

From Teacher Oriented to Student Centered Learning, Developing an ICT Supported Learning Approach at the Eduardo Mondlane University, Mozambique

Xavier Muianga

*DSV- Stockholm University, Stockholm, Sweden
xmuianga@dsv.su.se*

Tina Klomsri

*DSV- Stockholm University, Stockholm, Sweden
tinaklomsri@gmail.com*

Matti Tedre

*DSV- Stockholm University, Stockholm, Sweden
matti.tedre@acm.org*

Inocente Mutimucuo

*Faculty of Education - Eduardo Mondlane University, Maputo, Mozambique
inocente.mutimucuo@uem.mz*

ABSTRACT

Eduardo Mondlane University (UEM) is in the process of modernizing its teaching and learning approaches. As one of the pedagogical reform projects, student-centred learning (SCL) in combination with web 2.0 tools was introduced as a pilot in the course ‘ICT in Environmental Education’ in the Faculty of Education. This study explored - using action research strategy - to what extent the new pedagogical approach contributed to students’ competency development. Twenty-nine students were involved in the course, eight semi-structured interviews with students were combined with sixteen classroom observations and 8 weeks how students used the Learning Management System (LMS) and web 2.0 tools. Results showed that collaborative E-learning supported the development of students’ information management and problem solving skills as well as their metacognitive strategies for self-regulated learning. ICT supported problem based learning contributed to an increased intrinsic motivation. However, not all students were ready to adopt an active role. At the start they looked upon teaching as a one-way knowledge transfer. This study recommends that E-learning initiatives in Mozambique should always go together with an ICT literacy course and training in 21st-century learning skills.

KEYWORDS: Student-centred learning, generic competencies, web 2.0 tools, E-learning.

INTRODUCTION

ICT is changing the way people process, access and distribute information. Technological skills are among the key qualities employers seek (Moeller & Reitzes, 2011; Young & Chapman, 2010). Higher education institutions are adapting themselves to employers’ demands to deliver ‘technology savvy’ students. They incorporate ICT in their programs in order to prepare students for their working life (Moeller & Reitzes, 2011). Hayes *et al.* (2001) described how ICT can also transform pedagogy. In terms of educational philosophy, ICT can facilitate a shift in students’ learning approach: from reproducing knowledge conveyed by others to constructing knowledge themselves. In terms of didactical approach, ICT implies a move from teacher-centered to student-centered learning. In terms of material, ICT shifts the focus on global resources. In terms of activities, ICT helps to perform complex tasks, using multi-modal information. Those changes do not take place as separate phenomena, but are interwoven. Learning with technology assumes a participatory and self-regulatory approach, while SCL benefits from E-learning and web 2.0 tools.

UEM started a curricular reform around 2000 (Muianga *et al.*, 2013). ICT and SCL were introduced to improve the quality of teaching and learning. The start was not easy. Evaluation of courses across faculties showed that direct instruction was still the dominant approach, despite the various attempts to introduce a constructivist-learning model (UEM, 2008). Teachers lacked knowledge about new pedagogical approaches and used technology ineffectively (*ibid.*).

These findings urged UEM to speed up the reform process in almost all faculties. A second phase of curricular reform was launched (UEM, 2008-2012). Competency-based program design was emphasized to assure the highest quality of learning and a push was given to ICT as a tool for active and critical learning. Several faculties started

web supported SCL pilots.

Besides the various positive experiences, there was also uncertainty about how students perceived the introduction of ICT and SCL. This doubt is not specific for UEM. Schweisfurth (2011, p. 430) pointed at a lack of research studies that focus on the voice of young learners in developing countries. In order to find out which obstacles hindered the adoption of a new way of teaching and learning, this study specifically aimed at exploring the perceptions of students.

The research questions of the study were:

How does the adoption of SCL in the course ICT in Environmental Education contribute to the development of generic competences, as perceived by the students?

How does the use of web 2.0 tools in the course ICT in Environmental Education support the adoption of SCL, as perceived by students?

“MOODLE” was used as LMS and web 2.0 tools were introduced to facilitate SCL and thus the acquisition of generic competencies.

STUDENT-CENTERED LEARNING

A variety of learning theories speak about SCL in terms of self-regulated learning, the nurture of higher level learning abilities, collaborative learning, intrinsic motivation and metacognitive skills, surface learning strategies and intrinsic goals, as well as deeper learning strategies (e.g., Biggs, 1993; Marton & Säljö, 1976; Laurillard, 2005). Felder and Brent (1996, p. 43) defined SCL as a broad approach that includes active learning experiences, self-paced and cooperative style, responsiveness to individual needs and arousing of learning potential. The authors underlined the importance of giving students responsibility for their own learning and for engaging them in activities, such as peer discussions, writing essays and exploring each other’s attitudes and values. Commonly used terms for SCL are “active” and “collaborative” learning, emphasizing students’ involvement in the learning process (Froyd & Simpson, 2008, p. 2).

The two dominant research traditions on SCL have focused on students’ approaches to learning (SAL) and self-regulated learning (SRL) (Biggs, 1987; Lonka, Olkinuora & Mäkinen, 2004; Young, 2005; Apiola & Tedre, 2013). The SRL side has highlighted, for instance, deep learning, as it emphasizes learners’ autonomy. Students are encouraged to control and direct their actions to achieve learning goals like information acquisition and self-guidance of professional growth (Marton and Säljö, 1976; Zimmerman, 2000). Many scholars point out that in self-regulated learning the involvement of students in learning activities, the responsibility to motivate oneself and the attainment of personal goals are the main pillars (Zimmerman, 2000; Greene & Azevedo, 2007).

In SCL the lecturer takes the role of facilitator and is not just a presenter of information (Motschnig-Pitrik & Holzinger, 2002). This role is crucial to guide students to become producers of knowledge instead of consumers. SCL is not exclusively focused on personal and cognitive growth, but also on the development of competences needed to perform as a professional in a future job or in self-employment.

Studies carried out in developing countries have shown SCL to have various advantages over traditional teaching methods. First, SCL supports students with diverse learning needs and it increases their retention of knowledge and skills (Baeten et al., 2013; Thanh, 2010). Second, SCL increases students’ motivation and self-confidence by including them in the decision-making process (*ibid.*). Third, SCL stimulates creativity through emotional and intellectual discovery learning, which encourages students to become lifelong learners (Motschnig-Pitrik & Holzinger, 2002). Fourth, the focus on group work requires debate, brainstorming, and negotiation and this in turn gives students the opportunity to develop their communication and teamwork skills (O’Neill & McMahon, 2005). Fifth, increased responsibility for one’s own learning encourages students to become independent learners (*ibid.*).

The introduction of SCL in developing countries also faces challenges. Limited resources and large classes impede its implementation (O’Neill & McMahon, 2005; Schweisfurth, 2011). In the beginning it is hard for teachers and learners to assume their new roles, as they must unlearn previous approaches (O’Neill & McMahon, 2005; Thanh, 2010). The shortage of staff trained in SCL is another problem (Tedre, Apiola & Cronjé, 2011; Schweisfurth, 2011). Initial training in new pedagogy is therefore indispensable (O’Neill & McMahon, 2005).

UEM (2008) recognizes that SCL is not a panacea for all problems. Not all students are involved, as independent, self-regulated learning might not suit everybody (*ibid.*). Nevertheless, SCL offers opportunities to experience authentic learning, as a basis to develop competencies that modern society requires of university graduates.

COURSE ORGANISATION

Like other courses that are used as pilot on using SCL approach, the course ‘ICT in Environmental Education’ was run for first year undergraduate students in the Faculty of Education. The aim was to provide students with knowledge and skills about the use of web 2.0 tools and a LMS in environmental education. They were expected to explore with these tools the content in a more creative and critical way, thus developing relevant generic competencies.

Up till the pilot, teaching was done the traditional way relying on transmission of knowledge, memorizing theory that had no link to real life problems, and accumulation of information through lectures. The content and materials were selected by the teacher and evaluation was a reproduction of what was transmitted.

In the pilot the lecturer changed roles from deliverer of knowledge to facilitator of learning in small groups, at students’ own pace. The lecturer helped students to develop skills allowing them to construct their own knowledge and their own learning strategies. Also the lecturer got involved more in the organization of the course activities and monitoring students interactions in LMS.

Twenty-nine students, divided into eight groups of three/four students, participated in the course of eight weeks. The class met face to face twice a week, three hours each, for theoretical and practical guidance. Independent work, in groups or individually and using the LMS, took 18 hours a week. Besides ICT skills, the students were expected to develop generic competencies: communication and collaboration; information research and information production; cooperation and self-learning; media literacy and information literacy; critical thinking and problem solving.

At the start students were trained to use the LMS. Each group worked for two weeks with one of the web 2.0 tools: wikis, podcasts, video sharing, social bookmarking or social networking sites (Blogs, Facebook and Twitter). Each group wrote a blog entry with the chosen tool and presented it during a classroom meeting. For this task, students created multimedia content using mobile phones, a digital camera or Moviemaker. One computer lab assistant and two IT technicians were available to help. Students discovered how to use different IT tools and they taught others about it. Most discussions took place in the LMS.

In the first face-to-face session, students were introduced to web 2.0 tools; they created Facebook accounts and connected their profiles. Then they were divided into groups. Each group chose a realistic environmental issue to study, produced videos and pictures, uploaded them to their blog and discussed their findings. Next, they decided how they could raise awareness among citizens about that particular issue. Some examples of the problems chosen were littering, erosion, the increase of waste in poor neighborhoods, and inappropriate use of drains.

During the following 3-hour sessions, students analyzed and evaluated the work of two other groups. For evaluation a predefined rubric was used to generate questions and debates in the LMS discussion forum. The various assignments that were carried out were used to assess the course. Group work carried 50% weight in the final evaluation. The other 50 % was divided over active participation in the classroom and the discussion forum, sharing resources, Internet search results, and evaluation of each other’s work.

METHODOLOGY

Action research was adopted because it deals with real problems, preferably within communities, with the aim to find solutions and produce guidelines for best practices (Koshy, 2005). The outcomes of the pilot could be helpful to improve all programs offered at UEM. The interventions in this study targeted two elements of the curricular reform: the professional development of students and the modernization of the teaching and learning approaches across the university.

Action research consists of self-reflective stages, which are fluid, open, and responsive (Koshy, 2005). The first stage has to do with the identification of the change pursued. This was done through context analysis: how can SCL contribute to the improvement of the university’s courses? Researchers explored the current teaching and learning practices and the existing pedagogical vision. They pinpointed what could be improved through adoption of SCL. Next, the researchers developed the research questions and planned the research. It was decided to integrate SCL and ICT in a regular course. A formative evaluation scheme was designed with the intention to use the results to improve the SCL approach (third stage). SCL strategies based on web 2.0 tools and learning activities were (re-)designed with the intention to promote generic competencies. Implementation of SCL and learning activities was stage four. The final stage was a summative evaluation of all steps. In each stage researchers (experts) and students (learners) were involved.

In this study the cycle of self-reflective action research stages was carried out once. However, the results of this

research feed directly the future actions needed to improve the educational practice of the university.

Data were collected through semi-structured interviews, observations by researchers having a strong experience in ICT for education. The observations were used to collect data for checking if the content is suitable with class learning needs, and verifying whether the proposed activities improve the student learning process. This technique was also used to monitor the appropriateness of resources with the content. Observations were performed in the classroom, in the LMS and across web 2.0 websites produced by students.

During the interview process with students, the focus was to understand whether and how web 2.0 tools improved their competencies. During the 8 weeks course, an interview was conducted every two weeks with two students randomly chosen. Students' activities in their assignments were analyzed using Creswell's (1998) data analysis spiral. Additionally, the interviews were also transcribed, coded, analyzed, reflected upon and categorized in a circular process. Interviews were held in Portuguese and translated into English by the researchers.

FINDINGS

There was a shared feeling among students about the valuable contribution of group collaboration to their competence development. Their perception concerning the use of modern pedagogical practices had changed. One of the male students, "I" (pseudonym), described the changes in his mind-set:

I__[male] "At the beginning of this course, I could not take hold on the problems of my colleagues ...nor formulate a constructive judgment ... but now I understand how to help my colleagues ... and improve my own work after seeing the work of my colleagues"

The above excerpt exemplifies that collaboration enabled students to take an active role in knowledge sharing. The decision-making processes in groups stimulated students to explore the views expressed by others. Analysis of blogs showed improvement of information management skills. Students collaborated to find information on the Internet about environmental problems and they discussed their findings in order to come up with solutions. Working in groups requires interpersonal and communication skills, which are important professional characteristics in today's workplace (Young & Chapman, 2010). The following quote shows a combination of collaborative learning with ICT tools:

M__[female]"We managed to select an environmental problem and uploaded pictures to illustrate it... we also produced text to explain the pictures. This helped to discuss our topic with other groups ... we also managed to produce a video that showed our thinking. "

Since all the assignments were accessible online, students could comment and evaluate each other's work without the lecturer's interference. These activities contributed to critical and constructive thinking. M reported that: "This course and web 2.0 tools helped us to reflect on our work and gave us a different vision on how to evaluate our own work and the work of our colleagues." Constructive evaluation is essential for the development of critical thinking (Froyd & Simpson, 2008). Observation showed metacognitive development when students learned from assessing their work with a rubric and from compared their solutions with those of others.

The use of technology together with realistic and self-selected tasks increased students' intrinsic motivation, as confirmed by previous studies (Motschnig-Pitrik & Holzinger, 2002). R [female] commented, "Real-world problems made me study the tasks more intensively, so I understood the topic better." Students searched the Internet for relevant information, which enabled them to deepen their knowledge and to propose suitable solutions to environmental problems. Reflection took place in each step of the learning process: orientation, problem analysis, and presenting conclusions. The way of learning in the course was a turning point for many students. They perceived the positive effects of collaborative and self-regulated learning as well as the advantages of modern ICT tools; all elements long campaigned for by the university.

Another positive effect was the increase in computer literacy. Students did not have smartphones or Internet connections at home, and did not have e-mail accounts or social networking accounts at the beginning of the course. During the course, all students learned how to create multimedia content with web 2.0 tools and how to upload the content to various websites. The results confirmed Motschnig-Pitrik and Holzinger's (2002) argument that Internet technology is well suited for SCL, as it enhances independent learning and problem-solving skills. Yet, students had different perceptions of why and how technology was of value. Some appreciated tool-specific skills: "I learned to edit videos and animate images with Moviemaker ... and also to use a blog" (P [male]). Others emphasized the value of new tools for sharing knowledge: "Now I can use a blog and share information about environmental conservation" (R [female]). Others mentioned growth of meta-knowledge: "Now I understand why ICT is important

... I learned to select relevant information.... I also know how to learn without a teacher...I can find solutions This is good when I have a job” (V [male]). Another student said, “Multimedia is a strong tool for environmental education because you can illustrate what is wrong and what is good, ... and people learn faster”. Students’ media literacy was developed, and they learned skills to use web 2.0 tools to produce digital content in different formats (videos, pictures, and text).

The quality of group work improved throughout the course. All students learned to create and use blogs and some students started to use Facebook and other social media instruments. They were able to discuss their cooperation and the final results.

CHALLENGES

Observation showed differences between students’ activity in the discussion forum. In the interviews, some of the less active students said that they lacked necessary basic ICT skills, while others disliked the new learning approach. Therefore, some additional explanation in the classroom meetings was needed on the use of the tools and on the participation that was expected.

Some students had difficulties adapting themselves to the new role of being an active learner that came along with SCL. According to Felder and Brent (1996), some resistance is to be anticipated when introducing SCL, since its benefits are neither immediate nor automatic. In this study, SCL was introduced in a formal setting, which was new to most students. Therefore, the shift to ICT-based interaction and SRL raised problems: some students waited until the classroom meetings to ask questions and others expected their lecturers to give direct help, instead of using the course material, rubrics, or other self-guidance material. Those difficulties indicate a lack of confidence of learners in their own capacities, as P [male] explained: “most things were new ... I wasn’t sure whether my group was doing the right thing ... sometimes it wasn’t easy to understand what the lecturers wanted from us”. Another challenge was how to comment each other’s work. Some students did not quite master the art of giving constructive feedback, which led to clashes.

Blog contents and interviews showed that not all groups were successful in producing appropriate content for their selected problem. N [female] pointed out that: “in the presentation of your problem, your group spoke about the poor garbage collection by the city council, but the video that you uploaded reported health problems that arouse from bad drainage maintenance. Although there is some relation between the two problems, they are not the same”.

DISCUSSION AND CONCLUSIONS

The interviews and assignments confirmed that students developed the generic competencies that this course was supposed to enhance: problem-solving, collaboration, e-learning skills, information production on web 2.0 and information search on the Internet. Mastering of those skills are an absolute requirement for career readiness in the 21st century (Moeller & Reitzes, 2011).

Web 2.0 tools and the LMS supported the adoption of SCL. Similarly, SCL facilitated the technology-enhanced learning practices. The combination of e-learning and SCL worked well even in this tradition-bound educational context. The web 2.0 tools enhanced students’ learning activities by stimulating them to write, collaborate, research, analyze, compare, debate, classify and publish what they have learned. Students searched for relevant information using the Internet and presented the information in appropriate formats. Even though the quality of the blog content varied between the groups, the results displayed students’ growing ability to plan, organize and produce multimedia content. This was in line with the course objectives to develop information management skills. The results of the pilot study confirmed other studies that say that a combination of SCL and web 2.0 tools enables students to explore information that is relevant to perform tasks at hand (Motschnig-Pitrik & Holzinger, 2002).

Most students did not feel a too great distance from the new practices, as they found that technology was of positive value for their knowledge construction, even though some of them struggled to learn independently how to use these tools. The majority of students perceived the organization of the course as exciting, which increased their intrinsic motivation. Several research studies confirm that SCL combined with modern technology is an enjoyable way to learn (Froyd & Simpson, 2008; Moeller & Reitzes, 2011; Motschnig-Pitrik & Holzinger, 2002; O’Neill & McMahon, 2005).

In terms of collaborative learning, group assignments encouraged communication, interpersonal skills, and knowledge sharing. However, students’ level of engagement in group work varied. Previous studies showed that students without proper skill training work less effectively in groups (Brush & Soye, 2000). Hence, it would be incorrect to assume that every individual student benefitted equally from the group assignments. Also individual performance was assessed by looking at active participation in the classroom and in the discussion forum, and by

sharing materials and important resources.

In terms of competency development, the possibility to choose a real-life environmental problem as an assignment was motivating. Students showed that they could use available technology to find information, to discuss problems, and present a solution. Efficient use of technology promoted critical thinking and problem-solving skills. Group work evaluation, constructive feedback, commenting on group presentations, and reflecting on how the learning process went, all contributed to the gradual development of higher order learning skills.

The implementation of SCL also faced several challenges. Not all students embraced SCL. This hampers a wide-scale implementation of curriculum reform, as has been pointed out by several researchers (e.g., Schweisfurth, 2011). Furthermore, not all students adopted the available technology. They were not used to structure their own work and assume the role of an active learner. Students needed a lot of guidance and extra face-to-face meetings, as they had little experience in how to handle open-ended and (semi-)realistic assignments. This was an expected challenge, as it would be not very realistic to assume that students would perform perfectly on their first encounter with SCL. However, the adoption of SCL in a traditional learning environment could be improved by giving first a few smaller assignments as a way to carry out learning activities without direct instruction by the teacher. By practicing, students can slowly adapt to SCL (Froyd & Simpson, 2008; Brush, & Soye, 2000).

Main reason for students' inactivity to use new technology was the traditional teaching and learning culture they were familiar with. This challenge has been pointed out in many previous studies and was expected to show up in this study as well (O'Neill & McMahon, 2005; Schweisfurth, 2011; Thanh, 2010). The buy-in time for SCL implementation varies and depends on the culturally appropriate distance between teachers and learners (Schweisfurth, 2011). In the case of Mozambique, students are used to receive a lot of direct assistance from the lecturers and they assumed to receive this during the pilot 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 pilot shows that with the necessary preparation and guidance SCL can support the competency development of students.

The findings indicate that SCL and web 2.0 applications have the potential to increase the quality of education in terms of equipping future graduates with necessary skills to perform as successful professionals in the 21st century labor market. The design of the pilot course and the lessons learned from this study are suitable to be adapted to other courses at UEM.

Because the results are promising, the university should continue to invest more in training lecturers in SCL. This new pedagogy is required to fulfill the requirements of the labor market to deliver competent students. By shifting to SCL, combined with the use of web 2.0 tools, we believe that the quality of education at UEM will increase, especially in terms of a greater motivation, a better retention of knowledge, an increase in learning skills and a deeper understanding of the subjects taught (Froyd & Simpson, 2008). Lessons can be learned from the pilot study on how to realize a transformation of the direct teaching approach towards self-regulating learning. Guidance must enable students and teachers to leave behind the roles they are culturally used to. The curriculum must be restructured and the assignments must be updated.

The findings presented in this paper about the improved learning results should be taken with some caution, as students had limited opportunities to practice their newly acquired skills. The solutions they presented for the environmental problems were theoretical; hence there is no assurance that the solutions will work in reality. Furthermore, the results of this study cannot be generalized to other populations outside this specific study. There is, however, no reason to believe why the results would not be applicable, to some extent, to other similar contexts. The most important finding of this study was the positively experimented change in pedagogical approach and the development of ICT competencies that gave a push to student centered learning. In further studies its important to compare the learning outcomes before and after the introductions of pedagogical changes.

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