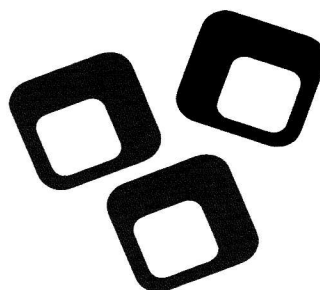# CONFERENCE PROCEEDINGS

Central European Conference on Information and Intelligent Systems
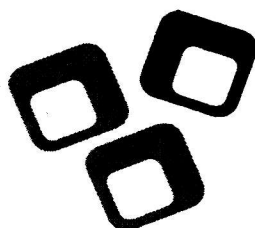
22nd
International Conference
2011

Organized by:
University of Zagreb,
Faculty of Organization and Informatics
Varaždin, Croatia

September 21st - 23rd, 2011
Varaždin, Croatia

University of Zagreb
Faculty of Organization and Informatics Varaždin

22nd Central European Conference
on Information and Intelligent Systems

September 21st - 23rd, 2011
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CONFERENCE PROCEEDINGS

Varaždin, 2011.

Full title of publication:

Proceedings of the 22nd Central European Conference on Information and Intelligent Systems, September 21st-23rd 2011, Varaždin, Croatia.

Short title:

CECIIS 2011 Proceedings

Editors

Tihomir Hunjak, Sandra Lovrenčić and Igor Tomičić

In Cooperation with:

Albert-Ludwigs-Universität Freiburg, Institut für Informatik und Gesellschaft, Germany
IEEE Croatia, Zagreb
Karl-Franzens Universität Graz, Institut für Informationswissenschaft, Austria
University of Zagreb, Faculty of Transport and Traffic Science, Croatia
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University of Maribor, Faculty of Electrical Engineering and Computer Science, Slovenia

Under the Auspices of:

Ministry of Science, Education and Sport, Republic of Croatia
University of Zagreb, Croatia
Varaždin County

Contents

Invited Lectures

Education for Information Society

Flexible Learning Approach and Curricula Education towards the Labour Market in Secondary Technical Education: A Case Study

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Abstract. *In 2010/2011 The School of Electrotechnics Zagreb and Electromechanical School Varaždin have implemented the IPA project With Flexible Learning Approach and Curricula Innovations towards the Labour Market supported by Croatian Agency for Vocational Education and Training. Flexible learning model implements significant changes to the existing school curricula. Using e-learning tools, it provides students with the opportunity to choose own pace and direction of studies. The project also provides direct student contact with small, medium and large businesses thus creating close connections between vocational training and employment. This case study explores challenges associated with implementing flexible learning approach in secondary technical education using e-learning tools with a special accent to teacher training and student satisfaction. Based on involvement of schools from different parts of Croatia, strong support by national Agency for Vocational Education and Training and European character of the project, authors are convinced that results of this study can be generalized to other vocational schools in Croatia and beyond.*

Keywords. Flexible learning model, vocational education, IPA, e-learning

1 Introduction

Secondary vocational schools in Croatia provide students with the opportunity to gain knowledge in competitiveness skills within their field. However, the existing educational system and school curricula do not grant students the opportunity to emphasize their personal abilities and skills, thus providing poor overview of the current requirements of the labour market. The majority of students who do not proceed to further education end up in jobs unrelated to their degrees. In order to address those issues, a new educational approach should be developed [1].

Based on such premises, the School of Electrotechnics Zagreb and Electromechanical School Varaždin developed the joint project "With Flexible Learning Approach and Curricula Innovations towards the Labour Market" [2]. The main project goals are implementation of flexible learning model in the traditional learning process and development of additional school activities such as the *school corner* where students can develop contacts with companies in electrotechnical and computer science sector.

Flexible learning model provides students with the opportunity to control duration and progress of the learning process [3] [4]. Although the flexible learning model contains a significant level of self-education, it is recognized that students engaged in the learning process need guidance and assistance. Accessibility of educational materials, exams and student-teacher interaction are therefore prerequisite for success. Implementation of the flexible learning model requires teacher training that covers theoretical and practical issues in the field of technology enhanced education. Additionally, a neurolinguistic programming course [5] is organized with the purpose of improving tutoring abilities.

2 Project overview

2.1 Project background

During past few decades there has been a significant technological movement in the field of education. Modernization of educational system requires constant improvement of its curricula, as well as lifelong specialization of teachers. The main disadvantages of existing educational system are its inflexibility and distinctiveness [1].

The participation of the School of Electrotechnics Zagreb in previous projects such as "CARDS", "PISA", "Leonardo da Vinci" and "Comenius" resulted in transition from classical learning model approach to flexible learning model approach. There is no unambiguous interpretation of the term flexible learning model. In vocational education it usually stands for curricula improvement, international certificates usage and implementation of advanced e-learning methods [3] [4].

The project provides necessary technological equipment and modern educational program for flexible learning model implementation, with a goal to improve secondary vocational education [2]. However, it does not take flexible learning model for granted. Instead, it constantly questions whether flexible learning model provides adequate opportunities for constant update of educational materials according to the latest technological developments.

2.2   Project goals

The basic goal of the project is to improve quality of educational experience within the partner schools by providing their teachers with new perspectives and educational methods based on flexible learning model. The project introduces innovations in the existing school curricula and provides accessibility to internationally certificated programs. Finally, it supports students' interests according to the requirements of domestic and European labour markets [2].

Raising teacher competence is prerequisite for achieving the aforementioned goals. For this reason, the project provides teachers with the opportunity to acquire international certificates in Solarteur and Konnex specialization. The certificated programs are offered as additional parts of the school curriculum and implemented in the flexible learning model [2].

2.3   Target groups

Target groups for the project are 60 vocational teachers and 60 students from both partner schools and over 100 small, medium and large businesses in electrotehnical and computer science sector [2].

2.4   Educational goals

2.4.1   Bloom's taxonomy

Educational goals of the project include most categories of Bloom's taxonomy (cognitive, affective and psychomotor) [6]. However, the contemporary labour markets first and foremost require critical and analytic thinking skills, observation skills, organizational skills and ability to adapt to new situations. For this reason, the project is mostly aimed on the highest taxonomy levels: analysis, synthesis and evaluation. This is achieved by providing each student with the choice to access different educational material based on previous educational experience and interest.

2.4.2   Learning theories

Educational goals, testing methods and rewards are clearly defined for each lesson. Results of student effort can be seen momentarily: such approach roughly corresponds to behaviorist learning theories.

Students are granted access to new educational content according to previous achievements. Considering individual differences, students with higher level of skills and knowledge obtain access to more complex educational content. Such approach, which roughly corresponds to cognitivist learning theories, is designed in order to keep high levels of student motivation.

The project, however, is predominantly informed by constructivist learning theories. Instructional design is based on independent student engagement where students develop own skills and attitudes, as well as soft skills such as team work. Teachers are primarily facilitators with the main roles to direct learning process and suggest additional learning resources. In this way, the constructivist approach is oriented to the development of student independence. [7].

3 Project development

The project consists of three components. Project duration is September 2010 - September 2011.

3.1 The first component

The first component of the project develops the flexible learning model according to the specific contexts of partner schools and requirements of the national strategic and legislative framework in the vocational educational system. The first component was realized from September 2010 to November 2010. Activities contained in the first component are:

- First activity
  o Analysis of the vocational education national strategy and legislative framework with the purpose of defining projects' anchor points and development strategy for the flexible learning model implementation.
- Second activity
  o The flexible learning model training for the vocational teachers.

3.2 The second component

The second component of the project consists of teacher training. It was realized from October 2010 to March 2011. Activities contained in the second component are:

- First activity
  o Advanced training for teaching and administrative staff aimed at establishing professional educational and counseling center for electrotechnics and computer science.
- Second activity
  o Training in neurolinguistic programming.
- Third activity
  o International certificate education for "Solarteur" and "Konneks" lecturers.
- Fourth activity
  o Basic and advanced New Adobe eLearning Suite training.

3.3 The third component

The third component implies acquisition of equipment and implementation of the customized flexible learning model. Its planned duration is March 2011 to September 2011. Activities planned (and partially conducted) for the third component are:

- First activity
  o Implementation of the flexible learning model in selected classes.
  o This activity will be realized with specific requests and requirements of both partner schools.
  o 30 students from each partner school will be involved in the project.
- Second activity
  o Implementation of vocational career corner as a part of flexible learning model.
  o Forming the national vocational career center.
- Third activity
  o Development and implementation of additional educational materials through internationally certificated programs and e-learning system.

4 Project evaluation

This case study is based on experiences from The School of Electrotechnics in Zagreb. In order to identify possible issues early in the project, it is made half way through its realization.

This evaluation is focused to realization of projects goals through specific activities. Therefore, project goals are the main criteria for project evaluation and developing suggestions for improvements. On such basis, project evaluation is based around the following questions:

- Has the project fulfilled its expectations?
- Are all planned goals achieved?
- Does the project provide visible results?
- Are the realized activities implemented in educational system?
- What is the overall project influence on the target group of students?
- How did project implementation influence certain student groups?
- How should we proceed with project realization?
- How can we increase staff interest in project realization and its implementation in educational systems?

Evaluation process involves the following groups:

- Teaching staff
- Administrative staff

- Students.

Evaluation process includes the following methods:

- Polls
- Interviews
- Focus groups.

Polls are used because they provide a simple and efficient method for acquiring and quick processing large amounts of data. It is recognized, however, that positivist data acquired in this way is not sufficient for drawing the complete picture. In order to add an interpretative dimension to project evaluation, polls are complemented by interviews and focus groups.

4.1 Project evaluation (teachers)

Interviews and polls were conducted with 30 teachers. The poll consisted of the following questions:

- Has the project fulfilled your expectations?
- Are all project tasks that you were involved in completed?
- Did the project provide visible results?
- Have you implemented project activities in your class(es)?
- Do you intend to participate in further project development?
- Are you satisfied with your tutors?
- Are you satisfied with project organization?

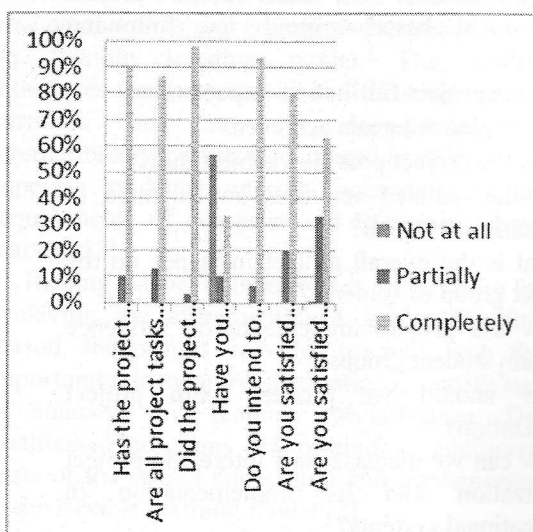During the interview, teachers had the opportunity to clarify their poll answers.

Figure 1 - Poll answers analysis

Poll results indicate that the project has generally fulfilled teachers' expectations. Project tasks are complete and provide visible results. Almost all teachers would like to continue their participation in the project. They are mostly satisfied with their tutors. However, four teachers are concerned with scheduling of some activities.

10 teachers find project organization partially satisfying and 1 examinee finds it unsatisfying. The reason for such results is also inadequate time schedule of some project activities. Based on these results, project team has developed a proposition for rescheduling some activities.

Only 10 examinees (33.3%) fully implement project results in their classes. 3 examinees (10%) partially implement project results and 17 examinees (56.7%) do not implement project results in their classes. During the interview, such results were explained by insufficient technology-related skills associated with the used hardware and software. Such results indicate significant problems in project realization. Accordingly, further teacher education is developed for the next project stages.

4.2 Project evaluation (students)

This evaluation is based on 26 students from six different classes divided in two groups of 13. During focus groups, they discussed the following questions:

1. Is flexible learning model a helpful part of your regular class?
2. How often do you use online educational material and exams?
3. Do you use online material simultaneously with regular class? If not, why?
4. Are online materials helpful for your regular classes and how?
5. Does online testing contribute to your exam performance?
6. Do you find the additional educational material useful?
7. Would you like to use flexible learning model in other classes?

Students predominantly find using online educational materials helpful. Better achievers use the flexible learning model in order to prepare for upcoming regular exams, while others use online materials in order to improve their skills and knowledge as well as regular class achievements. Most students point out that using the online testing system improves improving regular class exam results.

Additionally, they suggested introducing online testing as a part of their final grade. Unfortunately, such suggestion cannot be fulfilled because the existing educational system does not allow online testing in final grading.

5 Discussion

The project "With Flexible Learning Approach and Curricula Innovations towards the Labour Market" is supported by Croatian Ministry of science, education and sport and the European Union. As an EU candidate, the Republic of Croatia is involved in development of vocational education according to European standards.

Project results match the criteria of the Vocational Education Development Strategy [1] and Vocational Education Act [8] enacted by the Republic of Croatia. Basic goals of the Vocational Education Development Strategy are modernization of education, maintaining competiveness of graduate students in labour markets, mobility and lifelong learning possibilities for graduates and teachers, and insurance of educational quality.

Croatian Vocational Education Development Strategy 2008-2013 is based on principles and goals from Lisbon Declaration of Education and Vocational Training. The Declaration states the importance of modernizing future educational systems and improvements towards labour market competency. Furthermore, the European Union invests a lot of effort into establishing competency of the dynamic knowledge-based economy. Such priorities and development strategy were confirmed by the Copenhagen Declaration [1] [8].

Project evaluation shows positive influence on teachers in the School of Electrotechnics in Zagreb. It improved their skills and motivation, while providing a new perspective in learning methods and benefits of lifelong learning.

The project also positively influences students. It simultaneously improves the school experience and provides skills for life that are prerequisite for successful careers in knowledge-based society.

At least in part, such results can be explained by school's extensive previous experience in e-learning projects. Schools that have four or five e-learning projects 'under the belt' are quite uncommon in Croatia. For this reason, results of this study should be implemented with care in less experienced environments.

The evaluation points out significant issues with teacher involvement: more than half of teachers do not implement the customized flexible learning model in their classes. It identifies that the main reason for this problem lies in inadequate teacher training, and proposes countermeasures.

The project encompasses roughly one third of the overall teaching personnel and roughly one third of the overall student population. This percentage is enough for confident generalization of the results to the whole school. However, the project is strongly biased towards more advanced and/or motivated staff and students. All participants voluntarily participated in the project: it is to be expected that introducing the flexible learning model to the whole school would require additional work on staff and student motivation as well as more thorough teacher training.

6 Conclusion

The project "With Flexible Learning Approach and Curricula Innovations towards the Labour Market" provides visible results and profoundly influences the current educational methods used in the School of Electrotechnics Zagreb and Electromechanical School Varaždin. Some results such as newly gained skills and knowledge significantly impact teachers who drastically changed the existing approaches to their students. Moreover, implementing the flexible learning model positively imprints teacher motivation.

Students' affirmative response to the flexible learning model can be easily explained on the bases of accessibility of educational material and online exams. Students have acquired the possibilities to test their skills and knowledge at any time and place. Moreover, adjusting study approaches and materials to the existing skills and knowledge levels of each student significantly improves student motivation and improves efficiency of instruction.

In order to address the main issues encountered in project implementation more effort should be put in teacher motivation and training. The results of this study have already been implemented: its direct practical

consequence is organization of new teacher training sessions.

Based on involvement of schools from different parts of Croatia, strong support by national Agency for Vocational Education and Training and European character of the project, authors are convinced that results of this study can be generalized to other vocational schools in Croatia and beyond. However, it should be emphasized that the project was conducted in a highly supportive and experienced environment: it is to be expected that implementation of similar projects into less experienced and/or supportive environments would create a whole new set of issues.

In order to immediately improve project performance, this case study is conducted approximately half way through the project. In order to be able to generalize the obtained results with more confidence, authors of this study are planning to undergo a similar study in the partner school Electromechanical School Varaždin immediately after project completion.

7   Acknowledgements

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