
Isak Shabani¹, Fatos Halilaj¹, Betim Cico²
¹ University of Pristina, Faculty of Electrical and Computer Engineering, B. Diellit w/n, 1000 Pristina, Kosovo
{isak.shabani, fatsos.halilaj}@uni-pr.edu
² CST, SEEU, Tetovo, Macedonia
{bcico}@seeu.edu.mk

Abstract. We are all used to evaluation methodologies in Balkan Universities. Lecture hearings, numerical and lab exercises, in some cases projects as a homework done in individual or group. But, for the final evaluation we have to go through final exams from where the final mark is taken. Having in mind the overload which comes out of a course following this manner it is impossible to thoroughly evaluate on which part a student is better. In this paper we treat process automation of the evaluating process in higher education using competences. The way these competences are organized, activities which are related to these competences and course contents which will help us to continuously evaluate students and prepare them for the labor market.

Keywords: competence, competency, e-learning, evaluation, learners support, methodology, competence management system

1 Introduction

In higher education, it is very important that closeness and communication between students and professors to be at the right level. In this paper we discuss the engagement of different level competencies which will increase teaching activities and would keep students focused on their studies. All this will be done based on the recommendations of EHEA using ECTS credits and hour engagements per ECTS unit. One of the fundamental aspects of higher education for a state is the research for market needs from which competences for different study programs would be created. With the use of competencies in the University of Pristina we aim to prepare students professionally and based on the market needs and requirements [1].

As part of this pilot project which we have taken as a sample for our results, we will provide details on the creation of competencies, their relationship with relevant courses, creation of activities, mapping activities with relevant course and contents. Furthermore, we explain activity assessment which leads to the extraction of final grade automatically providing students with transparent and real-time assessment.
2 Competence

With competence we understand the ability or skill to realize something successfully or efficiently. Students will gather competences by taking part in different teaching activities which are related with teaching contents [2]. It is recommended that a particular course be given no more than 5-8 competences. Based on the recommendations of [2] University of Pristina has decided that competences be divided into two main categories:

- **Transversal or Generic Competence** – This set of competencies consists of instrumental competencies which are gathered by the end of study program of university courses, providing students a guarantee for the future and preparation for their professional life.
- **Specific Competence** – These are specific competencies for study program. These competences make distinction among different study programs. These are specific for the department of studies in University of Pristina.

*Example:* Competences in bachelor studies in the program of Telecommunications are different from those in Computer Science. This indicates that students from Department of Telecommunications will gather different competences compared to the students from Computer Science Department or other program.

2.1 Competences in University of Pristina

University of Pristina has created competence catalogs for the pilot program in a few academic units and is working to extend the catalogue for other study programs too. Using competence matrix we create the link between course and the competence (see Table 1).

<table>
<thead>
<tr>
<th>Competence</th>
<th>Course 1</th>
<th>Course 2</th>
<th>Course 3</th>
<th>Course n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence 1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Competence 2</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Competence N</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Numbers (1) which are placed in the above table mark the relationship between the competence and the course. To keep the process simpler, it is recommended that for a single course there be no more than 5-8 competences specified. In the case provided in the table (see Table 1) we can observe that Course 1 is related to competences \{1, n\}, Course 2 with competences \{1,2, n\} and so on.
3 Students Role

Students will have access to the course syllabus, teaching activities, they will be able to see different notifications and results and their overall assessments. The CUP (Competence System in University of Pristina) interface will be an important factor because the students will have a better overview of their achievements on their studies. This will allow the students to focus their studies and their commitment on these parts that they have less succeeded successfully. This will increase the study quality, their professional preparation and increase the competitiveness. The syllabus and the teaching activities will be a contract between students and their teacher.

4 Teaching Activities

To increase students’ engagement, teaching activities are created. Table 2 shows details with all attributes for a teaching activity.

Table 2. Teaching activity details and attributes.

<table>
<thead>
<tr>
<th>Activity Title</th>
<th>Description</th>
<th>General data</th>
<th>Type of activity</th>
<th>Hour summarization of student’s engagement for activity</th>
<th>Evaluation criteria</th>
<th>Mark %</th>
<th>Relation with competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity Title</td>
<td>Description</td>
<td>General data</td>
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<td>Evaluation criteria</td>
<td>Mark %</td>
<td>Relation with competence</td>
</tr>
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<td>General data</td>
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<td>Hour summarization of student’s engagement for activity</td>
<td>Evaluation criteria</td>
<td>Mark %</td>
<td>Relation with competence</td>
</tr>
<tr>
<td>Activity Title</td>
<td>Description</td>
<td>General data</td>
<td>Type of activity</td>
<td>Hour summarization of student’s engagement for activity</td>
<td>Evaluation criteria</td>
<td>Mark %</td>
<td>Relation with competence</td>
</tr>
</tbody>
</table>

**Table 2.** Teaching activity details and attributes.
Activities are divided into two main categories:

- Activities that are evaluated and
- Activities which are not evaluated

### 4.1 Activities that are evaluated

Evaluating activities play an important role in overall assessment of the students. During the creation of activity the weight in percentage for the final mark is given. Final mark will be extracted as a result of the sum of all evaluating activities specified for a single course.

The total percentage of all activities should be 100%, thus it is important that percentage be divided uniformly. CUP makes this process easy by disabling professor’s mistakes in percentage, by limiting them not to overcome the total of 100% or by giving warnings when this values is less than that for the evaluating activities.

### 4.2 Activities which are not evaluated

These activities include all activities that do not directly affect the assessment of the student. Some of these activities might include:

- Lectures
- Numeric exercises
- Labor work
- Dictation and
- Other activities which do not directly affect assessment.

### 5 Evaluation of learning process

Evaluation of learning process will be continuous by assessing learning activities, those activities that are assessable with the effect on the final mark. The result of each activity is transparent until the final assessment. Evaluating techniques in UP are not always continuous, most of the professors follow classic methodologies of assessment by evaluating student only at the end of semester by providing them final exams.
In the following we explain how the continuous evaluation is realized for a course based on activities and competence evaluation for overall studies from which a diploma supplement is extracted. Courses have different activities where some of these activities will be evaluating and will have direct effect in final mark. Competence Software developed for the University of Pristina is based on the above logic and will do all these calculations automatically and keeping all this process as simple as possible.

5.1 Evaluating activities

Evaluation is done for activities that are linked with competences which students attend and get assessed. Also, activities are linked to course contents. Table 3 shows list of activities per course with evaluating activities, their weight in the final evaluation and grades for each activity.

Table 3. Activities and course final assessment.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Course</th>
<th>Mark percentage</th>
<th>Grade for activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 1</td>
<td>Course Name</td>
<td>10%</td>
<td>10</td>
</tr>
<tr>
<td>Activity 2</td>
<td></td>
<td>20%</td>
<td>10</td>
</tr>
<tr>
<td>Activity 3</td>
<td></td>
<td>30%</td>
<td>10</td>
</tr>
<tr>
<td>Activity 4</td>
<td></td>
<td>40%</td>
<td>10</td>
</tr>
<tr>
<td>Percentage and final grade</td>
<td></td>
<td>100%</td>
<td>10</td>
</tr>
</tbody>
</table>

As can be seen from the above table requirements are that overall activity percentage be 100%. In this case (see Table 3) we have taken an example where student has taken maximal grade 10 for each activity thus its final grade is 10 [3]. Mathematically this can be expressed in the following relation (1):

\[
 FinalEvaluation \left( \text{Course}X \right) = \frac{\sum Grade(\text{Activity}_n) \times Percentage(\text{Activity}_n)}{10} \tag{1}
\]

From relation (1) we can see that final assessment depends on activity evaluations. Calculation of a single activity will result as follows in the relation (2):

\[
 Activity Evaluation = \frac{\text{Activity Grade} \times \text{Percentage}}{10} \tag{2}
\]

Example: Based on the equation (2), if we take a learning activity named “Group Project” and if it’s evaluated with 30% weight on the final grade, and if after assessment student gets grade of 9 we calculate:

\[
 ActivityEvaluation(\text{Group Project}) = \frac{9 \times 30}{10} = 27 \text{ points}
\]
After doing the same calculating for each activity using relation (2) we can extract final results (final assessment) for overall activities in a course using relation (1).

Final assessment based on standards and agreements in the University. In University of Pristina grading is done through points i.e.: 0-49=5, 50-59=6, 60-69=7, 70-79=8, 80-89=9 and 90-100=10 [3].

5.2 Competence Evaluation

As specified above each learning activity is linked to specific or transversal competence. Therefore we should do calculations so that we can extract results from overall assessment and list competences which the student has acquired. CUP enables extraction of diploma supplement at completion for graduate students, which as addition to diploma provide better overview of student’s qualifications and competences.

In the following methodology for evaluation of competence in the general level of study program is explained.

Competence mapping for study program in tabular form is given in the following (see Table 4).

Table 4. Mapping of competence and course.

<table>
<thead>
<tr>
<th>Competence 1</th>
<th>Course 1</th>
<th>Course 2</th>
<th>…</th>
<th>Course N</th>
</tr>
</thead>
<tbody>
<tr>
<td>√ (30)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competence 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>√ (15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competence 3</td>
<td>√ (10)</td>
<td></td>
<td></td>
<td>√ (30)</td>
</tr>
<tr>
<td>…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competence N</td>
<td>√ (40)</td>
<td>√ (30)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From Table 4 we can see that Competence 1 is referenced in Course 1 with 30 points, in Course 2 with 20 points. Competence 2 is referenced only in Course 2 with 15 points. Competence 3 in Course 1 with 40 points and in Course N with 30 points.

Calculations of percentage for course (highlighted in blue in Table 4) is calculated with following formula (3):

\[
ReferencePercentage\ (K,L) = \frac{\sum_{i=1}^{n} A_{n}}{n}
\]  

(3)

Where:
- \( K \) – Competence,
- \( L \) - Course,
- \( A_{n} \) – Total points in each activity (calculated using formula given in relation (2),
- \( n \) - Number of activities where the competence has been referenced.

Calculation of total points gathered for competence in general level (study program level i.e., Computer Science, Telecommunication, etc.) is calculated using relation (4):
Based on the equation (4), if we calculate total points from Table 4 we will get the following results: Competence 1 = 25 points, Competence 2 = 15 points, Competence 3 = 20 points and Competence N = 35 points. From where we can understand that the student has been best in acquiring Competence N, which has 35 points. These values (points) based on the agreement can be converted into grades (from 5-10) or with literals.

6 Competence in University of Pristina CUP

CUP is developed based on the procedures of Quality Assurance Framework of Qualifications [4], and recommendations of cooperating teams inside University. The aim of this system is to develop and promote procedures, assessment instrumentations for improvement of competence harmonization according to competences developed in higher education institutions for labor market requirements.

The CUP is a research-supported system based on the Primary goal of defining the critical competencies (behaviors) needed for effective and superior individual and institutional performance [5].

Main motivation of research: identify the competencies of the faculty members for the competitive enhancement of the educational institution, Develop a competency model for the faculty members, Integrate the competencies and the job functions of the faculty member in the institution and Extract the significant patterns from the competency database to help in succession planning and performance assessment [6].

In the following we provide screenshot excerpted from CUP. To keep all this simple we provide only the most important views.

6.1 Mappings between competence and course

Fig. 1 depicts a view of mapping department and transversal competences.
As can be seen from the figure, the user which has Management (user-role) access can choose competences which are relevant to the selected course (see Figure 1).

### 6.2 Education Planning

Fig. 2 depicts a view from Professor user-role where all education processing is done including content definition, creation of learning activities, mapping activities with competence and content, and final evaluation.

As can be seen from the above figure, professor is able to see the hour-engagement in total which help them see if they’ve created enough hours for the required total (shown in brackets as 150 in Fig. 2). Based on the recommendations of [7] one ECTS credit is equal to 25 to 30 working hours.

### 6.3 Activities

The following figure (as shown in Fig. 3) details for creating an activity can be seen.
During the creation of activity the Course’s professor will choose type of activity, specifies engagement hours for activity, specifies weather the activity is assessable or not. In case when assessable activity is created the assessment criteria is specified and the weight in percentage for the final grade is provided. In the final part, competence-activity and content-activity mappings are provided by choosing relevant competences and contents that this activity will develop.

### 6.4 Activity Evaluation

As shown in the following (see Fig.4) the list of choice for activities is provided such as that when professor selects one of the evaluating activities it can evaluate each student by providing a grade to each one. A list of student enrolled for the specified course and teacher will be provided.

For each student in the list a grade is provided as per merit. The CUP then based on the Final Evaluation provided by Equation (1) makes automatic calculations by providing final grade as a recommendation every and each time a new activity is evaluated with a grade (an example given in Fig. 5).
CUP recommends final grade based on the results provided for each activity. At the end professors will decide for the final grading and they’re able to confirm the final grade. After professor has confirmed the final grade, students can decide if that’s the grade they want or refuse it for re-assessment. If the student also confirms the same, final grade is moved to the transcript of records.

7 Conclusion

Preparing students for labor market plays an important role, Competence Software in University of Pristina is developed to provide that. Having organized learning activities and mapping them with different competences helps students acquire more competences and prepare professionally. As this pilot project has been implemented in 4 faculties in UP and it has proven to impress students and teachers our goal is to extend it further.

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References