learning site by providing other ways to stay connected through mobile technology. The following graphs represent the data collected related to mobile phones and SMS technology.

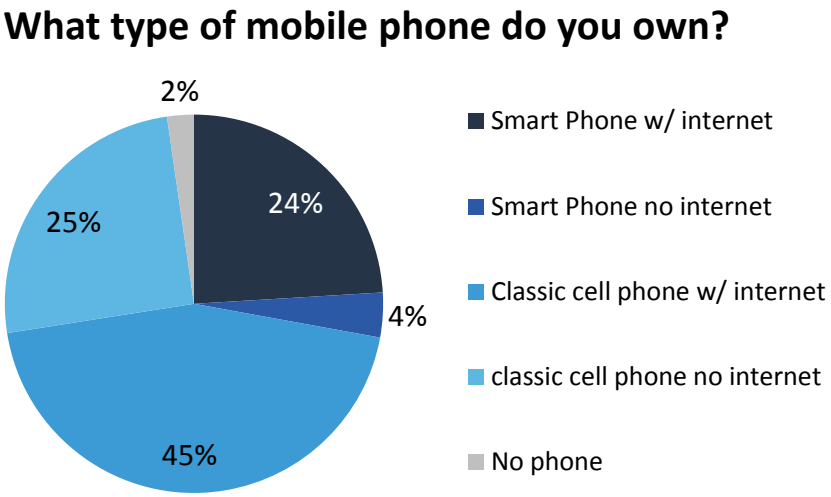


Figure 17: Student mobile phone ownership

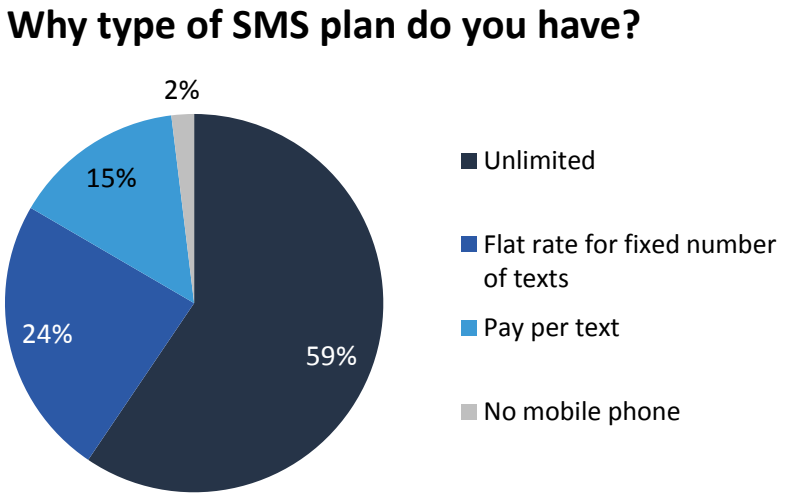


Figure 18: Student SMS plans

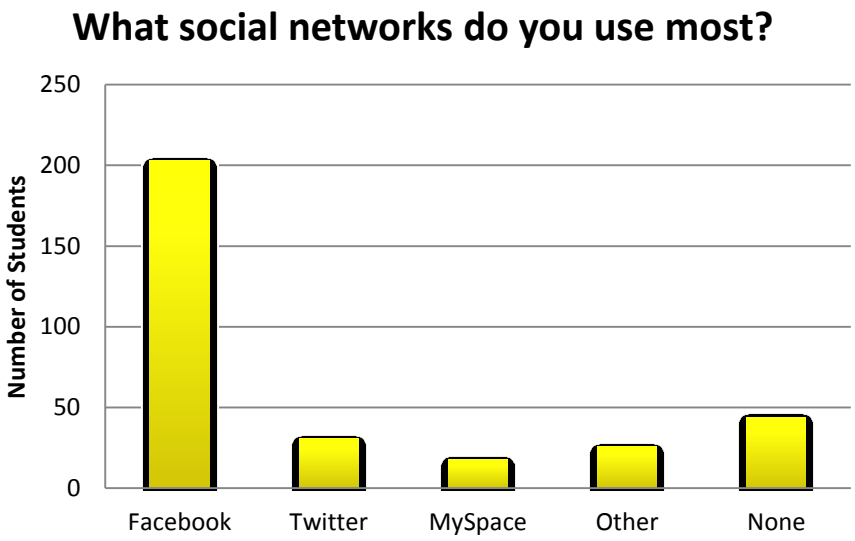


Figure 19: Most popular social networks among students

Based on the results of the surveys, we determined that SMS and social networks are widely used by most students on campus. Utilizing these services for e-learning access would be an effective way to provide class announcements. Figure 17 shows the types of mobile phones that students own. One of the most important observations is that many have access to Internet on their cell phones—an impressive 69%. This means that many students can access the e-learning site without a computer, which is important. SMS notifications are another important way to integrate mobile phones into the learning management system. With 83% of students on a texting plan (59% with unlimited texting), SMS notifications would be an effective means of alerting students using MyPoly. We also looked at which social networks are most popular and would be most appropriate to utilize for e-learning purposes. Figure 19 shows that Facebook is the most popular social network, and could be a useful tool for integrating e-learning into the lives of students. From Figures 17 through 19, it is evident that SMS and social network integration could be very effective in increasing the use and accessibility of e-learning on campus.

The third topic we addressed in our survey was the overall opinions on e-learning. We asked one question comparing the two e-learning sites and one asking if e-learning negatively or positively influences their courses. The results are shown below in Figure 20 and Figure 21.

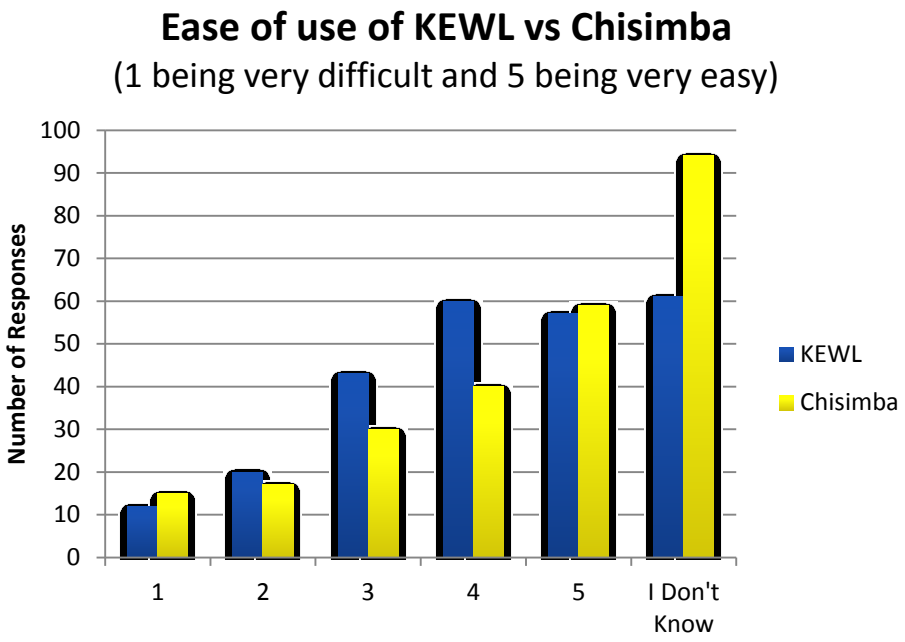


Figure 20: Ease of use for KEWL versus Chisimba

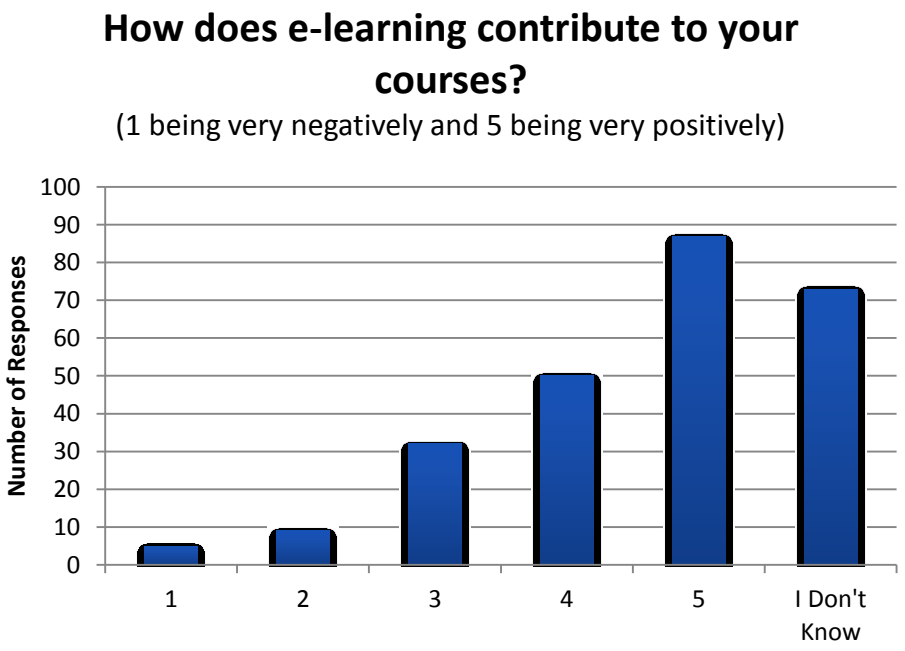


Figure 21: Effect of e-learning on a course

We determined that the most pressing issue from Figure 18 is the fact that the highest number of responses were in the "I don't know" category. This has proved to be the biggest problem with e-learning adoption. Disregarding the "I don't know" responses, both graphs are left

skewed—a great sign that those who have used the e-learning sites think they are easy to use. Similar results were obtained from Figure 19. With 29% of the responses in the "I don't know" column, a lack of e-learning awareness is evident. However, ignoring the "I don't know" column again, 75% of the students believed Chisimba positively contributed (response 4 or 5) to their course with only 8% believing a negative contribution (response 1 or 2). With these graphs a confidence is displayed that by decreasing the "I don't know" responses, the e-learning sites would prove to be a valuable educational tool in the eyes of the students.

4.7.2 Faculty Interviews and Surveys

During the interview and survey process, we received opinions from 15 different lecturers. For those lecturers who did not have time to participate in an interview, we directed them towards our online survey, which included the same questions as the interview. In total, we conducted four interviews, and received eleven online surveys from lecturers. We had a varied sample population, with professors who had been teaching for anywhere from less than five years to over twenty years. They had also been working at the Polytechnic for anywhere from 8 months to the entire length of time it has been an institution (16 years). The lecturers we interviewed worked in varied departments as well. We asked them questions regarding their use of e-learning and which features they use the most. We also asked how they communicate with their class, since that would help us with our recommendations.

The majority of lecturers did not use Chisimba, while slightly more than half used KEWL. This was not surprising, see as KEWL is still being phased out and Chisimba has only just been introduced. Considering this information, it was also not surprising that more people used features of KEWL than Chisimba. However, despite more lecturers using KEWL, every feature of Chisimba we asked about was used by at least one of the lecturers, whereas nobody had used the Assessments feature in KEWL. It was also not surprising that more lecturers found KEWL easier to use than Chisimba because they have more experience with KEWL than with Chisimba. For the same reason, they were more satisfied overall with KEWL. The lecturers were for the most part in favor of our ideas for Chisimba help resources, which will hopefully make it easier to use in the future.

Based on the information we received, once lecturers are more informed on the use of MyPoly/Chisimba, they will be more likely to use it. From some of the comments we received, they will also be more likely to use it once the Polytechnic and Windhoek in general have faster Internet speeds. Several lecturers mentioned accessibility issues, so if more students own laptops and the

Internet speeds improve, those lecturers will hopefully be more in favor of using MyPoly/Chisimba. Some lecturers will still be unlikely to use it unless they see more benefits, such as one lecturer who said he has too many students to devote time to using e-learning. If he realizes how easy it is, perhaps he will be more likely to use it.

4.8 Results Summary

Once we discovered the significant lack of awareness of Chisimba on campus, we went through several different strategies to make the e-learning system more visible and more recognizable. By branding the site, we created a sense of ownership for the Polytechnic community. By marketing the site, we made them more aware of it and its features, which encouraged them to use it more frequently. Our e-learning sessions and pamphlets taught them about the lesser-used parts of the sites, including collaborative features. As a result of these strategies, we expected to see an increase the usage of e-learning overall, as well as the use of its interactive features, improving the out-of-classroom learning experience.

CHAPTER 5: RECOMMENDATIONS AND CONCLUSIONS

After accomplishing our project goals and analyzing the results of our observations, surveys, and interviews, we were still left with recommendations for the CTL and the Polytechnic that did not fit into the scope of the project. In this section, we discuss our recommendations for the future development of e-learning at the Polytechnic, as well as our overall conclusions on this project and its impacts.

5.1 Recommendations

Throughout our time at the Centre for Teaching and Learning at the Polytechnic of Namibia, we developed a greater understanding of the e-learning culture. In our eight weeks at the Polytechnic, we accomplished many tasks that laid the groundwork for future projects that we did not have the time or resources to accomplish. We expect that the CTL will continue to increase awareness of MyPoly through using the marketing package we left them with and the advertising campaign we started. We have also formalized a series of recommendations that address MyPoly's accessibility and usability issues. Accessibility recommendations include SMS integration, specifically for notifications, as well as Facebook integration, as a response to both survey results and popular demand. Additionally, negotiating a 3G educational discount offered by local mobile carriers would allow a larger portion of students to access e-learning through 3G-capable phones, computers, and residential networks. To address usability, we leave recommendations for further staff support offered by the CTL, which specifically includes making additions to our online help desk and establishing a physical help desk. It is the intent of these recommendations to cover a broad variety of the problems we found that hindered e-learning adoption. If addressed seriously, we anticipate that full student and faculty participation will be achieved in a matter or years, even surpassing expectations of the Polytechnic Strategic Plan (PSP-3).

5.1.1 Prerequisites for Effective E-Learning

As discussed in the results and analysis section, many of the issues that are inhibiting e-learning are due to poor Internet accessibility and network infrastructure. Before we discuss recommendations, it is important to mention the expected improvements to the Internet in the next two years. In 2012, Namibia will receive an undersea cable connection at Walvis Bay via Portugal

that will connect to Windhoek. Unlike the limited connection that Namibia currently receives through South Africa, the undersea cable is capable of handling Namibia's expanding Internet demand for many years. Once it arrives, the price of Internet should decrease, and a majority of the Polytechnic students (and Windhoek residents) will be able to purchase Internet, meaning that e-learning will be much more accessible than it was at the time of this project. The impact from the undersea cable has the capacity to skyrocket e-learning usage and have an overall positive impact on Namibia's educational infrastructure and economy.

5.1.2 Improving Performance of E-Learning Site

One of the observations we made while using the student network at the Polytechnic was that the e-learning site often loaded very slowly. While not surprising, it did seem strange that load times would be this long to access a server located at most a quarter mile from our office. Upon further investigation, we isolated the problem and discovered that the website was accessing files from an external server, and the slow speed of the Internet was causing the whole site to slow down. As a result, we made a recommendation to host the file locally on the server, rather than going out to the Internet every time it needed to load. This would significantly decrease load times and increase site speed of the e-learning site, because all aspects of the site would be hosted locally on the Polytechnic's network. After some research, we found that the Chisimba development community was aware of the issue, and that it was being fixed in the next version. However, the next version's release date is still unknown, so we decided it would be beneficial to fix the problem in the meantime. We wrote up a series of instructions to mitigate the issue and passed them off to Mr. Nkusi. In a routine visit to the Bureau of Computer Science, who maintains the e-learning servers, Mr. Nkusi made the modifications, and the pages showed significant speed improvements.

5.1.3 SMS Integration

From our findings, it is evident that integrating SMS notifications into part of the students' e-learning experience will prove to be very beneficial. Through testing we also found that this was a feasible aspect to add to the MyPoly experience. Students are sure to be more connected to e-learning if they have notifications sent to their mobile phones. We suggested that the CTL convey this option to the lecturers to use for their courses. The CTL could suggest the use of the Twitter

module in MyPoly, and train lecturers on how to set up a Twitter account, how to send out "tweets" using Twitter, and how to encourage students to participate in the service.

As another option for SMS integration within the MyPoly system we recommend to incorporate the system already in use at the Polytechnic for promoting campus activities. With permission, this system can be used to distribute SMS messages to all students who have signed up for the service. The existing system could be adapted for use in individual classes as a notification system. This system would benefit the impact that e-learning has on any particular course; with almost instant notification, students could be connected to their coursework throughout the day.

5.1.4 Social Network Integration

One of the questions on our survey asked which social networks Polytechnic students use most. We found that Facebook is the most popular social network, while 13% of students do not use a social network at all. Below in Figure 22 is a chart indicating social network usage on campus.

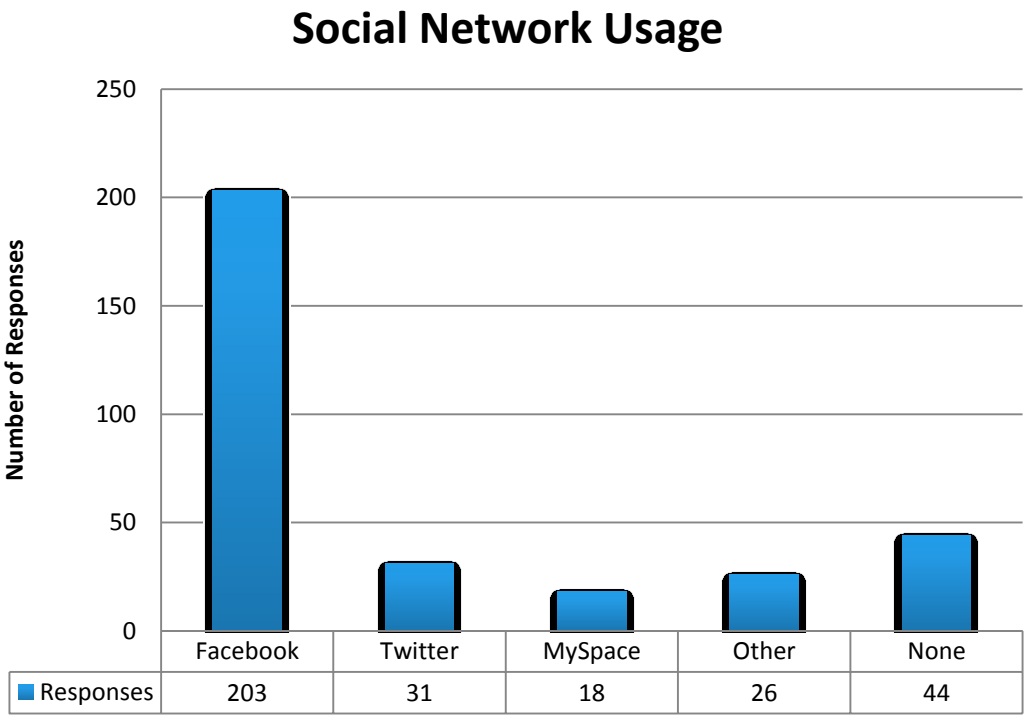


Figure 22: Social network survey responses

The most important conclusion from this data is that Facebook and Twitter are the most popular social networks among Polytechnic students. As a result, we recommend that it would be beneficial to explore the integration of these two systems as a supplement to the e-learning platform. By integrating Facebook and Twitter, students will have further access to the e-learning site, and the resources available. Twitter, especially, would be very useful to use for notifications and announcements to students.

The main issue with Twitter and Facebook integration is the fact that these two services are blocked on campus during most hours of the day. Currently, this is controlled for reasons of bandwidth. So many students use Twitter and Facebook that it would slow the network substantially. Once the fiber optic cable comes to Windhoek in 2012, these restrictions could likely be lifted.

If restrictions on these two social networks are lifted, it would be worthwhile to explore the possibility of creating a Facebook application that is connected to the MyPoly website. It could have the capability of displaying course updates and announcements, as well as any other pertinent course information. Students are often on Facebook, and it would very likely be a good way to give them information without them having to visit the e-learning website. For this reason, Facebook integration would be a great way to raise awareness and increase participation in e-learning on campus. Basic explanations of Facebook should be provided to faculty who are not familiar with the site.

5.1.5 3G Educational Discounts

Based on all the information we gathered about computer accessibility on campus through our survey and general observations, lack of computer and Internet accessibility are the main factors inhibiting e-learning from widespread use. To briefly revisit related results of the survey, only about 75% have frequent access to computers, and only 39% of those computers are connected to the Internet. However, among those students who don't have access to a computer at home, nearly all students have mobile phones, and 70% of those mobile phones are capable of accessing the Internet. This number is disappointing, but understandable, because both computers and Internet are very expensive. In Namibia, it is uncommon to have unlimited Internet at a fixed price per month. Instead, users are charged by the amount of data, usually measured in megabytes, that their Internet devices consume, rather than by the number of minutes they are online. Consequently, although most students can access the Internet through their mobile devices, they do so with

hesitation because they are charged for every action they take online, every bit of information they download, and every time they access the e-learning site from an off-campus network.

Our proposed solution to this problem is to negotiate an educational discount with local Internet service providers (ISPs). An educational discount on Internet can be interpreted in two ways: 1) overall discount on Internet bandwidth to students; 2) discount on bandwidth to e-learning sites only. The quicker, easier option for ISPs would be to offer students an overall discount on Internet bandwidth. This is simple to implement because it only requires a special pricing plan, offering the discount when a student ID is presented at the register. As there are no options on campus currently, computers could be sold by a store on campus operated by the Polytechnic, or by the Polytechnic's BCS (Bureau of Computer Services). However, this is not truly an educational discount because students can use their discounted bandwidth for any Internet service, meaning their education usage of the discount will probably only make up a small percentage of the actual usage. This is a problem because it forces the service provider to offer a far smaller discount as a result of the large amount of unnecessary traffic that will be included in the discounted price.

A more focused solution would involve negotiating an educational discount for only the Internet traffic to MyPoly, but not other websites and services. To do this, the service provider would need special modifications to their network to identify e-learning traffic, and discount accordingly. We do not have the information to determine whether this would be feasible for any specific ISP, but it is technically feasible with the right system in place. We recommend that a representative from the CTL meet with popular local service providers like MTC and Leo to learn these details and to begin negotiations to initiate this discount program.

5.1.6 Improving Support through the CTL

Since understaffing is one of the major issues at the CTL, we recommend that the CTL and the Polytechnic create a student helpdesk staffed by IT students. The IT students would be knowledgeable about Chisimba and could already have a good understanding of software systems in general, due to their background in information technology. Since they are students, they could work at a lower cost to the CTL than adults with degrees. We originally wanted to create a helpdesk for students and faculty, staffed entirely by IT students, but after speaking with current CTL staff, we determined that faculty members would be hesitant to ask for help from students. However, Mr. Nkusi informed us that he receives more phone calls from students than from lecturers asking for help, so it will be useful to have a helpdesk for students.

Another recommendation we made to improve CTL support was for them to create a helpdesk for faculty, staffed by CTL members since lecturers would feel more comfortable asking them for help. Since the CTL currently has few staff members, it would be difficult for some to devote time to staffing a helpdesk, but even if they could have one member staff it for an hour each day, that would be a good start. The CTL was planning to hire one additional staff member to lower the workload of the other staff. Hiring any additional staff would certainly be helpful, but would largely rely on their budget and hiring resources.

5.2 Summary Conclusions

The goal of our project was to increase the use and awareness of e-learning at the Polytechnic of Namibia, as well as to look into ways to implement mobile technology. We managed to accomplish these through various strategies in our time at the Polytechnic.

When we arrived at the Polytechnic of Namibia, we planned to increase the usage of e-learning and evaluate mobile technology implementation. We did not expect, however, to go to our first meeting with students and learn that few of them even knew about Chisimba or even e-learning at all, and that those who did thought it was only for English courses. At that point, the goals of our project shifted to a focus on developing awareness.

With increasing awareness in mind, we designed many different marketing strategies. We branded the site and gave it a new name and skin, so that the Polytechnic community would feel a sense of ownership. We also created pamphlets explaining the site's features so that students and faculty members would be more informed about them and therefore use them more. We also created posters to increase awareness, and we held information sessions so that students and lecturers would be more informed about e-learning in general.

We surveyed students to determine which would be the most important aspects of our project to pursue. Based on our results and talking to the students, we realized that implementing SMS would be an important step in increasing the use of Chisimba. We have made several recommendations in order to facilitate this process, and we have also explored ways to make the Internet more accessible to students.

We have accomplished a great deal towards increasing the usage and awareness of e-learning at the Polytechnic, and once Namibia is connected to faster Internet over the next several years, the access and usage of e-learning will continue to increase. The use and awareness of MyPoly and the impact of e-learning on the educational environment at the Polytechnic of Namibia will increase

dramatically over the next couple of years as a result of our work at the Polytechnic, our recommendations for the future, and the work of future IQPs at the CTL. This will allow the Polytechnic to continue evolving with cutting-edge technology and use the latest educational strategies to maintain their status a prestigious, modern university. Our many accomplishments in promoting e-learning at the Polytechnic of Namibia can contribute new ideas to the Chisimba open-source project and positively influence e-learning adoption at developing universities and learning institutions around the world.

REFERENCES

Benbunan-Fich, R., & Hiltz, S. R. (2003). Mediators of the Effectiveness of Online Courses. *Professional Communication, IEEE Transactions on, 46*(4), 298-312. Retrieved from http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1255527

Elwell, C. (February 10, 2011). Clark University. *Meeting With Project Team.*

Franceschi, K., Lee, R. M., & Hinds, D. (2008). Engaging E-Learning in Virtual Worlds: Supporting Group Collaboration. *Hawaii International Conference on System Sciences,* 7.

FrontlineSMS. (2011). *About the Software: FrontlineSMS.* Retrieved February 8, 2011, from http://www.frontlinesms.com/aboutthesoftware/about-the-software/

Gehringer, E. (2010). *Online vs. on-paper exams.* 818 N Street, N.W., Washington D.C, 20036-2479, United States: American Society for Engineering Education.

Green, K. C. (2010). IT Budget Cuts are Down, LMS Strategies are in Transition. *The Campus Computing Project,* (October), 1.

Gunderson, D. E., & Moore, J. D. (2008). Group Learning Pedagogy and Group Selection. *International Journal of Construction Education and Research, 4*(1), February 10, 2011, 34-45.

Hegarty, B., & Penman, M. (2005). Approaches and Implications of E-Learning Adoption in Relation to Academic Staff Efficacy and Working Practice.

Kangandji, L. (2008). Determining how the faculty at the Polytechnic of Namibia are responding to the introduction of e-learning in the form of blended learning. *Nawa Journal of Language and Communication, 2*(2), 179-198.

McDonald, D. S. The Twitter Generation Encounters the Classroom. *Adopting the 2009 Model Curriculum: A Panel Session to Address the Challenges for Program Implementation,* 45.

Mohd, Nor N., Razak, N. A., & Aziz, A. (2010). E-learning: Analysis of online discussion forums in promoting knowledge construction through collaborative learning. *WSEAS Transactions on Communications, 9*(1), 53-62.

Morgan, G., & Educause Center for Applied Research. (2003). *Faculty use of course management systems* ECAR, Educause Center for Applied Research.

MyWPI Staff Jessica Caron and Thomas Collins (February 3, 2011). *Meeting with Project Team.*

Polytechnic of Namibia Five Year Students Statistical Report 2006-2010 (2010). Polytechnic of Namibia, Windhoek, Namibia.

Polytechnic of Namibia Strategic Plan-3 (2009). Polytechnic of Namibia, Windhoek, Namibia.

Smart, K. A., & Meyer, K. A. (2005). Changing Course Management Systems: Lessons Learned. *Educause Quarterly, 28*(2), 68–70.

Tjivikua, Dr. Tjama. *On the Occasion of the Launch of the Polytechnics's Student Laptop Initiative.* Polytechnic of Namibia. 3 March 2011. Speech.

Trifonova, A. (2003). Mobile Learning: Review of the Literature. *Technology Report no.DIT-03-009.University of Trento, Department of Information and Communication Technology.*

Valdes, R. (2010). *Text Question?* Retrieved February 10, 2011, from http://www.gsu.edu/41416.html

Wambui, L., & Black, E. (2009). Factors that impede adoption of e-learning in developing countries: Advice for moving beyond challenges with integrating e-learning platforms at Polytechnic of Namibia.

GLOSSARY

Design Elements - overall visual cues including shapes, symbols, colors, and fonts, and effects that are repeated regularly, and often subtly, through a graphical design that identify a specific theme or brand.

Discussion Forum – a widely used Internet collaboration format where users post short to medium sized comments called *posts* pertaining to a common topic. Posts are recorded chronologically and can be viewed at any time.

GSM - a cell phone radio that allows a computer to connect with cell towers, giving it the ability to connect to the Internet and send text messages.

Learning Management System - an online collaborative framework that allows students and educators to organize classwork, complete assignments, and open discussions pertaining to course materials.

Modem - an electronic networking device that connects a computer (or local network) to the Internet.

Open Source - a descriptor for software whose source code is open for public viewing. It is maintained by a group of contributors or by a corporation, and either way, is available under a free license and can be modified by users to customize the functionality of the program.

Short Messaging System (SMS) - A standardized protocol that allows instant messaging between mobile phones in 160 characters or less.

Text Messaging - (See short messaging system)

APPENDICES

Appendix A: Student Survey

1. What do you study at the Polytechnic?_____

2. What is your expected year of graduation? _____

3. What are your primary means of communication related to school? (You may choose more than one.)

- Email
- SMS (text messaging)
- Phone conversations
- Face to face communication
- Other (please specify) _____

4. What are your primary means of communication related to friends and family? (You may choose more than one.)

- Email
- SMS (text messaging)
- Phone conversations
- Face to face communication
- Other (please specify) _____

5. Do you have access to a computer at your residence?

- Yes, with Internet access.
- Yes, without Internet access.
- No.

6. On a scale from 1 to 5, how often do you need a computer to complete school assignments? (1 being never and 5 being very often)

1 2 3 4 5

7. On a scale of 1 to 5 how easy is it to gain access to computers on campus? (1 being very difficult and 5 being very easy)

1 2 3 4 5

8. On a scale of 1 to 5 how easy is KEWL to use? (1 being very difficult and 5 being very easy)

1 2 3 4 5 Do not know

9. On a scale of 1 to 5 how easy is Chisimba to use? (1 being very difficult and 5 being very easy)

1 2 3 4 5 Do not know

10. On a scale of 1 to 5 how do feel that a system like Chisimba or KEWL contributes to your experience in a course? (1 being very negatively and 5 being very positively)

1 2 3 4 5 Do not know

11. What is the best way for you to receive class announcements and notifications?

- Chisimba or KEWL
- Email
- SMS
- Social Networks
- Other (please specify):_____

12. What type of cell phone do you own?

- Smart phone with Internet access
- Smart phone with no Internet access
- Non-smart phone
- I do not own a cell phone.

13. Does your cell phone plan include text/SMS messaging?

- Yes, with unlimited messages.
- Yes, I pay a flat rate for a fixed number of messages per month.
- No, I pay per text message.
- I don't have a cell phone.

14. What social networks do you use most? (You may choose more than one)

- Facebook
- Twitter
- MySpace
- Hi5
- I do not use a social network
- Other (please specify): _____

Appendix B: Faculty Interview and Survey Format

1. How long have you worked as a teacher or professor? (round to the nearest year)

a. 0-5 years

b. 6-10 years

c. 11-15 years

d. 16-20 years

e. More than 20 years

2. How many years have you worked at the Polytechnic of Namibia?

3. What department do you work in at the Polytechnic?

4. On average, how frequently do/did you use KEWL each semester?

a. For all of my courses

b. For some of my courses

c. For none of my courses

5. This semester, for how many courses are you using Chisimba?

a. For all of my courses

b. For some of my courses

c. For none of my courses

6. Which features of KEWL did/do you use in your courses?(Check all that apply)

- Posting Syllabus
- Distribution of lecture notes
- Posting Assignments & Assignment Submission
- Assessments
- Discussion Board
- None
- Other (Please Specify)

7. Which new features of Chisimba do you use? (Check all that apply)

- Posting Syllabus
- Distribution of lecture notes
- Posting Assignments & Assignment Submission
- Assessments
- Discussion Board
- None
- Other (Please Specify)

8. On a scale of 1 to 5 how easy is KEWL to use? (1 being very difficult and 5 being very easy)

1 2 3 4 5 Do not know

9. On a scale of 1 to 5 how easy is Chisimba to use? (1 being very difficult and 5 being very easy)

1 2 3 4 5 Do not know

10. On a scale of 1 to 5 how satisfied are you with KEWL as a tool for your classes? (1 being very unsatisfied and 5 being very satisfied)

1 2 3 4 5 Not Applicable

11. On a scale of 1 to 5 how satisfied are you with Chisimba as a tool for your classes? (1 being very unsatisfied and 5 being very satisfied)

1 2 3 4 5 Not Applicable

12. On a scale from 1 to 5, how often do you give assignments that require the use of a computer? (1 being never and 5 being all the time)

1 2 3 4 5

13. Which of the following Chisimba support methods would you use if they were available? (You may choose more than one.)

- Help desk — Visit the help desk any time during school hours to get questions answered directly by CTL staff.
- Training workshops — Scheduled sessions covering a variety of topics
- Online help documents — A library of helpful documentation on common problems.
- Office hours at the CTL — Scheduled times where CTL staff hold open office hours for lecturers to address questions.
- Online training videos
- All of the above
- None of the above

14. What are your primary means of communication within the Polytechnic? (You may choose more than one.)

- Email
- Phone conversations
- Face-to-face communication
- SMS (text messaging)
- Other (please specify) _____

Appendix C: Design Elements

Color Pallet

#263448 #2C59A6 #3C9AD5 #5EB6E2 #B9DDEF

#FEBD11 #FCEE2D

Print fonts

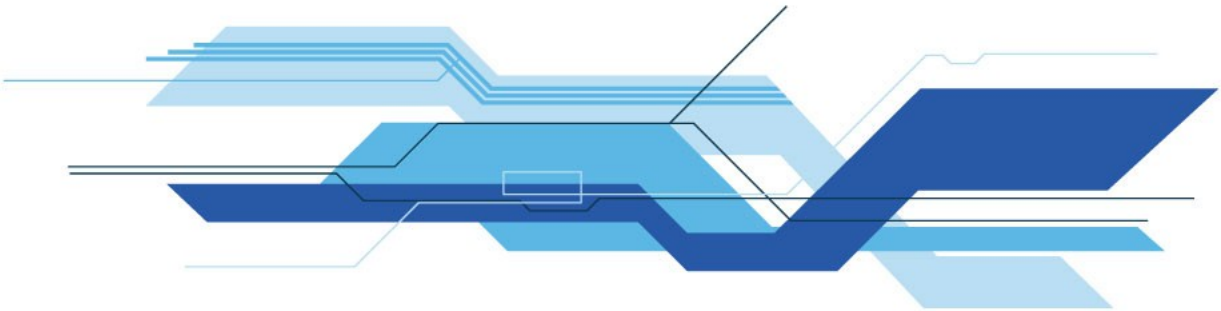
TITLE

SUBTITLE - CENTURY GOTHIC #263448 11PT

HEADER - CENTURY GOTHIC, #263448 BOLD 11PT ALL CAPS

Body text - Century Gothic, #3F5775 10pt

Circuit cluster #1



Callout pennants

banana pennant

deep blue pennant

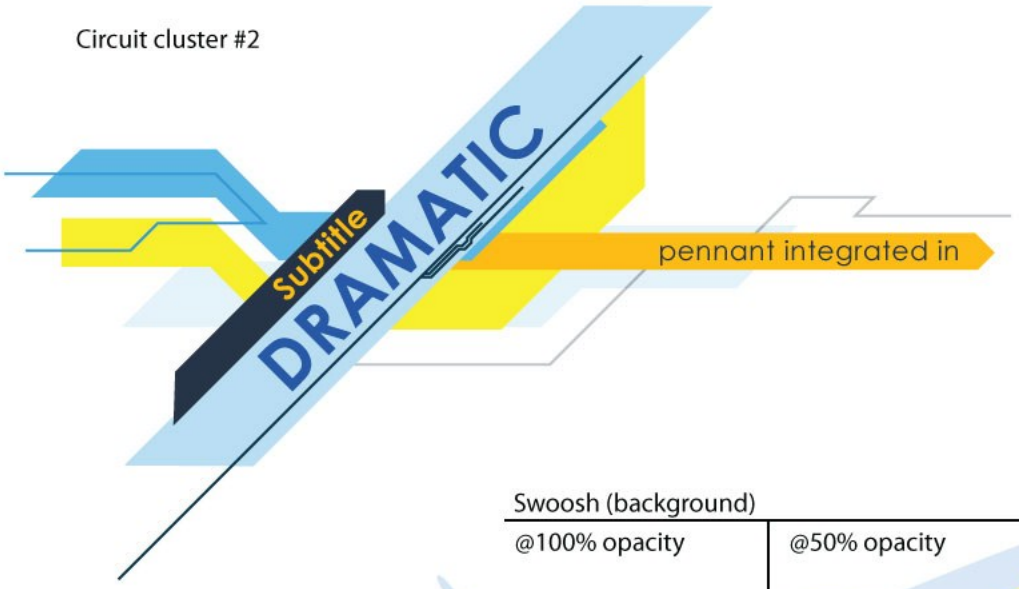
#2634498 Century Gothic 15pt lower case

#FEBD11 Century Gothic 15pt lower case

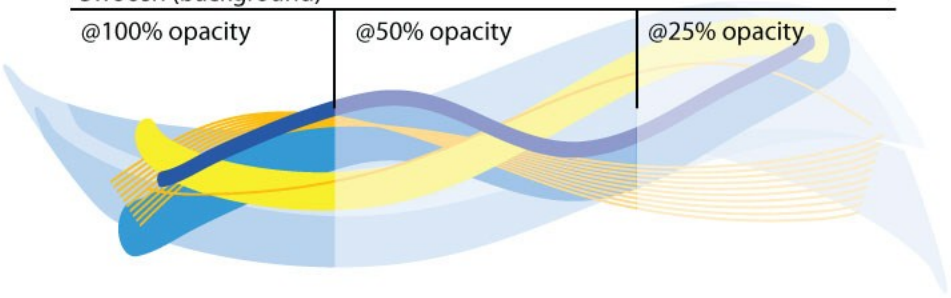
MEGATITLE

Polytechnic logo

Circuit cluster #2



Swoosh (background)



MyPoly Logo

MyPoly
POLYTECHNIC OF NAMIBIA

MyPoly alternative logo, slim profile

MyPoly POLYTECHNIC OF NAMIBIA

Circuit cluster #3, heavy 3D depth

Web Title

List or content section

breadcrumb | Verdana | #2C59A6 | 12pt