Adaptive competence-based system in an e-learning platform
Adapting support tasks to students

Juan Manuel Vaca, J. Enrique Agudo, Mercedes Rico
Department of Computer and Telematics Systems Engineering and Department of English Philology
University of Extremadura
Mérida, Spain
{juvasa, jeagudo, mricogar}@unex.es

Abstract—Under the auspices of the most recent education legislation, teachers are urged to apply competence-based evaluation to monitor students’ progress towards the effective acquisition of key competences. As students have different learning needs and develop key competences at their own pace, we propose an alternative approach that would help teachers register students’ tasks and evaluate them against such competences within an eportfolio that in turn forms part of an e-learning platform. In addition to this evaluation, the integration of support tasks adapted to each student’s needs could encourage acquisition and independent learning.

Keywords- Key competences; Assessment portfolio; Adaptive systems; Support tasks; Competence-based learning

I. INTRODUCTION

In Spain, the current education law, based on the framework for key competences in a knowledge based society [1] establishes a set of eight competences to be developed in primary education and consolidated in secondary school [2]. These key competences are based on the need for knowledge, skills and attitudes that enable personal fulfillment and development, active citizenship, social inclusion and employment [3].

In the light of this educational context, a portfolio could be an effective tool for monitoring competence-based evaluation because it involves the collection of evidence that demonstrates a learning process over time [4]. Though there are a wide range of portfolios available for this purpose [5], in this case, we refer to it as an educational eportfolio which includes features such as: reflection, critical thinking and monitoring that are used for supervising and evaluating students’ competences.

Moreover, all students do not learn processes and concepts within a subject at the same rate and therefore do not develop key competences in the same way. Adaptive Hypermedia Systems offer a solution to this, since these systems adapt their content or navigation to a student model, that is, to the characteristics, needs or personal goals of each student [6]. Therefore all student data recorded in the eportfolio can be used to personalize student’s learning.

II. MOTIVATION AND OBJECTIVES

Considering there are no in-depth studies in this field, our objective is to research competence-based evaluation models and their effect on students’ progress as well as their role in identifying competence acquisition. In our case, (Extremadura), primary and secondary teachers have an electronic tool available to them to record students’ grades, but it does not allow monitoring throughout the learning process and evaluation based on key competencies as established the primary and secondary curriculum and required by the education act [7]. Therefore we aim to create a tool which allows teachers to appropriately monitor their students and to gain insights concerning the application of a competence-based evaluation model.

On the other hand, the integration of a task-based adaptive system would help each student to identify weaknesses and recommend tasks to address. This system would recommend tasks according to the learning profile of each student and based on their progress towards key competences and focused on individual weaknesses.

In this sense, our portfolio implementation focuses on creating a tool with two main objectives: (1) it allows teachers to record their students’ progress based on their development of key competences through tasks recorded and evaluated in an eportfolio –see part 1 in Fig. 1-; and (2) it recommends supporting tasks, created by teachers, to enable students to improve their competence abilities, according to each student’s progress as recorded in the eportfolio – see part 2 in Fig. 1-.
III. RESEARCH PHASES

To achieve our objectives, we have designed the following stepped procedure:

First, we will evaluate which e-learning platform has features compatible with our objectives. Teachers involved in the research will then design tasks and assessment criteria that will form an eportfolio that can measure progress against key competences. Teachers indicate the percentage of a key competence developed within each task and to which topic or sub-topic of the course the task belongs. In addition to self-evaluation by students, teachers will provide feedback to students on each task.

Likewise, adaptive support tasks will be developed by teachers to be used within the platform. The parameters to be taken into account for the design of each adaptive task need to be established. Therefore we must decide what to measure with the recorded data in the evaluation and what method we will use to recommend tasks to students that meet their needs. In order to recommend support tasks, we need to take into account which competence is the least developed and in which topics a student is underperforming and whether to use these data individually or in combination; or to consider other parameters. In addition, we need to know what method (e.g. Clustering [8] or Reinforcement Learning [9]) is suitable for each support task. Once these decisions have been taken, the adaptive system can be developed.

Finally, when the design and development of the tool is complete, it will be tested in a group of schools. Therefore teachers and students will need to be trained in the use of the tool. The tool will then be evaluated within the schools to observe whether assessment based on key competences in primary and secondary education is appropriate for students learning, how students participate in their learning and the impact of the support tasks have on improving the students’ competence levels.

IV. CURRENT STATE

In the first year of this project (2011), we designed and started to create the eportfolio, tool which would help us create the adaptive system. This tool was designed within the e-learning platform Moodle, chosen because it is open-source and also because we have been working with it for some years. Thus, to design the eportfolio we used some of the features offered by Moodle such as user management, courses and content, as well as the grade book.

The implementation of this tool is based on the evaluation of tasks according to the eight key competences established by the relevant legislation. Before we worked on the design, we interviewed some teachers in order to create that suits the task.

The final version of the eportfolio will include tasks that can be evaluated as well as the provision of feedback to students. Teachers will have the following options to create tasks within the system: create tasks and allocate them to subjects and topics within the course; weight the tasks depending on their importance; allocate the percentage of competences developed through the task; and assign evaluation criteria to grade the task. All of the above is based on the curriculum of the institution.

Over the next few months, we are going to evaluate a prototype of the tool and modify it based on the feedback we receive. In addition, we will collaborate with another research group who work with adaptive and collaborative systems in order to develop the adaptive part of our project.

V. FINAL REMARKS

This project is focused on an assessment system recently adopted in Spanish education based on key competencies that need to be developed in primary and secondary education. This research is novel in that this assessment system will be used by teachers in their classrooms through an eportfolio and is also focused on designing a new adaptive system to recommend supporting tasks to help students develop their key competences and improve learning.

This thesis project encompasses two current education needs: on the one hand competence-based evaluation and self-assessment, and on the other hand tasks adapted to the students’ individual needs. Furthermore, this project includes new features, such as collaborative tasks adapted to different student groups or tasks that take into account the learning context, which provide opportunities for research in the future.

ACKNOWLEDGMENT

This work is supported by the Regional Government of Extremadura, Spain, through the project PRI09A067 and research group grants.

REFERENCES