

From Teacher Centered to Student Centered Learning: Developing Modern ICT Supported Learning in Eduardo Mondlane University, Mozambique

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Abstract

Eduardo Mondlane University, Mozambique, is in the process of modernizing teaching and learning approaches. In one of the pedagogical change projects, student-centered learning was combined with web 2.0 tools in the course 'ICT in Environmental Education'. The study explored the students' perceptions of the new pedagogical approach, and to what extent the intervention contributed to their competency development. Action research was used as research strategy. Eight semi-structured interviews with students were performed together with sixteen of classroom observation and 8 weeks of virtual observation in the learning management system

and in the web 2.0 tools. The results showed that collaborative e-learning activated students, supported development of information management skills as well as metacognitive skills and strategies, particularly task and strategic knowledge. The results also showed that problem-based learning contributed to increased intrinsic motivation. In addition, not all students were ready to adopt an active learning role: their received view of learning as a one-way knowledge transfer hindered their transfer to self-regulated learning. This study recommends that e-learning initiatives in Mozambique should always be paired with a remedial ICT literacy course and with a course on 21st-century learning skills.

Keywords: Student-centered learning, generic competencies, web 2.0, ICT, Mozambique.

Introduction

Modern information and communication technology (ICT) is changing the way people work, communicate, access, and distribute information. Technology skills are more important than ever before, and they are among the key qualities sought by many employers (Moeller & Reitzes, 2011; Young & Chapman, 2010). Many institutes of higher education are adapting to the demands of technology savvy students and include ICT to support both teaching and learning so that students feel more prepared to use technology in their work life (Moeller & Reitzes, 2011). According to Hayes et al. (2001), the use of ICT can transform pedagogy in various ways. In terms of education philosophy, ICT can facilitate a shift from students reproducing knowledge of others to constructing knowledge themselves. In terms of teaching and learning approaches, ICT can facilitate a move from teacher-centered to student-centered learning activities. In terms of material, ICT can facilitate a shift of focus from local resources to global resources. In terms of activities, ICT can provide opportunities for performing complex tasks and to use multi-modal

information (Hayes et al., 2001).

The Eduardo Mondlane University (UEM) has started a curricular reform in the early years of 2000 (Muianga et al., 2013; Mendonça & Popov, 2014a). The aim was to introduce ICT and SCL approaches in order to improve the quality of teaching and learning. The evaluations of curricular reform across the faculties have shown that, despite attempts to introduce constructionist thinking in the institution, instructionist teaching methods dominate university pedagogy (Mandlate, 2003; UEM, 2008; Cossa et al., 2012). Those studies revealed a lack of knowledge among teachers of new pedagogical models, as well as ineffective use of technology in teaching and learning.

The above findings have led UEM to start a curricular reform process in almost all faculties. Those curriculum reforms emphasize a student-centered learning (SCL) and competency-based model to assure the highest quality in teaching and learning processes (UEM, 2008-2012). The aim of this study was to explore (1) students' perceptions of student-centered learning in the course 'ICT in Environmental Education'; (2) the role of web 2.0 tools in facilitating SCL and competency development, and (3) to what extent the intervention contributed to the development of students' generic competencies. As mentioned in the study by Schweisfurth (2011, p. 430) there is a lack of research studies that focus on the voice of young learners in developing countries, on their opinions on SCL, and on their views of learning environment during the implementation.

The research questions of the study are:

- How does the adoption of SCL contribute to students' generic competence development in a course about ICT in Environmental Education, as perceived by the students?
- How does the use of web 2.0 tools in a course about ICT in Environmental Education support the adoption of SCL, as perceived by students?

This study discusses the results from a pilot educational project conducted by the Faculty of Education of Eduardo Mondlane University. In the pilot project, Chissimba was used as the learning management system (LMS), and a variety of social media and web 2.0 tools were used to facilitate SCL and generic competency development (the tools included collaborative content management systems, podcasts, video-sharing websites, social bookmarking, and social networking).

Student-Centered Learning

There are many learning theories that can be used to implement SCL approaches like self-regulated learning, student approaches to learning, collaborative learning, intrinsic motivation, metacognitive skills and strategies. Felder and Brent (1996, p. 43) define student-centered learning as a broad approach that includes active learning experiences that is self-paced and/or cooperative learning. They underline the importance of giving students the responsibility for their own learning and for engaging in activities, such as discussing different topics with peers, writing essays, and exploring others' attitudes, values, and opinions.

There are different terms used to describe SCL depending on the principles and practices emphasized. Some of the most common phrases used are "active learning" and "collaborative learning", which all focus on the active role of the students in the learning process (Froyd & Simpson, 2008, p. 2).

In SCL environments the role of the lecturer is that of a facilitator ("a guide on the side") and not just a presenter of information ("a sage on the stage") (Kember, 1997). Student-centered learning approaches are closely related to constructivism, because the lecturer's role as a facilitator is crucial for the students' personal learning and competence development (Motschnig-Pitrik & Holzinger, 2002). The SCL paradigm is not exclusively concerned with the personal and cognitive growth of students, but equally concerned with the competence development of the facilitators. The meaningful interactions between both parties offer personal satisfaction where individuals can grow as persons (ibid.).

Student-centered learning has several advantages compared to many traditional teaching methods. Firstly, SCL can support students with diverse learning needs and increase their retention of knowledge and skills (Baeten et al., 2013; Thanh, 2010). Secondly, SCL can increase students' motivation by including students in the decision-making process; this in turn may allow students to develop greater self-confidence, as they are accountable for their own learning (Baeten et al., 2013; Thanh, 2010). Thirdly, it can encourage students to be creative through emotional and intellectual discovery, which leads students to lifelong learners (Motschnig-Pitrik & Holzinger, 2002). Fourthly, when SCL is focused on group work, it requires debate, brainstorm, and negotiation between students and this in turn gives the students the opportunity to develop their communication and teamwork skills (O'Neill & McMahon, 2005). Fifthly, in SCL learners take increased responsibility for their own learning; hence learners need to understand how to evaluate the material. This process enables them to become independent learners (ibid.).

In the last decades, many African countries have been committed to the improvement of education quality by implementing curricular reforms, with the aim of enabling teachers to move away from traditional learning methods to utilizing alternative methods that encourage inquiry among students (Leyendecker et al., 2008). The main critique of SCL, in the context of developing countries, is that limited resources and large class sizes might create challenges in the implementation of SCL (O'Neill & McMahon, 2005; Schweisfurth, 2011). Several studies have found that when SCL is introduced for the first time in schools it is hard for both teachers and learners to adapt to the new roles, as it is hard to unlearn previous teaching and learning approaches (O'Neill & McMahon, 2005; Thanh, 2010). The shortage of staff trained on SCL is another problem faced by developing countries (Tedre, Apiola & Cronjé, 2011; Schweisfurth, 2011). To mitigate this problem a high-quality initial training is indispensable to address teachers' concerns about the student-centered pedagogy (O'Neill & McMahon, 2005).

Other challenges that may hinder successful implementation of SCL in developing countries, especially where technology is involved, are related to teachers' lack of confidence in technology and their traditional cultural values (Moeller & Reitzes, 2011; O'Neill & McMahon, 2005; Tedre, et al., 2011). Those may inhibit the creation of an atmosphere in which meaningful learning can take place. Furthermore, power and agency in terms of "who, and what drives change, or hinders it" (Schweisfurth, 2011, p. 429) is an important factor to consider when implementing SCL. Curriculum reforms are unlikely to be successful if some of the educational stakeholders do not support the intervention (ibid.).

UEM (2008) recognizes that SCL is not a panacea for all problems within the educational sector. For example, SCL does not guarantee the inclusion of all students, and independent, self-regulated learning might not suit every student (ibid.) Nevertheless, SCL offers the opportunities for students to experience authentic learning, as a basis to develop various competencies modern society requires of university graduates.

Organisation of the course

The course 'ICT in Environmental Education' was run for first year students in the Environmental Education program, which was organized using a learning management system (LMS) was called Chissimba. The objective of using LMS were to support course organization, synchronous and asynchronous communication, self-directed and responsible learning (Park & Mills, 2014). The students were trained to use the platform at the beginning of the first semester. The aim of the course was to provide students with broad knowledge about the functions of web 2.0 tools in environmental education. The students were expected to explore the web 2.0 tools and their content in creative and critical ways in order to develop generic competencies in focus of the course.

The lecturer designed broad activities, organized, and assessed the entire process, taking into account the requirements of the course 'ICT in Environmental Education'. The lecturer then shifted his/her role from classroom directed-knowledge delivery to knowledge facilitator. The students learned in small groups, at their own pace, and used their own strategies. The shift into SCL philosophy required students to re-think their attitudes towards learning, learning styles, roles and responsibilities, and the specific learning activities they do.

In total, 29 students participated in the course. The duration of the course was eight weeks and was designed so that the students had to work on activities both in groups and individually. The class met face-to-face twice a week, for three hours each time, for theoretical and practical guidance.

The group members worked together for two weeks with different web 2.0 tools including wikis, podcasts, video sharing, social bookmarking, social networking sites (Blogging, Facebook and Twitter). Each group had to write a group blog entry on each web 2.0 tools, and present one of the tools to their colleagues during a classroom meeting. For this task students were required to create multimedia content in their blog entry. Students could use mobile phones, digital cameras, and Moviemaker to create their multimedia content. All discussions between students, as well as between students and teachers, took place in LMS platform.

In the first section of the course, the students got introduced to the web 2.0 tools included in the study, and each student creates an account in Facebook, and connect with others. The students were then divided into groups. The groups had to choose an environmental issue, produce video and pictures about this issue, and upload in the blog of the group, and discussed within the group whether the problem was related to environmental education or not. They then had to decide how they could raise awareness among citizens about that particular issue. Some examples of the problems selected by the students were the increase of waste in poor areas of the city, inappropriate use of drains in Maputo city, littering in non-appropriate places, and erosion across the beach.

During the second section of the course, the students focused on analyzing and evaluating the work of two other groups. The evaluating groups used a predefined rubric produced by lecturers to generate questions and initiate debates in LMS discussion forum.

Methodology

Action research was chosen as research strategy because it is aimed at dealing with real-world problems and regard change as an essential part of research (Cohen et al., 2007; Koshy, 2005). Hence, action research strategy is appropriate as the emerging evidence-based outcomes could improve aspects of higher education in Mozambique. The actions and interventions in this research study were aimed at two broader elements of change: to support the professional development of lecturers, and to modernize the teaching and learning approaches across the university as part of the curricular reform.

Action research consists of self-reflective stages, which are fluid, open and responsive (Koshy, 2005). The first stage of this study was to plan a change, which in this study was done through context analysis on how SCL can improve higher education in Mozambique. During this stage the researchers reflected on current teaching and learning practices and identified what can be improved through adoption of SCL. In the second stage, the researchers developed the research questions and planned the research. It was decided that SCL approach was to be introduced in the course 'ICT in Environmental Education'; hence a formative evaluation was designed to evaluate both the course and the SCL approach (third stage). This process consisted of selecting and planning SCL strategies based on web 2.0 tools, and designing learning activities aimed at promoting the development of generic competencies in focus. The fourth stage of this study was to implement the SCL approach plans, which consisted of students performing the learning

activities. The final stage in the action design was a summative evaluation of the four stages. Each stage consisted of a number of activities involving researchers (experts) and students (users). Therefore, both lecturers and students participated in decision-making and they had control over their environment and activities in the learning process.

This study is limited to only one cycle in the process of action research. It does not repeat the cyclical process of each self-reflective stage in action research. However, the results of this research feed directly into the educational practice of Eduardo Mondlane University. The researchers adopted a critical reflection during each stage of the research process with the aim to improve the educational practice.

Data was collected through semi-structured interviews, observations, and students' and staff members' course outputs and deliverables. Interviews with students were conducted every two weeks, and were focused on how web 2.0 tools were perceived to improve their competencies. Observations were performed in the classroom, LMS, and across web 2.0 websites produced by the students. The qualitative data was analyzed using Creswell's (1998) spiral analysis. Creswell's spiral analysis offers a generic and suitable approach because it offers flexibility in the analysis process, which is appropriate in triangulation of the two data sources. The interview data were transcribed, coded, analyzed, reflected upon, and categorized for emerging issues in a circular analytical process as described by Creswell (1998).

Results

There was a shared feeling about the valuable contribution of group collaboration to students' competence development. One of the male students, "Ivo" (name changed), described the

changes in his mindset concerning collaborative learning:

Ivo: “At the beginning of this course, I could not read the problems of my colleagues understand and formulate a constructive judgment. But now I can understand how to help my colleagues to improve their work by formulating problems, as well as to improve my work after seeing the work of other colleagues”

The above excerpt exemplifies a broadly shared notion that collaboration between students enabled them to take an active role in knowledge sharing and learning. The decision-making processes in the groups allowed the students to explore the views expressed by other students. The observation of the blogs showed that students improved their learning and information management skills by working together to find information on the Internet about the environmental problems and solutions. In addition, working in groups requires interpersonal and communication skills, which are important traits as it is common in today’s work place to work together with others (Young & Chapman, 2010). The following quote of a female student serves as an example of how successful collaboration deepens students’ knowledge:

Marta: “The group managed to select an environmental problem, and upload pictures from Internet depicting it. We were successful in producing a text to explain it with the pictures uploaded, and these pictures helped to convey what the group wanted to convey. The group also managed to produce a video that further enhanced the subject that was described by

the group”.

Since the digital learning material produced was accessible online, students could independently organize their learning process by commenting and evaluating each other’s work, and expand their ideas without teachers’ interference. These activities contributed to critical and constructive thinking; for example, Marta (female student), reported that: “This course and web 2.0 tools helped us to reflect on our own work and gave us a different vision on how to evaluate our work, and the work of our colleagues, and giving constructive contributions.”

Evaluations of other students’ work, by giving constructive feedback to other students, were integral to students’ development of critical thinking. Moreover, observational data showed that the evaluation process enabled the students to improve their own work by assessing their work against a rubric, and learn new things by comparing their work with the work of others. For example, Victor (male student) explained that: “Seeing others blog content made me realizes how I could improve our group’s images and videos. Also, I really liked having a rubric as a checklist to help me give feedback to other groups, as well as reflect on my own work”.

The use of technology together with real-world, self-selected tasks that were of interest to the students, contributed to raising students’ intrinsic motivation. For instance, Ivo (male student) encouraged more real-life problems for courses: “I appreciated having had an opportunity to choose real-life problems. I think that they are supposed to be solved and taught to the people. In particular, I liked to invest more effort into solving problems that concern people”. Another student, Rosa, commended the fact that real-world problems increased students’ motivation to

work intensively on the course, and helped to understand the real environmental problems better. Students selected a real-world environmental problem and worked on how they could solve the problem by raising awareness. The students searched the Internet for relevant information in order to deepen their knowledge, and propose suitable solutions to the problem at hand. This procedure was accompanied by discussions among the group members throughout each step of the process.

Some of the participating students did not have an email or social networking account. During the course, however, students learned how to use various web 2.0 tools - and many students used them for the first time. They also learned how to create multimedia content and how to upload their content to various web services. Blog contents showed that most students improved their skills in the use of modern technology. Perceptions of why and how the course was valuable for learning technological skills differed between students. Some considered tool-specific skills to be important: “In this course I learned to use different tools like Moviemaker to edit videos and animate images. [...] and also I learned to use a blog” (Pedro, male student). Others emphasized new means for content and knowledge delivery: “Now I can use a blog and share important information about environment conservation, as well as helping other people preserve the environment in which they are living” (Rosa, female student). And yet others mentioned meta-knowledge on ICT: “Now I can understand why ICT is important, its applications. I learned to search and select relevant information for our work” (Victor, male student). Students’ media literacy was improved and they became better in the use of web 2.0 tools that were in focus of the course. The blog contents showed that students learned how to acquire and evaluate information, and produce digital content in different formats (videos, pictures, and text).

Another positive finding from the observations showed that the work of the groups continuously improved throughout the course. Students started with very little understanding of web 2.0 tools, but after eight weeks most students had greatly improved their understanding of the tools and could utilize the tools efficiently.

Challenges found with student-centered learning approach

Observation notes showed that some students did not participate actively in the discussion forum. In the interviews, those students explained that the reasons for this were due to students' lack of basic ICT skills and their preferences in terms of learning approaches. Therefore, it was necessary to do some additional explaining in classroom meetings about how to use the tools and what was expected of them in the course.

The course lecturers were faced with a problem with the overwhelming number of questions posted by students in the discussion forum. One possible reason for the large number of questions is that students had difficulty dealing with the lack of structure to succeed at the assigned tasks. Students are used to well-specified and structured problems and they were uncertain of how to proceed with less structured tasks, and with what was expected of them in the course. A lot of the lecturers' time was spent answering questions and facilitating the discussion forum.

Some students had difficulties adapting to their new role that came with SCL. The shift to forum-based interaction posed problems: many students waited for the classroom meetings to pose questions about topics that they did not understand. Self-regulated learning posed another

challenge: some students repeatedly asked their lecturer to comment on how they were doing, instead of reading the curriculum, rubrics, or learner's guides themselves. Those difficulties may indicate lack of confidence. For example, Pedro (male student) explained, "Most things were new. I wasn't sure whether my group was doing right. Sometimes it wasn't easy to understand what the lecturers wanted from us. I and some colleagues preferred that the lecturers taught us, and showed how to use these tools"

The blog contents and the interviews showed that not all groups were successful in producing appropriate content that is consistent with the problem selected. The students practiced critical and creative thinking in order to give their peers constructive criticism and possible solutions. There were numerous examples of constructive feedback; for example, Marta (female student) pointed out similarities between two problem fields: "In the presentation of your problem, your group spoke about the lack of garbage collection by the city council, and the video that the group uploaded in the blog reports health problems that arouse because of the lack of drainage maintenance in Xiphamanine market. Although there is some relation between the two problems, the problems are not exactly the same".

Most students analyzed the work of other groups carefully and critically in order to give constructive criticism. The students were aware of the problems posed by their colleagues and proposed solutions on how they could improve the quality of their work. Some students, however, did not quite master the art of constructive criticism.

Discussion and conclusions

The interview results indicate that students perceived SCL to be effective for their generic

competence development. The interviews and course deliverables confirmed that students developed the competencies that this course was purported to deliver: problem-solving, collaboration, information production on web 2.0, and information search on the Internet. Another competence that improved immensely was the students' ICT literacy skills, which is a necessary competence to have for career readiness in the 21st century (Moeller & Reitzes, 2011). After this course, students are fully ready for using ICT for teaching and learning.

The integration of web 2.0 tools and Internet in the course supported the adoption of SCL. The web 2.0 tools enhanced and supported students' learning activities by allowing them to write, collaborate, research, analyze, and publish what they have learnt. By offering means for activities that are central for SCL, web 2.0 played a crucial role in the course. The interviews and observations showed that students could search for relevant information using the Internet and present the information in appropriate formats. Even though the quality of the blog content varied between groups of students, the results display students' ability to plan, organize, and produce multimedia content in a satisfying way. This corresponds to the course's objective of competence development in information search, information production, and self-management. The results suggest that a combination of SCL and web 2.0 enables students to freely explore material that are considered relevant for the solution to the task at hand (Motschnig-Pitrik & Holzinger, 2002). This course also prepared students for SCL.

All students found technology to bring positive value for their knowledge construction, even though some of the students struggled to independently learn how to use these tools. The majority of students perceived the organization of the course as fun and this increased their

intrinsic motivation. It was satisfying to observe that all students improved their technology skills over the course of eight weeks. This confirms the results of several research studies that SCL combined with modern technology is an enjoyable way to learn and this motivates students (Froyd & Simpson, 2008; Moeller & Reitzes, 2011; Motschnig-Pitrik & Holzinger, 2002; O'Neill & McMahon, 2005).

In term of Collaborative learning, group assignments encouraged communication between students. This has especially benefitted the development of students' interpersonal skills, as well as knowledge sharing and learning. How actively the students engaged in the group work varied, as did their previous knowledge and experience with group work. Previous research studies have shown that students without proper training and experience in cooperative and collaborative skills work less effectively in groups (Brush, & Soye, 2000). Hence, it would be wrong to assume that individual students benefitted equally from the group assignments.

Pedagogically, the possibility to choose a real-life environmental problem was appreciated among the students. Students showed that they could use available technology in an efficient way to solve the problems they were faced with. Efficient use of technology promoted students' problem solving skills. Another exercise that encouraged students' problem solving skills was the evaluation of other groups' work. The results indicate that most students learned to think critically and give constructive feedback through this exercise.

The implementation of SCL faced several challenges, though. Not all students embraced the introduction of SCL, which hampers a successful implementation of curriculum reform on the

broad scale, as has been pointed out by several researchers (Schweisfurth, 2011). Furthermore, not all students were active in the use of available technology. There were two reasons for this; the first reason is that the students were not used to the structure and their new roles in SCL. Students needed a lot of guidance, as they had little (or no) previous experience in how to handle open-ended problems. This was an expected challenge as it would be improbable to assume that these students would perform perfectly on their first encounter with SCL. However, the course could improve the adoption of SCL by introducing the students to several smaller unstructured problems, so that they can slowly and reflectively adapt to changes in teaching (Froyd & Simpson, 2008; Brush, & Soye, 2000).

The second reason for students' inactivity in technology use is the teaching and learning culture with which students were familiar. This challenge has been pointed out in many previous studies and was expected in this study as well (O'Neill & McMahon, 2005; Schweisfurth, 2011; Thanh, 2010). The buy-in time for SCL implementation varies and is dependent on the culturally appropriate distance between teachers and learners (Schweisfurth, 2011). In this case, the students were used to receive a lot of assistance from the lecturers and presumed to receive it during the course as well. When they had to work independently, they felt insecure and confused. Even though it is hard to change what is culturally appropriate, the evidences show that introducing SCL approach in education support positive competence development for students. Hence, it is important to increase effects of teaching 21st - century learning skills.

SCL and web 2.0 applications are mostly welcome and used for education in last years by students. The students were motivated to learn and were satisfied with the organization of the

course although the implementation of the new pedagogical ideas encountered some challenges. The findings indicate that SCL has the potential to increase the quality of education in terms of preparing future graduates with necessary skills to succeed in 21st century labor market. The design of this course and the lessons learned from this study can be adapted to fit other courses at Eduardo Mondlane University.

As the results are promising, the university should invest more in lecturer training on the use of SCL in order to fulfill the requirements of the pedagogical approach based on competence development. The design of this course can be adapted to fit other courses at the university. However, it would be wise to gradually introduce the students to SCL through several smaller unstructured problems, so that they can slowly and reflectively adapt to changes in teaching, as recommended by other researchers (Brush, & Soye, 2000; Froyd & Simpson, 2008). By doing this, we believe the quality of education at Eduardo Mondlane University would increase in terms of preparing future graduates with necessary skills to succeed in 21st century labor market.

It is essential to disseminate the results of this study to ensure effective implementation of SCL approach combined with web 2.0 tools. The lessons learned will hopefully support a necessary transformation of teaching and learning both culturally and structurally.

The findings presented in this paper should be taken with caution, as the students did not have the chance to practice their newly acquired skills to solve real-life problems that were discussed during the course. The solutions to the environmental problems presented by the students were theoretical; hence there is no way to ensure that the solutions would work in reality. Further, the

results of this study cannot be generalized to other population outside of this specific study. It is up to the reader of this qualitative study to decide the extent to which the results can apply to other contexts (Creswell, 1998). It is necessary to undertake follow-up studies in order to investigate in deeper these findings.

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