

International Collaboration inside Technology Enhanced Learning from UNED

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Abstract— This article opens new research and innovation teaching activities in four different new areas and projects mainly oriented in disseminate and integrate technology enhanced learning in several new geographies regarding digital and practical competences to new students regarding some disadvantages and disabilities to increase their literacy for future education development,

Keywords—Erasmus Plus, TEL, Technology Enhanced Learning, Research, Teaching innovation, Competences.

I. INTRODUCTION

Since 2014 the UNED (Spanish University for Distance Education) in Madrid, Spain, is been involved in several Erasmus Plus projects mainly oriented to innovation in teaching and research inside the field of Technology Enhanced Learning and to provide support and new competences and knowledge to several academic and industry institutions in Europe, Middle East and South America, inside the mEQUITY, mRIDGE, VISIR+ and PILAR Projects.

All those projects have some activities in common:

- Applications of Technology to improve education,
- Research and teaching innovation activities,
- Education methodology and evaluation/quality assurance application, and
- International collaboration to increase synergies and apply competences in new geographic areas.

II. MEQUITY PROJECT

mEquity project (Improving Higher Education Quality in Jordan using Mobile Technologies for Better Integration of Disadvantaged Groups to Socio-economic Diversity), [1], is an Erasmus+ Capacity Building in Higher Education 2015 project, n° 561727-EPP-1-2015-1-BG- EPPKA2-CBHE- JP, starting in November 2015 and finishing in October 2018. The coordinator of the project is the Plovdiv University.

Partner's of the project are: Plovdiv University, (Bulgaria) Electrical and Computer Engineering Department, (UNED), and Social Pedagogy and Education Theory Department, (UNED), (Spain), Ravensbourne Higher Education Institution RAVE, (UK), The University of Jordan (Jordan), Jordan University of Science and Technology – JUST (Jordan) and Princess Sumaya University for Technology – PSUT (Jordan).

The project is aiming the development of an adaptive curriculum in engineering education that is based on digital learning resources for mobile devices, responds to the

requirements for modernization and accessibility of the Jordanian high education system to improve the educational integration of disadvantaged learners in the educational system - groups in risk whose special needs or socioeconomic status significantly restrict their ability for adequate education.

We can summarize as specific objectives:

1. Analysis of user needs in different contexts and existing curriculum at three Partners universities.
Given the objectives of the project, this study is oriented toward assessing the extent of use of these technologies by the specified groups of learners and opening opportunities for their inclusion in the learning process.
2. Design of Mobile Digital Resources (MDR) Model to support the didactic features of mobile technologies in order to adapt them to the training conditions of disadvantaged groups of people
3. Design of educational scenarios:
 1. Use of mobile technologies to expand training opportunities for students with special needs;
 2. Use of mobile devices for distant training of socio-economic disabled people.

The general objective of the scenarios is the improvement of the conditions for equal access to education and training by enhancing the motivation to participate in the educational process, by facilitating the access and by additional activities with the students.

4. Development and adaptation of mobile applications and digital educational resources
5. This objective addresses the need for implementation of m-learning generalised across a range of disciplines in the field of engineering education and across institutions, the needs of disadvantaged groups education and training.
6. Strengthening the institutional capacities of the 3 Jordanian universities through short term intensive training of academics and staff members.
7. Creating system of joint actions and co-operation between partner universities.

As well as wider objectives:

1. Increasing the quality of the Jordanian higher education system by promoting the adoption of the

MDR Model as a model for a wider reform of the education in the domain of engineering education for people with special needs.

2. Implementation and promotion of inclusive education practices for students with special educational needs in the Jordanian universities that will lead to delivering a more equal education opportunity for all students.

The project is in the middle of the development and activities I and II has been implemented and III are on-going.

- I. Analyzing the needs of the target groups.
- II. The development of the conceptual model combines the activities of team members and teachers, dealing with students from groups at risk.
- III. Main activities in the scenario development:
 - Defining and implement the methods of training and facilitating the work of the teachers of students in groups at risk in accordance with the scenarios.
 - Defining and implement the types of assessment to be used in the process of training by mobile devices.

III. MRIDGE PROJECT

mRIDGE project (Using mobile technology to improve policy Reform for Inclusion of Disadvantaged Groups in Education), [2], is an Erasmus+ of the Forward-Looking Cooperation 2015 project, n° 562113-EPP-1-2015-1-BG-EPPKA3-PI-FORWARD, starting in November 2015 and finishing in October 2017. The coordinator of the project is the Plovdiv University.

Partners of the project are Plovdiv University, (Bulgaria), Electrical and Computer Engineering Department, (UNED), and Social Pedagogy and Education Theory Department, (UNED), (Spain), Ravensbourne Higher Education Institution RAVE (UK), University of Craiova (Romania), Primary school "Geo Milev", (Bulgaria), Secondary Vocational School for Children with Hearing Disabilities (Bulgaria), Special gimnazial school "Sf. Mina", (Rumania), Regional Industrial Association (Bulgaria) and Plovdiv Municipality (Bulgaria).

The aim of the project is the creation of digital learning resources for mobile devices to improve the educational integration of disadvantaged learners in the educational system - groups in risk whose ethno-cultural characteristics, special needs or socioeconomic status significantly restrict their ability for adequate education.

Specific objectives:

1. Analysis of user needs in different contexts and existing curriculum in Bulgaria and Romania.

Given the objectives of the project, this study is oriented toward assessing the extent of use of these technologies by the specified groups of learners and

opening opportunities for their inclusion in the learning process.

2. Design of Mobile Digital Resources (MDR) Model to support the didactic features of mobile technologies in order to adapt them to the training conditions of disadvantaged groups of people.
3. Design of educational scenarios:
 - Enhancing of interactivity in teaching of Roma children using mobile devices
 - Roma has its own specific characteristics and needs and their integration seeks alternative methods and approaches that will be able to render the necessary influence. The use of multimedia resources in education by mobile devices would be appropriate, because they incorporate something new, figurative and attractive, which has a real chance of a beneficial effect on the motivation of the minority group.
 - Training of learners with hearing disabilities, supported by mobile devices
 - Our goal is integration of students with hearing disabilities into the learning process through the use of innovative educational technologies for learning by mobile devices. Unlike children without hearing problems, children with hearing disabilities perceive visual information mostly because their visual sensitivity is highly developed. Therefore, visual stimuli that support the process of storing information should be used in their teaching.
 - Use of mobile technology to expand training opportunities of people with musculoskeletal disorders
 - Learning by mobile devices has the potential to increase access to education for people with limited mobility, to create a supportive learning environment, independent of time and place - removes spatial barriers - physical classrooms have become redundant in the traditional sense of the word and students can conduct courses from a place and at a time of their choice.
 - Use of mobile devices for distance learning of unemployed
 - This scenario will focus on people who have no access to education because of distance, lack of financial security, socio-economic exclusion. According to this scenario a set of courses for initial qualification based on the e-learning platform DIPSEIL will be developed.
4. Development and adaptation of mobile applications and digital educational resources.

This objective addresses the need for implementation of m-learning generalised across a range of

disciplines and across institutions, for the needs of disadvantaged groups education and training.

5. Improvement of the present policy measures and good practices, and development of new policies and practices in the fields of disadvantaged groups and Roma young people education at the EU member states. By following this strategy it will have a direct impact on European policy making in the fields of education and training.

The project research is subjected to the assumption that digital resources developed with the help of mobile technologies and the use of these technologies in the deployment of digital resources in the learning process will lead to retention of Roma children in schools, better utilization of learning material in the training of students with special educational needs, the opportunity for better integration of disadvantaged students in the existing educational system and possible inclusion of isolated people due to socio-economic reasons in the system. To confirm or reject this hypothesis study will be conducted which will include development of appropriate mobile resources and use of proper diagnostic tools.

The work on the project will lead to the development and adaptation of training modules, improvement of qualification of teachers dealing with students at risk, new teaching methods with the use of mobile technologies and devices, and generally will have an impact on the socio-economic inclusion of disadvantaged groups.

IV. VISIR+ PROJECT

VISIR+ Project (Educational Modules for Electric and Electronic Circuits Theory and Practice following an Enquiry-based Teaching and Learning Methodology supported by VISIR) is an Erasmus+ Capacity Building in Higher Education 2015 project, n° 561735-EPP-1-2015-1-PT-EPPKA2-CBHE-JP, starting in November 2015 and finishing in October 2017, being extended until March 2018. The coordinator of the project is the Polytechnic of Porto.

Partners are Polytechnic of Porto (IPP-ISEP) (Portugal), Electrical and Computer Engineering Department, (UNED), and Social Pedagogy and Education Theory Department, (UNED), (Spain), DEUSTO University (Spain), Blekinge Tekniska Högskola – BTH (Suecia), Carinthia University of Applied Sciences – CUAS (Austria), Federal Institute of Education, Science and Technology of Santa Catarina – IFSC (Brazil), Universidade Federal de Santa Catarina (Brazil), Pontificia Universidade Católica do Rio de Janeiro (Brazil), School of Exact Sciences and Technologies - National University of Santiago del Estero (Argentina), Universidad Nacional de Rosario - UNR (Argentina), Associação Brasileira de Educação em Engenharia - Brazilian Association

of Engineering Education (Brazil) e IRICE-CONICET (Argentina)

The VISIR+ project objectives are:

- to allow teachers enriching course curricula, on electric and electronic circuits theory and practice, by including hands-on, simulated and remote labs;
- to scaffold student's learning and foster their autonomy, namely by allowing them to conduct real experiments, over the Internet (on a 24/7 basis);
- to increase students' meaningful knowledge acquisition and retention by enabling them to compare results from calculus, simulation and real experiments, at any place / anytime;
- to increase students success rates in continuous assessment modalities, particularly those covering the acquisition of experimental skills;
- and, finally, to allow the partner institutions using an ICT-based tool for attracting students to STEM careers, particularly amongst secondary schools.

These objectives will contribute to achieve the following aims in Argentina and Brazil:

- provide the labour market with high-skilled professionals in the area of Electric and Electronics Engineering,
- reduce the number of dropouts from initial years in higher education, in particular in science and engineering degrees,
- increase the number of students that opt for STEM careers, when applying to higher education.

VISIR+ will support to training better engineers in the partner institutions, as well as in an open way in all the world, helping to change the situation in Argentina and Brazil as main focus partners.

Installing a VISIR system in each partner institution will contribute to an increased sense of ownership by local teachers and students. This will facilitate its adoption, namely within lesson plans and as an activity contributing to quantitative assessment. As students are able to access VISIR from any internet-client device, including mobile devices, there is an increased motivation to do more experiments. All these aspects are positively correlated with better students' performance as reported in [3]. Increased motivation and better performance directly contribute to reduce dropouts.

V. PILAR PROJECT

PILAR project (Platform Integration of Laboratories based on the Architecture of VISIR) is an Erasmus+ Strategic Partnership project, n° 2016-1-ES01-KA203-025327, starting in September 2016 and finishing in August 2019. The coordinator of the project is the Electrical and Computer Engineering Department of the UNED.

Partners are: Electrical and Computer Engineering Department (UNED) and Social Pedagogy and Education Theory Department, (UNED), (Spain), Blekinge Tekniska Hogskola (Sweden), Internationale Gesellschaft fur Online Engineering Verein (Austria), Deusto University (Spain), Instituto Politecnico do Porto (Portugal), Espoon Seudun Koulutuskuntayhtyma OMNIA (Finland), EVM Porject Management Experts SL (Spain) and Fachhochschule Kärnten - gemeinnützige Privatstiftung (Austria)

PILAR (Platform Integration of Laboratories based on the Architecture of VISIR) is a project that addresses the following needs:

1. Need of real, extensive and intensive, online, cheap practices for building and interacting with electrical and electronics circuits in engineering subjects of university level, and also as a lifelong learning activity (industry oriented) and at a school and high school level.
2. Need of reliable, highly available, remote laboratory services offered through Internet by a robust remote labs service provider, that will enhance a stronger digital integration for learning and teaching.
3. Need of having these practices available at any time and from anywhere, in a timely and controlled manner, helping to increase the number of graduates at the university that cannot easily access these practices

The main objectives pursued by PILAR are:

- Based in the different implementations of VISIR in several of the partners in the project (BTH, CUAS, UDEUSTO, IPP, UNED), the first objective is building a reliable, highly available, unique international VISIR platform federation, that integrates all the different resources used by VISIR in each of the partners.
- Once established, this federation will be completely opened to other partners in Europe, through easy gateways to the federation, allowing to extend the capabilities of PILAR to much more interested educational institutions.
- Building a set of remote practices, based in this new platform, for electrical and electronics circuits, at school, grade and master level, and also as a lifelong learning activity, that will be offered as remote lab services, to students in all the partners institutions and, as a second step, to anyone interested. The results will bring added value at EU level because the activities can not be attained in a single country.
- Those new remote lab VISIR Internet services must allow, in a transparent way, the use of the best set of remote learning services of each partner in each moment.

IV. CONCLUSIONS

This preliminary paper introduces four new research and teaching innovation projects under the support of the European Union Erasmus Plus Program.

The four projects are oriented to digital competence based introduction in several areas (Jordan in Middle East, Brazil and Argentina in South America, and Romania and Bulgaria in Europe), focusing in several disadvantaged users depending the project and geographic area, including new digital models to perform learning activities (mEQUITY and mRIDGE) or to develop new practical competences based on VISIR remote laboratory (VISIR+ and PILAR)

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