

FLEXIBLE LEARNING APPROACH IN SECONDARY TECHNICAL EDUCATION

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Abstract

This study provides a comparison of the relevant aspects of school life before, during and after introducing flexible learning approach in two secondary vocational schools in Croatia: The School of Electrotechnics Zagreb and The Electromechanical School Varaždin. Research methods include comparisons between stocktaking reports and final reports, questionnaires, interviews and focus groups conducted with teachers and students. On such basis, this study presents an exhaustive documentation of various issues associated with each important step in introducing flexible learning model into technical education in Croatia and provides recommendations based on real-life experience in two different contexts. 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 secondary technical schools in Croatia and beyond.

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

1 INTRODUCTION

In 2010/2011 The School of Electrotechnics Zagreb and The 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. The first study by this group of authors – *Flexible Learning Approach and Curricula Education towards the Labour Market in Secondary Technical Education: A Case Study* – explores the initial challenges associated with implementing flexible learning approach in The School of Electrotechnics Zagreb using e-learning tools with a special accent to teacher training and student satisfaction. The second study by the same group of authors – *Introducing Flexible Learning Approach in Secondary Technical Education: A Comparative Study of Two Schools* – explores the same challenges in Electromechanical School Varaždin and compares found results, paying special attention to organizational and cultural differences between schools. Both published studies have been conducted roughly half way through the project, and the developed recommendations have been implemented in its later stages.

This, final study in this series, is conducted after project completion, and presents a complete comparison of relevant aspects of school life before, during and after introducing flexible learning approach. Research methods include comparisons between stocktaking reports and final reports, questionnaires, interviews and focus groups conducted with teachers and students. This study analyzes results from the previous studies, places them into appropriate contexts, and explores validity of earlier recommendations after their implementation. In short, it presents an exhaustive documentation of various issues associated with each important step in introducing flexible learning model into technical education in Croatia and provides recommendations based on real-life experience in two different contexts.

2 METHODOLOGY

The initial evaluation consisted of surveying political, economical, social and technological conditions as well as eloquence and capability (based on school management, employees, partners, resources and results). The initial evaluation has been done according to EU project standards using mixed-mode research methods from analyses of school documentation to interviews with employees.

In order to maintain consistency of the research, mid-project evaluation and final evaluation have roughly followed the research methods used in initial evaluations. However, those evaluations were more focused to polls, interviews and focus groups with students and teachers. Polls were 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.

3 THE PROJECT

The project "With Flexible Learning Approach and Curricula Innovations towards the Labour Market" had been implemented in The School of Electrotechnics Zagreb (project leader) and The Electromechanical School Varaždin (project partner) between September 2010 and September 2011. Overall project budget was 334.460,00 Euro, whereof 284.291,00 Euro were provided by European Union and 50.169,00 Euro from own budgets. The project consists of three components.

3.1 The first component

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

1. Analysis of the Development Strategy of the Vocational Education System in the Republic of Croatia 2008-2013 (Government of the Republic of Croatia, Ministry of Science, Education and Sports, 2008) and legislative framework with the purpose of defining projects' anchor points and development strategy for the flexible learning model implementation.
2. The flexible learning model training for the vocational teachers.

3.2 The second component

The second component of the project consists of teacher training from both schools. Activities contained in the second component are:

1. Implementation of flexible learning model according to examples of good practice in European Union (Wade, 1994; Race, 1998; Knudsen, 2011b).
2. Advanced training aimed at establishing professional educational and counseling center for electrotechnics and computer science.
3. Training in neurolinguistic programming.
4. International certificate education for "Solarteur" and "Konneks" lecturers.
5. Advances eLearning training.

3.3 The third component

The third component of the project consists of acquisition of equipment and implementation of the customized flexible learning model. Activities for the third component are:

1. Implementation of the flexible learning model in selected classes.
2. Implementation of vocational career corner as a part of flexible learning model.
3. Development and implementation of additional educational materials through internationally certificated programs and e-learning system.
4. Acquisition of required specialized equipment and concession.

Based on school-specific conditions and available resources, project implementation in two schools had been realized as simultaneously as possible (The School of Electrotechnics Zagreb, 2011).

4 THE INITIAL EVALUATION

4.1 Political, economical, social and technological conditions

Political conditions are related to correlation between education in the European Union and Croatian vocational education legislation. An important difference between the Croatian government and the

European Union is that the Croatian government can establish legislatures while European Union does not have authority upon educational system of its members. Considering difficult economical conditions, it is to be expected that more vocational schools would gain autonomy as their directionality towards labour market (Government of the Republic of Croatia, Ministry of Science, Education and Sports, 2008).

As far as social conditions are concerned, more adults wish to change their work competencies and continue education accordingly to labour market requirements, which implies flexibility and mobility of the educational system (The School of Electrotechnics Zagreb, 2011).

Finally, keeping vocational schools up to current technological novelties is one of the main prerequisites for the success of their students on European labour markets (Wade, 1994; Government of the Republic of Croatia, Ministry of Science, Education and Sports, 2008).

4.2 Eloquence and capability

Eloquence and capability of both schools were analyzed based on their management, employees, partners, resources and results. This evaluation is based on (Knudsen, 2011a & The School of Electrotechnics Zagreb, 2011).

4.2.1 Management

Headmasters of both schools are committed to constant improvements in order to modernize vocational education. Accordingly, both schools have participated in various projects as well as invested in new resources and personnel in order to implement the flexible learning model.

The School of Electrotechnics Zagreb has based its strategic goals on three important pillars:

- Modernization of vocational curricula according to demands from labour markets, which includes partners such as Siemens Croatia, Končar Institute, Faculty of Electrical Engineering and Computing at the University of Zagreb etc.
- Running a local CISCO Networking Academy.
- Conducting permanent school laboratory improvement and staff development

The Electromechanical School Varaždin has been conducting a less structured path of improvement, which also includes elements from modernization of curricula, establishing in-house IT courses to conducting permanent staff development.

On such basis, it may be concluded that both schools have very strong and active leadership which may represent the most significant changeover factor during implementation of flexible learning model.

4.2.2 Employees

During the past few years a lot of effort has been invested in staff development. Students from both schools think that their teachers are very qualified and competent for subjects they teach. However, they would like to enrich the educational process with more discussions, group work and collaboration.

Population analyses show that teachers from The School of Electrotechnics in Zagreb are almost a decade younger than teachers from The Electromechanical School Varaždin. It is therefore hardly a surprise that they teach strictly according to school curricula and agenda. The Electromechanical School Varaždin supports very little collaboration with companies. Teachers predominantly consider themselves as tutors, and keep up their competencies through seminars, conferences and various projects.

Teachers from The School of Electrotechnics in Zagreb are younger and more experienced in collaborative learning. They also teach according to school curricula and agenda. Despite vivid collaboration with various companies, they are still unable to clearly express market expectations from their students. They also consider themselves as tutors, and do not wish to develop that role into directions such as facilitation. Finally, they also keep up teacher competencies through seminars, conferences and various projects.

This overview clearly indicates that the differences between the schools are smaller than they seem. An important general impression from both schools is that teachers feel insecure about their future and would like to keep things as they are. Interviews show that some teachers in both schools already implement flexible learning model in their educational practice. However, such attempts are far from systematic and can be best described as 'lone ranger approach'. Provided that teachers' insecurities

are appropriately addressed, both schools have some experience which they can build on and in order to introduce and improve flexible learning concept.

4.2.3 Partners

Both schools are partners with Microsoft Academy and Cisco Academy of Network Technologies. Both schools cooperate with other schools and universities in their geographical surroundings. However, The School of Electrotechnics Zagreb has a much more developed network of partners relevant for this project than The Electromechanical School Varaždin.

4.2.4 Resources

The School of Electrotechnics Zagreb is situated in an old building and suffers from a significant lack of space. Consequently, it operates in two shifts. Despite issues associated with space, educational equipment is on high level and obtained by participating in various European project.

The Electromechanical School Varaždin is situated in a new building with high quality educational equipment, spaced and operates in one shift.

On such basis, it can be concluded that both schools are very well equipped.

4.2.5 Results

Teachers are generally satisfied with their practice. In their opinion, flexible learning model is a challenge which requires a lot of investment before it provides adequate results.

During the initial screening, students have displayed high levels of motivation. Based on student-centered approach, they would like to establish new and different relationships with their teachers. Students also seek better support for less successful colleagues and the possibility for faster progress of successful students which is not supported by the traditional educational model.

The last but not the least, most students express the ambition to proceed to higher education, which somewhat undermines vocational character of the schools.

5 THE MID-PROJECT EVALUATION

In order to debug the main problems with the project on time, this team of authors has conducted an extensive mid-project evaluation. For this reason, this chapter is based on the full paper: *Flexible Learning Approach and Curricula Education towards the Labour Market in Secondary Technical Education: A Case Study* (Jandric, Bozuric & Carapina, 2011).

Mid-project evaluation had been wrapped around project goals. For this reason, it was based upon 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?

5.1 Mid-project evaluation (teachers)

Interviews and polls were conducted with 30 teachers from The School of Electrotechnics in Zagreb and with 16 teachers from The Electromechanical School Varaždin. During the interview, teachers had the opportunity to clarify their poll answers.

The teacher 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?

5.1.1 *The School of Electrotechnics in Zagreb*

Poll results indicate that the project has generally fulfilled teachers' expectations. 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 mostly 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 has been developed for the next project stages.

5.1.2 *The Electromechanical School Varaždin*

Teachers who participated in evaluation expressed wish to continue participating in project realization (100%). The majority of them (87.5%) would recommend participation in the project to their colleagues. Half of them (50%) find their expectations not fulfilled. None of the respondents fully implements project activities in their classes, 10 teachers (62,5%) partially implements project activities, while 6 teachers (37,5%) not at all. The evaluation results show problems in project realization.

5.2 Project evaluation (students)

This evaluation is based on 26 students from six different classes divided in two groups of 13 that were involved in project in The School of Electrotechnics in Zagreb. Students from The Electromechanical School Varaždin did not participate in project evaluation, since none of the teachers from The Electromechanical School Varaždin fully implemented flexible learning model in their class.

During focus groups, they discussed the following questions:

- Is flexible learning model a helpful part of your regular class?
- How often do you use online educational material and exams?
- Do you use online material simultaneously with regular class? If not, why?
- Are online materials helpful for your regular classes and how?
- Does online testing contribute to your exam performance?
- Do you find the additional educational material useful?
- 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.

5.3 Recommendations based on evaluation results

Project evaluation shows significant differences in results between two schools, therefore flexible learning model cannot be unambiguously implemented in schools with different experience, curricula and geopolitical position. Schools that have little or none experience in implementation of new technologies or educational methods are likely to have more problems in implementing the flexible learning model. On such basis, evaluation results show importance of organizational continuity as the main recommendation for further project realization.

6 THE FINAL EVALUATION

Despite issues identified in mid-project evaluation, the final evaluation indicates significant differences in educational process between the initial and the final state in both schools. Teachers gained new knowledge and experience regarding the flexible learning model, while schools implemented new equipment and programs.

Project outcomes have been explored on three main levels: educational, political / organizational and general. At the time of writing this paper, unfortunately, student feedback was not available.

6.1 Educational outcomes

Educational outcomes of the project have been assessed by the poll for teaching staff in both schools which consists of the following questions:

- Has the project fulfilled your expectations?
- Did the project provide visible results in your school?
- Are all project tasks completed?
- Have you implemented project activities in your class(es)?
- Is implementation of the project activities helping your students to achieve better results and are they more satisfied with education?
- Do you intend to use the flexible learning model in your clas(es)?
- Do you find help from specialized service as important part in your future implementation of the flexible learning in your class(es)?
- Do you wish to participate in similar projects?

Unfortunately, teacher feedback in both schools was fairly low. In addition, there was no significant statistical difference between poll answers provided by teachers from both schools. For this reason, their results have been analyzed together.

The poll research that was conducted at the end of the project showed partial satisfaction with the project results. The project has fulfilled its expectations with half of teachers, while others find their expectations partially fulfilled. Most of them partially use some of the project activities in their educational process while half of them plan to fully implement them in their classes.

20% of surveyed teachers think that they have been fully equipped for implementing flexible learning model through the project. However, 80% feel that they need additional support in order to implement flexible learning model in their classrooms.

70% of surveyed teachers find that project outcomes are partially visible in their schools, while 30% of surveyed teachers think the activities are fully visible.

Almost all teachers find that the project has made impact in their schools once the project has finished. However, the educational process itself didn't pass through visible transformation, apropos meaningful change from classical model of education to the flexible model which was the main goal of the project.

Most involved teachers only partially implement some form of the flexible learning model in the existing school curricula.

Furthermore, most involved teachers think that project results are visible in their schools according to new material and nonmaterial capacities that are used in educational process. However, only few teachers implement the flexible learning model in their classes.

Finally, despite the fact that most teachers have had difficulties with transforming their educational methods, 70% of surveyed teachers wish to participate in similar projects in order to gain new knowledge and experience.

6.2 Political and organizational outcomes

6.2.1 The School of Electrotechnics in Zagreb

The School of Electrotechnics Zagreb got special equipment for education in renewable power sources (Solarteur®) and smart construction ("Konnex"). As a result, The School of Electrotechnics Zagreb became Konnex test center. Such status enables the School:

- Deliver the Konnex certificate to the successful VET students before their graduation;
- Use of the KNX Training/Testing Centre logo (on letter headed paper, envelopes, business cards etc);
- Generate income (self-financing mechanisms) from KNX training/testing activities, i.e. relevant courses could be offered as a adult education programme to the general public;
- Be listed in the KNX International Database that can be consulted via the KNX Association web pages(if desired);
- Have free publicity in the KNX Journal upon application and free copies of the KNX Journal for distribution to students;
- Right to participate to the KNX Training Centre Conference organized by KNX Association (Knudsen, 2011a).

The Electromechanical School Varaždin, which is situated in modern buildings and has more space, did not have any problems related to storage of new educational equipment. Due to lack of space, however, The School of Electrotechnics Zagreb had been forced to put an extra effort in benefiting from new equipment.

The School of Electrotechnics Zagreb has put additional effort in motivating teachers. As a project result not only they were engaged in specialization, but also rearranged and redecorated the available school space. In this way, teachers granted themselves better working conditions and modern education for their students (ibid).

On the basis of experiences gained under the project "With Flexible Learning Approach and Curricula Innovations towards the Labour Market", in the upcoming period the School of Electrotechnics Zagreb will be exploring possibilities to design new projects (developing specific project components/activities as separate projects or tackling specific sub-target groups/other issues) and apply for the EC funding available under the second phase of the IPA program in Croatia (e.g. IPA grant scheme "Capacity building of the adult education institutions").

In addition, results accomplished under the IPA project will be used by both VET schools-project partners as strong reference in establishing links with the VET schools from the EU member states with a view of applying/participating as project partners in the projects funded via the Community Programme "Lifelong Learning Programme 2007-2013", sub-programme Leonardo da Vinci.

6.2.2 The Electromechanical School Varaždin

Upon project completion, The Electromechanical School Varaždin continued its co-operation with Handwerkskammer Koblenz in terms of further extension of the provision of "Solar Expert" certificate, including the possibility to design relevant adult education program on the basis of the "Solar Expert" certificate. In that respect, representatives of The Electromechanical School Varaždin carried out a preparatory visit to the Handwerkskammer Koblenz in November 2011, with a view to discussing the possibilities for establishing a structured co-operation within the framework of a EU Leonardo da Vinci partnership project. The preparatory visit was funded by the EU Leonardo da Vinci sub-program.

6.3 General outcomes

Acquisition of equipment presents an important aspect of the project. Alongside the aforementioned physical equipment, the project also implemented Adobe eLearning Suite. The integration of the Adobe eLearning Suite offers a number of sustainable benefits to both schools in terms of advanced development of the e-learning tools such as:

- Complete eLearning toolbox;
- Extended functionality;
- Easy mobile authoring and effective collaboration;
- Flexible, standards-based output formats and integration with Adobe Acrobat Connect™ Pro for instant online access.

Furthermore, both schools have formed carrier corners where students can learn how to write their CVs, job applications, search through useful contents related to their vocational education and future work environments. Also, carrier corners are the places where students can get in touch with companies relevant for their future employment.

7 DISCUSSION

This paper is a comparative study of three different stages of life in two different schools. For this reason, it cannot provide an in-depth analysis of any of the parameters. Instead, it provides a wide theoretical and practical framework for understanding the complexities of introducing flexible learning approach in secondary vocational education.

Such approach leads to a series of methodological problems. Due to objective circumstances such as availability of data, the initial evaluation, the mid-project evaluation and the final evaluation slightly differ in methodology. For instance, the initial evaluation and the mid-project evaluation look into opinions provided by teachers and students, while the final evaluation is based only on teachers' opinions. In this context, study results should be interpreted very carefully in order to avoid bias.

However, one should bear in mind that this study results from more than one year of research, thousands of work hours by 60 staff members and hundreds of students, hundreds of thousands of Euro... Two researchers are external to this study, while the third one has been an important project member at The School of Electrotechnics Zagreb. The cities of Zagreb and Varaždin are situated more than 100 km apart, and all researchers are physically based in Zagreb. For these reasons, it is simply impossible to completely avoid bias in our conclusions. Therefore, readers of this paper are invited to create own informed opinions.

A very similar line of argument can be applied for teacher feedback, and to a lesser extent, to student feedback. As can be clearly seen from the final evaluation, one of the most important outcomes of the project is acquisition of equipment. Any project assessment, and especially this kind of assessment which is directly associated with project outcomes and opportunities for future funding, therefore becomes a political act. Teachers and students understand the need to participate in future projects very well. Therefore, their results are expected to have positive bias towards the project. On such basis, this study ends up with a possibility that some issues with the project simply went un-noticed. Using the applied methodology, unfortunately, those issues will remain unexplored.

8 CONCLUSIONS

The project has made important and visible impact on both schools. In terms of education, it introduced flexible learning approach into classrooms and raised awareness about the need to develop new educational approaches which correspond to the current social and technological conditions. In material terms, it introduced a lot of new equipment and trained teachers for its usage. In organizational terms, it helped both schools to develop capacities for further development. Finally, in political terms it created grounds for future collaborations and projects.

Some aspects of the project clearly need improvement. Staff should have more information more about the opportunities offered by the project, and European projects in general. After project completion, the schools should consider creating additional support channels for teachers. The comparison between schools clearly shows that an extremely important factor which contributes towards success of this kind of projects is organizational continuity. Therefore, schools should be slowly introduced into projects which bring significant educational, material, organizational and political changes.

This study is subject to important methodological restrictions such as inconsistency between interview samples. Considering size and scope of the project, the methodological issues have been minimized

as much as possible. Nevertheless, readers are advised to think over those issues and adapt conclusions to the contexts of own educational practices.

The research is firmly based in the context of Croatian secondary vocational education. However, 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 secondary technical schools in Croatia and beyond.

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