Tutor Platform for Vocational Students Education

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Abstract—Current vocational education characteristics as well as the dropout rates and compared to students' motivation, suggest the need for a system that allows and supports students to work towards the ultimate goal of their training: "Incorporating vocational students into the workforce". In this paper, we present a learning platform designed and developed to empower vocational and college students; a second aim is to provide students, faculty and staff a system to control and acquire new qualifications based on the official curriculum and work experience. The curricula-based improvement of the individual student's curriculum can be strengthened and improved when using the system, for the areas teachers determine necessary for each student. Consequently, the end system supports and contains official curricula information based on workers' professional qualifications, skills and competencies.

I. INTRODUCTION

VOCATIONAL education operates to serve the labor market needs for specialized technicians. Currently, vocational education in Spain is far from the enrollment rates recorded within the European Union's average. The rate involves early school leavers who do not get a post-compulsory degree or Bachelor or vocational education; these dropout rates have increased in 2000; the rate was 29.1% of the total, while in 2007 it was increased to 31% and 31.9 in 2008, compared to 14.9% of the EU average. We also found a graduation rate in intermediate vocational education in Spain at 39%, far from the 51% of the European average, and from the 45% of the average within the European Economic Community [2].

Currently there are 639,887 pupils within vocational education, of whom 312,441 students study middle level vocational training, 288,861 students study upper undergraduate studies, and 385,86 students study distance vocational education. With some recent changes in 2012, 15.7% of the students, compared to the previous year 2011, have decided to pursue distance learning and dropout data with previous years has declined to 26.5% [3]. Based upon such data, we found that the 20.5% of the jobs in Spain are actually technical derived from vocational education. In fact, the industry has experienced an increase of 1.32 points and 9.62% of this specific labor supply related to technical staff from vocational education. Finally, the number of jobs for new graduates has been increased by 35.22% and 9.62% of these offers refers to technical jobs again obtained from vocational education [4].

The vocational education cycles are related to the technical and professional skill levels degree obtained in Spain. Thus, the educational ministry is in a process of adapting the current titles to the professional qualifications in Europe (European Qualifications Framework, EQF).

For the titles to be valid, the professional qualifications are structured based upon associated curricula, and thus, they directly affect the teachers' schedules. To follow this curriculum, the students are on a six years' formal training, to achieve professional qualifications specified by the training cycles. The structure associated with the vocational education teachers, facilitates the creation of activities tailored to the current companies' needs, the in situ immediate environment, and sometimes it involves a car provided to the students depending on the labor market needs. Currently, one of the real problems is that the professional qualification a student acquires is not related to the real knowledge, skills and competencies he needs, compared to the ones acquired in the academic courses (i.e. improve the level of basic skills in foreign languages).

In this paper, we conduct a study on tutors' needs for a platform to support vocational education students, workers and college students. This tutor-based platform is seeing from two perspectives, the official curricula and each student's personal curriculum, in order to meet college, students, and companies' needs. First, we present the current situation in vocational education in Spain for LOMCE[1] [1] and the ways it affects Spanish vocational education, the curriculum structure as well as the associated training cycles. Secondly, based on needs analysis, we define the targets to achieve. Having established the aims and objectives, and based on cloud architecture, we propose the design and development of a platform as well as the ways to use it. Lastly, we finish with conclusions and future work.

II. STRUCTURE AND CLASSIFICATION OF PROFESSIONAL QUALIFICATIONS

Professional qualifications structures with associated curriculum provide the basis for comparison as well as the inter-relationships so to establish the main features of the vocational education units in relation to a system design and development. The professional qualifications characteristics and structure are described below [5] [6] [7]:

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[1] LOMCE: Ley Orgánica de Mejora de la Calidad Educativa

I. Identifying properties:

- **Family:** It identifies the "Family" feature by name, and consists of 26 professional families, of which every family has 5 levels classification, depending on the professional competence required for productive activities in accordance with knowledge required for the specific level.
- **Name:** It identifies the professional qualification that is within each of the families, also following specific levels.
- **Code:** It is a unique identifier, an alphanumeric code, consisting of the first letters of the family and the numeric code identifier.

II. Properties that define objectives and scope:

- **General Competition:** Competition is defined as "the set of knowledge and skills that allow exercising professional activity in accordance with the requirements of production and employment."
- **Professional Scope:** The productive sectors and occupations or jobs are related to specific professional qualification.
- **Productive Sectors:** This is a sector in the economy that produces a material. The productive sector includes mining, forestry, fisheries, agriculture, industry and energy, but excludes government activity and social services.
- **Units of competence:** Competence is to perform each qualification functionality. Therefore, the unit of competency is the minimum aggregate susceptible to recognition, evaluation and accreditation part.

III. Identification Data:

- **Name**: It identifies the Competence Unit (UC). It is related to one of the aspects that describes the general competence of the professional qualification, which is associated with the UC.
- **Level of qualification:** The level of professional competence qualification to which UC is associated with, according to the degree of complexity, autonomy and responsibility required to perform a work activity (these are five levels).
- **Alphanumeric code:** It allows locating systematically the units in the qualification competition with which they are associated.

IV. Professional Achievements:

The Professional Achievements are accomplishments as competition elements that set an individual's expected behavior, in the form of consequences or results of the functions or activities s/he performs.

V. Performance Criteria:

They express the professional performance acceptable level of a certain function, so as to meet the associated pro-ductive organizations' objectives. Thus, they construct a guide towards the professional competence assessment.

VI. Professional Context:

Describe, as a mentor, production media, products and results of the work, information used or generated and the ways several items of a similar nature are considered necessary to frame the unit of competency.

This professional qualifications system applies on vocational education to ensure that students receive formal training according to a regulated system within the European Union. There is no tracking application in the market for vocational education students, unemployed, and job seekers to support the professional qualifications management according to the rules and the training they receive.

III. System Description

VII. Definition and Objectives:

Having dealt with the qualifications system and its relationship with the educational system and vocational education in particular, and in addition to understanding the professional qualifications system structure, we present the design and development of a supporting platform. This platform automatically establishes a student's acquired professional qualifications via a combination of competency units. An example is provided for students' new professional qualifications acquisition as follows:

- Workers: Describes the student's successful work expertise and competence units during his/her vocational education, in addition to several more free settings competency units s/he may acquire new professional qualifications.
- Student training: The student can acquire new qualifications in addition to previous ones via training units adapted to student's needs. In this way, students can complete their degree with more professional qualifications susceptible to recognition within the training courses that are in the same professional family, see section II-point A.
- College students: Students can gain relevant professional qualifications through the courses curricula corresponding to professional families, or students may opt for an acquisition of professional qualifications advised by their teachers or following their own criteria.

The system also identifies and distinguishes student diversity and competence; gifted students may develop more skills and students who do not meet the minimum requirements for the qualification have a professional qualification on a level they could complete. As a result, an increase on students' motivation is possible as well as they can improve their professional qualifications through formal training in universities and also in schools where vocational education is provided.

VIII. Teaching Methodology:

In regard to the teaching methodology and the minimum knowledge students should acquire in associated taught subjects, specific teaching methods were developed. The ones that allow student's abilities maximum development using learning technologies are related to the constructivist methodology; the student builds upon their own methods using provided tools to solve a given situation or problem [8] [9].

To achieve this, the main aim of the platform is to design an annual training plan for each student built upon the objectives set at the beginning of their academic year. Thus, they can be aware of what the qualifications acquired once evaluated, in addition to what content they should study and work with the help of their teacher or tutor. Therefore, our duty as instructional designers is to build a training plan that includes all the educational stages a student can follow, or an academic plan. In case of a worker, a tutor academic plan is provided, that encompasses professional qualifications completed over a period of time to achieve these objectives.

IX. Architecture:

A system in a cloud can enable and support the students, teachers and workers to interact. This system allows the inclusion of ancillary services and associated performances. We have chosen cloud architecture, because, in addition to supporting phased development over time and adding new services, it facilitates their deployment and growth and can be integrated within diverse systems built by other agencies.

Figure 1 shows the system architecture: it operates in two hybrid clouds that receive information from outside, and in turn, it communicates such information within these clouds.

The platform begins with data collection, based on data from institutions and actors who interact in the platform; these are the teachers, students and workers.

In green color The "Qualifications CTutor" cloud is depicted with green color; it provides services for data collection and maintenance for professional qualifications. Also the data "Integration Services" is represented; these services collect data from students' curricula in order to normalize the data and adapt it to specific needs. What we ensure is data normalization and structure by following the structured criteria, previously presented in section two. Thus, once the data is structured and validated, the curriculum profile for students and workers is created.

Separated into two distinct groups, students and workers, the connection to obtain new skills and create the workers' curricula is established; also a map of the obtained qualifications exists as well as the professional qualifications they may obtain from their studies (student or worker). The tool also indicates the specific qualifications to update or enhance. This cloud contains students' curriculum profile adapted to the national qualifications system, which allows and supports the growth of students' professional qualifications, keeps updated these professional qualifications on the profile, and adapts it to possible changes.

- Students: It contains the data obtained by the official curriculum and the objectives that the students have achieved in each of the official training courses; this is in order to have enough data to seek the needed professional qualifications according to their training needs and establish a curriculum to obtain professional qualifications that can be obtained by their studies.
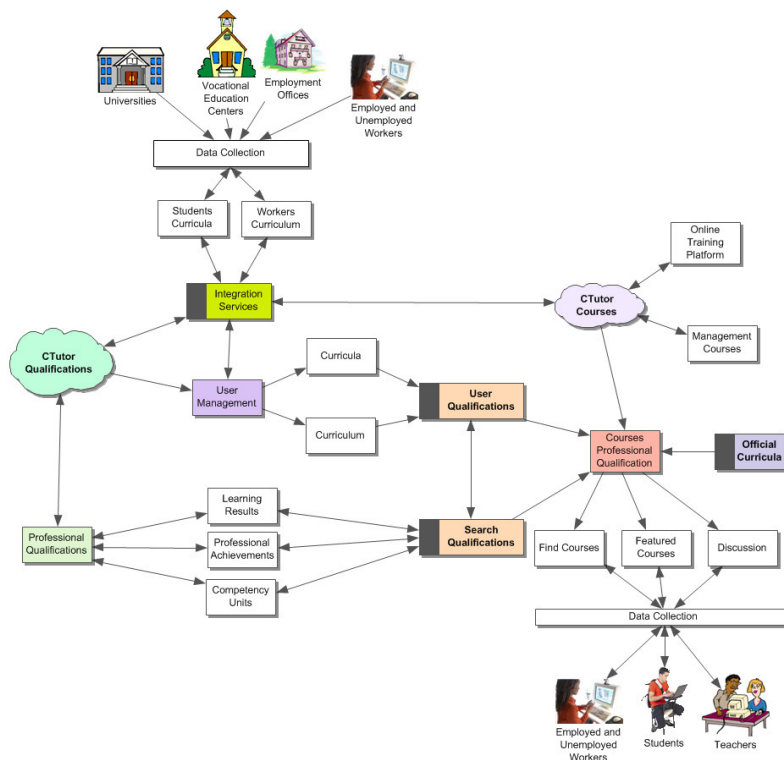

Fig. 1 System Architecture

- Workers: The data come from their curricula vitae; the CV must certify and accredit workers to obtain professional qualifications and training required for other professional qualifications; we also need to keep updating qualifications achieved to date.

The cloud "CTutor Courses" in purple color contains the services that facilitate the teaching and learning process. This cloud is fed by the data sent from the "Qualifications CTutor" cloud, and contains the necessary parameters to find the courses and users' profiles. The tool offers three options for choosing courses:

- **Find Courses:** Users can search for courses that best suit to their profile and then they can choose and start the registration process in the course, so to obtain the associated skills.

- **Featured Courses:** Users can access the recommended courses from their profile; this is the interface where teachers and human resource centers can recommend students what the way forward should be for training in accordance with the criteria to establish and improve the curriculum for pupils according to their official studies. In the case of workers, it is related to the needs that the company has about the qualification the company's employees must have, and also new expertise acquisition.

- **Discussion:** Students, teachers and community members enter into the debate educational course selection; as such, students can follow and solve any doubts on the process of choosing new courses. Sometimes it can be the case that a student or a worker is not aware of the comprehensive curriculum, so they can take advantage of the system and proceed to required corrections. At this level tests are included to accurately assess the student's knowledge, also including the necessary tests for languages found as required for the workers' skills as well as students' reinforcement in their language subjects.

It is important to keep the system updated, for that we include the official curricula of vocational education courses. As for the inclusion of qualifications in training courses, the target is to obtain formal qualification training at the end of several professional qualifications collection.

IV. How The Systems Works

The ways a student acts on the systems is represented here: after reviewing his/her profile, s/he has access to existing courses within the platform. The student detects that the platform recommends more courses than he already has, so to obtain better professional qualification. The platform offers him/her the possibility to start the acquisition process with these new courses, by, first, selecting them, and later, request the tutor's approval.

Fig. 2 Courses Screen

Figure 2 shows the information and actions that a student can visualize i.e.: students can view the detailed information about specific courses, a list of recommended courses and expected professional achievements. Therefore, based on such information, the student can work to obtain the best possible professional qualifications. The platform also offers a set of actions like:

- Consult personal data: The student can visualize his personal data and request the needed changes.

- Course Registration: The student can ask for registering with a set of courses at the beginning of each semester.

- Registration Errors Correction: If the student identifies registration errors, s/he may ask for corrections, and follow the request process.

- Courses Schedule: It shows the student his/her academic calendar (list of courses, rooms, time, etc.)

- Selecting favorite courses: The student may identify a course as a favorite course, so that both the tutors and the platform can list associated recommended courses for the student to study, so to improve his professional qualification specifically for this specific field.

- Searching for recommended courses: The student may ask for a list of recommended courses associated with his/her degrees.
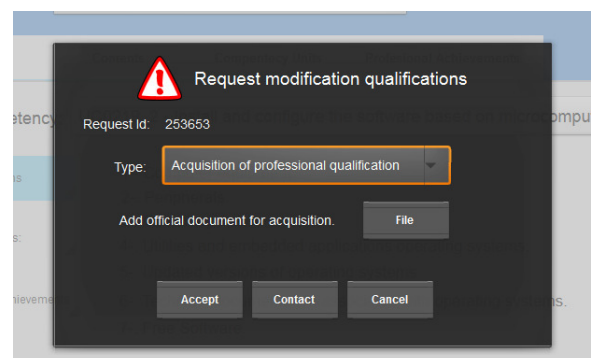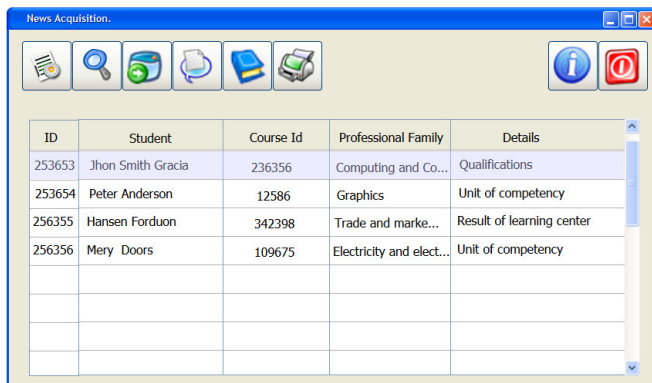

Fig. 3 Data Acquisition

Once a student observes that s/he already has the capabilities to acquire a competency unit, s/he may start the process of adding it to his/her professional qualifications, as in Figure 3. The student also has to argue about the merits with the administrators so to launch the validation process.

Fig. 4 System, new acquisition

During the acquisition process, the system sends a notification to inform the student about the process and the steps s/he has to follow, as in Figure 4. Once the student performs the requested information, s/he receives the notification informing him/her that the request is resolved; this service uses a message center.

V. CONCLUSION

The presented system aims to ensure students' and workers' improvement on the curriculum under the qualifications set within the European framework. Such system can keep the curriculum updated and allow the students to develop new qualifications based on skills acquired in formal training courses. The system interacts with users and provides all necessities related to the academic teaching methodology supporting the curriculum internationalization according to the European Qualifications Framework (EQF); an example is the language courses as they are becoming preparatory in Spain. As for the educational process, the students are able to perform additional studies, and thus, achieve more skills and be empowered in their curriculum subjects.

Following the platform design and development, future possible legislative changes are considered to adjust the platform to any new legislation structures and professional qualifications, as well as to adapt it according to the public academic administrations.

REFERENCES

[1] Borrado Lomce http://www.mecd.gob.es/servicios-al-ciudadano-mecd/participacion-publica/lomce.html
[2] Bolívar Botía, A., & López Calvo, L. (2009). Las grandes cifras del fracaso y los riesgos de exclusión educativa. Profesorado: Revista de curriculum y formación del profesorado, 13(3), 51-78.
[3] Ministerio de Educación, Cultura y Deporte. Datos y cifras Curso escolar 2012/2013. http://www.mecd.gob.es/dctm/ministerio/horizontales/estadisticas/indicadores-publicaciones/datos-cifras/datos-y-cifras-2012-2013-web.pdf?documentId=0901e72b81416daf
[4] Adecco, soluciones de recursos humanos. III Informe Empleabilidad y Formación Profesional http://www.adecco.es/_data/NotasPrensa/pdf/410.pdf
[5] Cualificaciones http://servicios.aragon.es/eac/webgcp/cualificacionProfPublico.editar.do
[6] Ministerio de Educación, Política Social y Deporte. Instituto Nacional de las Cualificaciones. Informe del Sistema Nacional de Cualificaciones y Formación Profesional. Edita Subsecretaria General Técnica.
[7] LEY ORGÁNICA 5/2002, de 19 de junio, de las Cualificaciones y de la Formación Profesional.
[8] Santángelo, H. N. (2000). Modelos pedagógicos en los sistemas de enseñanza no presencial basados en nuevas tecnologías y redes de comunicación. revista Iberoamericana de Educación, (24), 135-162.
[9] http://www.csems.uady.mx/media/docs/Formacion%20docente/Constructivismo%20y%20Competencias.PDF