Use of Mobile Collaborative Tools for the Assessment of Out-of-Classroom Courses in Higher Education
Cloud Technologies Applied to the Monitoring of the Practicum

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Abstract: In this paper we propose the use of collaborative tools to enhance traditional e-learning platforms for university courses that are developed outside the school environment, as is the case of a Practicum or internship in a company or external institution. These courses have specific requirements with regard to monitoring, guidance and assessment of students, and we postulate that collaborative tools, usually implemented as cloud-based applications, combined with mobile technologies, today affordable to most students, constitute a suitable platform for implementing the assessment of this type of courses.

1 INTRODUCTION

Out-of-classroom learning plays an important role in education as a complement to formal learning at school. The philosophy of education known as constructivism (Kolb, 1984) describes how new knowledge based on real life experience is constructed and integrated into existing knowledge.

But out-of-classroom learning activities have special requirements with regard to student monitoring and guidance, due to the environment where this learning takes place, often far from the physical presence of the instructor. Today, technological solutions exist that facilitate online guidance and assessment of activities outside the classroom.

As part of a more general study aimed at facilitating graduates' college-to-work transition and seeking to improve labour insertion in the context of the European Higher Education Area (EHEA), in a previous work (Perramon et al., 2012) we have developed a monitoring system for university students taking a Practicum course, i. e. an internship or external practice stage in a company or institution, integrated into the Moodle e-learning platform. The learning activity in this case is not a single task that makes part of a broader subject, but usually a whole course in itself.

Our focus in this paper is on generalising the system to any type of out-of-classroom course, and on extending it to make use of mobile devices (phones, tablets) which are nowadays more and more ubiquitous among the population, and in particular among university students. A widely deployed technology that is suitable to our needs is collaborative software, usually implemented today as cloud-based applications.

2 OBJECTIVES OF THE STUDY

The main objective of this work is to study the usability of mobile technologies for the monitoring and assessment of out-of-classroom educational activities, with an especial attention to the Practicum.

To achieve this goal, we firstly study the characteristics of out-of-classroom learning in general, and the specific requirements for the Practicum where three different actors are involved: the student, the workplace tutor, and the academic tutor.

Next, we consider the currently available tools for performing the monitoring of these activities in a collaborative way. We focus on those which provide ubiquitous access by means of mobile technologies. We then analyse how to integrate these tools into

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the learning management systems that provide support for the assessment of the students' activities, and specifically the Practicum in our case. Finally, we discuss some advantages and disadvantages of the use of these technologies and we draw some conclusions.

The initial hypothesis of this study is that the combination of collaborative tools and mobile technologies provide an appropriate framework for the development of the monitoring system that satisfies the requirements of the Practicum and of out-of-classroom education in general. This appropriateness can be confirmed if the advantages of mobile collaborative systems overcome any possible disadvantages.

The methodology of this work is based on the analysis of the different tools and their capabilities in order to assess their usability for our purposes. The outcome is a proposal of the work to be developed for implementing the monitoring of the Practicum through mobile collaborative tools.

3 OUT-OF-CLASSROOM LEARNING

In general, "education outside the classroom" usually refers to any school learning that does not take place in a class of students with a teacher (Neill, 2008). In our case, we focus on courses in higher education that are developed completely out of the campus environment. Examples of this type of learning activities include research projects, fieldwork and, specifically, the Practicum in university degrees. In the context of the work presented here, we understand by Practicum a course intended to make students put in practise the theory they have learnt, to be developed typically as an internship in the professional environment of a welcoming institution, i. e. a company, a public administration, or any other kind of organisation. The benefits of the Practicum in the learning process have been described in different models (Jaques et al., 1993), and in particular in Kolb's (1984) "experiential learning", in line with the constructivist theory.

Several aspects of the Practicum make it singular. For the purpose of our work the interesting point is that, unlike classical courses where a teacher interacts with a group of students (one-to-many interaction), in the Practicum there is usually a triangular interaction between three actors: the student, the academic tutor or teacher, and the external tutor or person in the company or external institution who is in charge of the student during his or her internship. Each of the three actors interacts individually with the other two: the student with both tutors for consultation and guidance (each tutor in their respective scope, either the university or the workplace), and the tutors with each other for the assessment and monitoring of the student's work. In turn, each of the vertices of this triangle can be manifold: the internship may be taken by a team of two or more students working in collaboration, the academic supervision may be carried out collegiately by a tutor responsible for all internships in a degree and a tutor directly in charge of the student, and there may be several supervisors at the workplace, typically a senior and a junior supervisor, the latter providing more day-to-day guidance to the student's activities. Our proposal focuses on collaborative tools for student monitoring, but we could also introduce in this proposal a module for collaborative evaluation (Rodríguez-Campos, 2012).

Out-of-class activities can take place in very diverse environments, such as an office, a workshop, or maybe even in the open air. This raises the need for proper monitoring and student guidance, suitable to the context where the activity is developed. Given the peculiarity of the triangular relationship between participants, we consider collaborative tools accessible from mobile devices an appropriate solution for the monitoring of the Practicum.

In its simplest form, the interaction between the three actors can be regarded as an instance of cooperative editing of a document. Such a document, once finalised, could be the student's final report of their activity during the internship, to be submitted for approval in order to assess their achievements in the Practicum course. But during its preparation, this document can be a container for the periodic progress reports that the student has to elaborate, for the student's enquiries to the tutors asking for advice and the corresponding responses, for the interactions between both tutors regarding their observations on the student's progress, etc. Most collaborative tools provide some form of cooperative editing of documents that can be used in this way, but some of them also incorporate more advanced functionalities to facilitate this type of interactions.

4 COLLABORATIVE TOOLS

4.1 Basic Characteristics

Collaborative software, also called groupware, provides the foundations for computer-supported cooperative work or CSCW (Carstensen and Schmidt, 1999). These tools facilitate the cooperation among several users to fulfil a given task, by means of a common information space. This space can be used to share

documents, messages, etc. in order to achieve the joint goals. In addition to this, project management tools or projectware, which form a subset of collaborative software, cope with task interdependencies in order to coordinate the various activities making up the project.

Different architectural models have been used for implementing collaborative software. The two main models are the classical client-server architecture, where each user runs a specific client application to access the collaborative space, and the web-based architecture, where the role of the client is played by a general-purpose web browser. This latter model has evolved to the cloud paradigm, whereby all the necessary resources, including applications and data, reside in a network of virtual servers (National Institute of Standards and Technology, 2011), and is rapidly becoming more and more widespread.

One of the most popular collaborative tools today is Google Apps (Google Inc., nd), based on cloud technology, and encompassing applications like joint editing of documents, presentations and spreadsheets, polls and surveys, forums, virtual meetings, hangouts, etc. Google Drive is the specific application within Google Apps to manage the storage and sharing of such resources. Another collaborative tool is Zoho (Zoho Corp., 2013), an office suite that comprises a number of components, grouped into business applications, productivity applications, and collaboration applications. The latter include Zoho Chat, Zoho Docs, Zoho Projects, etc. The Yammer service (Yammer Inc., 2014) is another example of a tool that can be used in a corporative environment for communication between its members. It is usually cited as an "enterprise social network", but it can be used in scenarios other than businesses. More recently, Asana (Asana, nd) has been developed as a teamwork tool for managing conversations and tasks in a more flexible way than simple e-mail exchange. As of today, there are dozens of different collaborative tools available, and their characteristics have been compared in many studies, e. g. Reixa et al. (2012), Drăghici et al. (2013), etc.

Like many others, Google Apps, Zoho and Asana are online services following the "software as a service" (SaaS) model. In these systems, all data (documents, calendars, conversations, etc.) and the application itself do not reside in the user's computer or device but in the server or servers supplied by the service provider, i. e. in "the cloud". The case of Yammer, although the server-side application is more characteristic of a social network, can also be included in this category.

The four examples of collaborative tools mentioned above are available for free, under certain conditions for personal projects or small groups, or for a monthly or yearly fee for larger professional teams. More commercial solutions also exist, but at present we focus on tools with basic functionality that can be used at no charge in an academic institution. An example of a commercial tool is Trunity (Trunity Holdings Inc., 2013).

4.2 Mobile Access

The ability to access the collaborative tools from a mobile device, i. e. a smartphone or tablet, is a positive factor for out-of-classroom courses given their externality.

Usually web-based applications can be accessed with most available web browsers, including those which are incorporated into mobile devices, i. e. smartphones and tablets. However the peculiarities of these devices (smaller display, touch-based input system) can complicate the user experience if the application is not specifically designed for them. Most applications intended to be used in mobile devices are therefore designed as mobile applications or "mobile apps" (or simply "apps").

This is the case for many of the collaborative tools described in the previous subsection. In particular, Google Drive as well as Asana and Zoho provide a mobile app version that can be downloaded to the user's device before accessing the corresponding tool.

This of course requires the user to be provided with such a mobile device, either a smartphone or a tablet. However today it is more and more common for students to have their own personal mobile device that they can use for training purposes at school. Actually, some academic institutions are introducing a BYOD policy (Bring Your Own Device) in their learning systems, a process that is not free from controversy, but it is out of the scope of this paper to debate this issue.

5 INTEGRATION WITH LEARNING MANAGEMENT SYSTEMS

External tools have been successfully integrated into learning management systems (LMS) using different methods, e. g. through the IMS Basic Learning Tools Interoperability (BLTI) standard (IMS Global Learning Consortium, 2010). If a LMS and an external tool both implement the BLTI interface, the tool can be integrated so that it is seen by users as though it was a

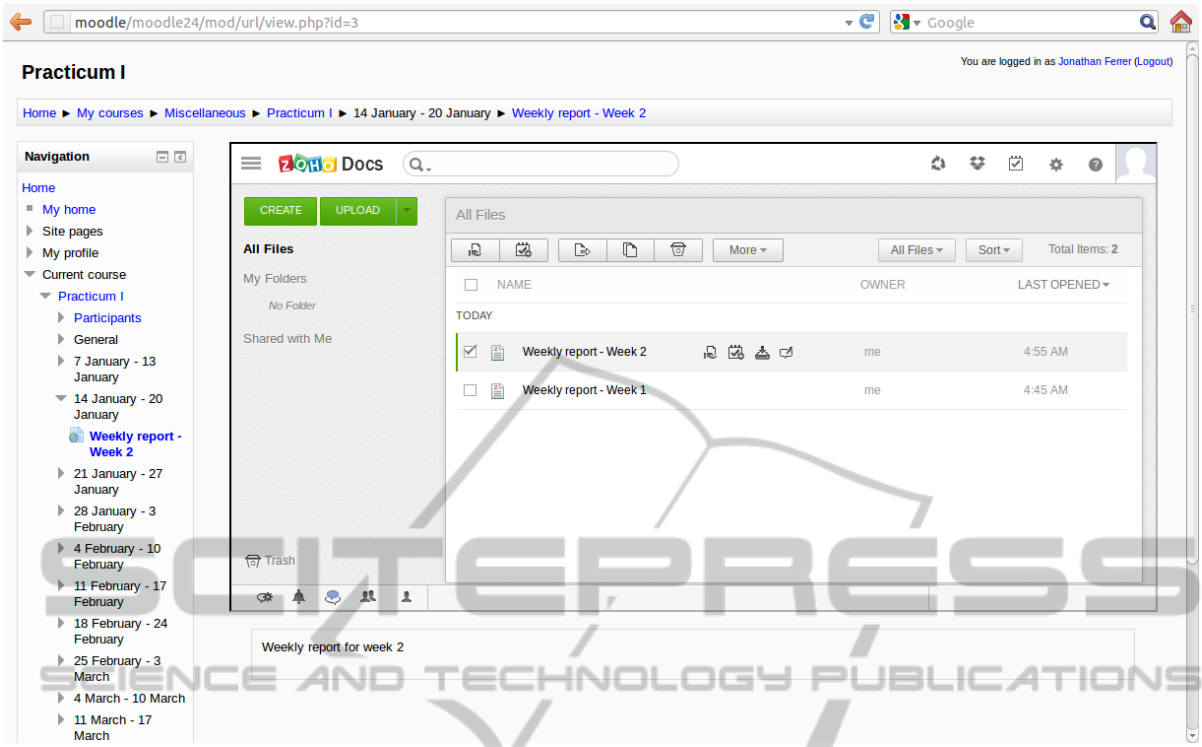

Figure 1: Example of the integration of Zoho Docs into Moodle as an embedded external link.

native tool of the LMS. This integration may imply, for example, that log-in to an external site is done automatically from data stored in the user's profile in the local LMS, following the "single sign-on" approach (SSO), without having to enter a new password.

One of the most popular LMS systems, the Moodle platform, incorporates support for BLTI since version 2.2. An example of a tool that makes use of this support for integrating Google Drive, and in particular Google Docs, into Moodle is Docs4Learning (Alier et al., 2012). On the other hand, Moodle provides a native module that allows the inclusion of wikis, which can be considered a basic form of collaborative tool, as part of the materials for a course. Also, the Moodle community has developed the Moodle-Google plugin (Moodle Documentation, 2011), available since version 2.1 of Moodle, that provides direct access to Google Apps, including Google Drive.

To the best of our knowledge, no implementations of the BLTI interface are available as of today for the other collaborative tools we mentioned above (Zoho, Yammer, Asana). Following up our proposal, we plan to evaluate the use of these tools within Moodle. If the results of these evaluations are satisfactory, we will implement the integration of the corresponding tool or tools in Moodle via BLTI or with a specific plugin.

As an interim solution for the evaluation of the tools, we can handle external objects in Moodle (e. g. a Zoho Docs shared document) as external resources, by inserting the links pointing to them. We have already applied this approach to the incorporation of Google Drive documents into an instance of an older version of Moodle, namely version 1.9, where it is not straightforward to install the Moodle-Google plugin (Perramon et al., 2012). Figure 1 shows an example of a Zoho Docs folder of documents shared between student and tutors, integrated as a resource within a Moodle course using the external link technique. This solution has the advantage of being simple to implement, although it does not provide full integration into Moodle. For example, it is necessary to login separately to Moodle and then to Zoho Docs, whereas a single sign-on solution would use the local user credentials in the LMS for transparently signing on to the external system. However, this arrangement is sufficient for our purposes of evaluating the use of the external collaborative tool.

Once the collaborative tool is integrated into the LMS, we can use it like any other component of the system. In particular, if the LMS provides an access method from mobile devices, it will also be possible to use it for accessing the collaborative tool. This is the case of Moodle, for which various mobile applications have been developed, including an official app (Moodle Documentation, 2014) and others with extended functionality, e. g. Moodbile (Piguillem et al.,

2012). Through these apps it is then possible to use the collaborative tool embedded in Moodle from a smartphone or a tablet, as is the goal of our proposal.

6 ADVANTAGES AND DISADVANTAGES

The advantages of using collaborative tools have been mentioned in Section 4 above. In our case, the use of these tools in monitoring an out-of-classroom course such as the Practicum has the benefit of facilitating a smooth interaction between the three types of agents involved: the student, the academic tutor and the external tutor.

When considering the individual tools, there is not a single one that is clearly superior to the others. Google Apps is probably one of the most popular, but Zoho and Asana have also a large user base. Among their advantages, Asana is cited as having a friendly user interface, appropriate for non-technical users, while Zoho has been considered more robust and stable, and offers more functionality, although Google Apps is catching up, and probably even surpassing, as it is constantly evolving and upgrading in a move to anticipate users' needs.

We have also discussed in Section 4 the advantages of using mobile applications, and specifically in the case of out-of-classroom education in general and the Practicum in particular. Mobile applications are more and more widespread today, and apps are already available for Google Apps, Zoho, Asana, and also for Moodle and other learning management systems.

With regard to disadvantages of collaborative tools, especially those implemented as online services, most are derived from the perceived negative aspects of cloud computing technologies. A major concern is related to security and privacy issues. In the case of educational activities these issues are of relative importance, since the privacy is not as critical as in applications managing personal data or internal company information.

Another issue with cloud-based tools is closely related to one of the advantages mentioned above. The fact that application providers have an absolute control over the functionality offered by their services allows them to upgrade the online applications to adapt them to users' requirements. However, they sometimes do so without previous notice, and may force users to change usage habits when they would prefer to continue working with the previous version of the application with which they felt more comfortable.

As for mobile applications, their disadvantages come from the particular characteristics of the mobile devices: display size, touch-based input method, battery autonomy, network availability, etc. Obviously a smartphone or a tablet is not the ideal device for writing a long report about the student's activities, but it is appropriate for taking short notes in situ that could be otherwise forgotten when preparing the final report. Da Silva et al. (2013) have performed a study of the problems of mobile applications and web applications adapted to mobile access in the specific case of e-learning environments. They conclude that a better integration between devices and applications needs to be explored to enhance the user experience.

7 CONCLUSIONS AND FUTURE WORK

We have presented a proposal for the monitoring of a specific type of courses, in which all the learning takes place outside the classroom as it is the case in the Practicum or internship. This proposal is based on collaborative tools for managing progress reports, i. e. their preparation by students and their assessment by tutors, to be accessed from mobile devices given the external location of the learning process in these courses. We have shown that the technology is already available and the devices are in widespread use, and the implementation of our proposal is neither excessively complex nor expensive.

We plan to evaluate the use of different mobile collaborative tools inside a LMS platform, namely Moodle, and according to the results of this evaluation we will implement the integration of the selected tool, following simplicity and user friendliness criteria.

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