Integration of ICT into Initial Education of Classroom Teachers:

The Case of Two Regions in Croatia

Marijana Kelentrić

Master thesis
Department of Educational Research
Faculty of Educational Sciences

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Comparative and International Education Program

Department of Educational Research

Faculty of Educational Sciences

University of Oslo

Abstract

One of the biggest changes in educational systems around the world has been integration of information and telecommunication technology (ICT). However, many countries report the disparity between the policies and strategies introduced and the absence of actual implementation of this innovation into teaching practice. The analysis of relevant research literature, national and international reports shows that Croatia is no exception.

Therefore, the purpose of this study is to shed light on issues around ICT integration into initial teacher education (ITE) programs in two regions in Croatia. The two faculties of teacher education in Rijeka and Osijek have been chosen because programs for equipping the future teachers of classroom education with the knowledge and skills to integrate ICT in their practice have been introduced there. The study takes a comparative perspective on factors influencing the application of ICT among three groups of teachers: university teachers, mentor teachers and student teachers included in these two ITE programs. The methods that were used in this qualitative study to gather data from 17 participants were semi-structured interviews and observations. Analyzed data was then discussed inside the framework based on the theories of educational change and the concepts around integration of ICT.

The study found that despite similar external obstacles such as lack of resources and poor management there are significant differences in the level of ICT integration in the two ITE programs at the Faculties of Teacher Education in Rijeka and Osijek. These differences stem mainly from the internal factors that in the ITE program in Rijeka present barriers because students and teachers still try to innovate on an individual level. On the other hand, the same groups of stakeholders in the ITE program in Osijek joined their personal efforts and applied their knowledge to build professional learning communities that brought the integration of ICT from the initialization to the actual implementation phase.

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Marijana Kelentrić

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List of acronyms

CARNet	Croatian Academic and Research Network
CEE Countries	Central East European Countries
EACEA	Education, Audiovisual and Culture Executive Agency
ICT	Information and Communication Technology
ITE	Initial Teacher Education
OECD	Organization for Economic Co-operation and Development
UK	United Kingdom of Northern Ireland and Great Britain
UNESCO	United Nations Educational Scientific and Cultural Organization

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1   Introduction

1.1 ICT[1] in the Croatian educational system

One of the most prominent changes in educational systems around the world is the integration of information and communication technology (ICT) into teaching and learning practice. However, the management of educational change can be quite complex (Fullan, 2007, Louis, 2006, Vujičić, 2007). In order to help integrating an innovation such as ICT into educational systems UNESCO proposes the following two-dimensional model.

Figure 1 A model for mapping the stages of ICT integration
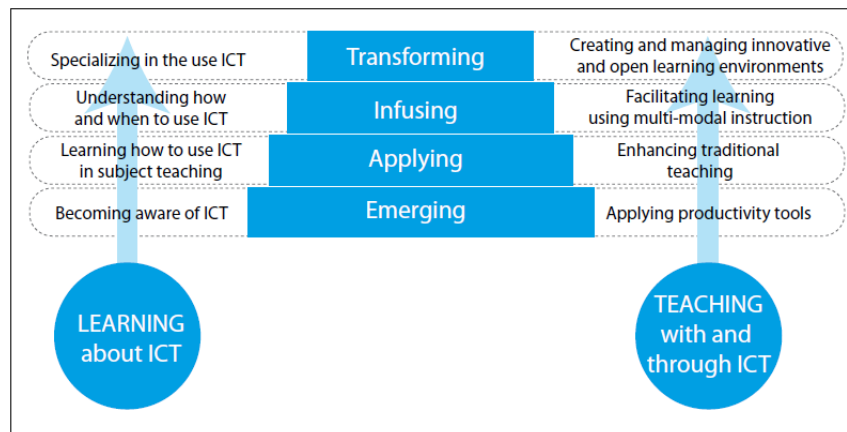
(Source: UNESCO, 2010).

The purpose of this basic model is to help institutions and individual stakeholders inside educational systems to determine the stage they are at. In that way they can make better decisions when it comes to for e.g. allocating finances or improving teacher education programs. Thus, educational institutions typically pass through levels ranging from emerging stages where computers have just been introduced to transforming where ICT is fully integrated into institution and broadly used on a daily basis. Teachers and other stakeholders also go through stages from learning the basics about ICT use to integrating it in practice by teaching with and through ICT throughout the curriculum (UNESCO, 2010). As such this

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[1] ICT is an acronym that stands for Information and Communication Technology or Technologies. UNESCO Institute for Statistics' Glossary (www.uis.unesco.org) defines ICT as "a diverse set of technological tools and resources used to transmit, store, create, share or exchange information". A somewhat similar definition is offered by OECD with a note that the classification of ICT products can be difficult due to the "rapidly changing character of ICT goods and services" (OECD, 2009).

model can be also applied to the Croatian educational system with the purpose to provide general background and clarify the aim of this research study.

Therefore, when it comes to the Croatian educational system, the awareness about the international trends in education and integration of ICT has been present from the early days of the newly formed state. In 1995 the Croatian government established the Croatian Academic and Research Network (CARNet) whose tasks have been construction, development and maintenance of the computer network on all levels of the educational system as well as providing teacher training courses for the use of ICT. But, in spite of the initial efforts that the Ministry of Science, Education and Sports invested into equipping educational institutions, OECD reported about the chronic underfunding of the educational sector in Croatia (OECD, 2001).

Yet, according to Lasič-Lazić, Špiranec and Benek-Zorica, crucial reforms in Croatian educational system were launched in 2005 (as cited in Kovačič, Zgrabljić Rotar & Erjavec, 2012). The aim of these reforms was the introduction of the *Croatian National Education Standard* that was supposed to bring the educational system to the European level when it came to building a knowledge society based on lifelong learning. One of the tools used to reach this aim was the integration of ICT into teaching and learning, which was specifically stated in the *Education Sector Development Plan 2005-2010* issued by the Ministry of Education, Science and Sports (MZOŠ, 2005). The same perception of ICT as an instrument for developing the knowledge-based society can be found in the *Strategic Development Framework 2006-2013* issued by the Croatian government (VRH, 2006).

In line with that, the report issued by UNESCO in 2005 confirmed that Croatia adopted a national policy and an action plan for the implementation of ICT. The results of the survey also showed that the strategy was focused on providing school equipment, building educational infrastructure, Internet access, training teachers and lifelong learning. Although the national policy covered remote schools, girls, children with special needs and minorities, the budget predicted for the implementation of the ICT strategy was barely 0.0103%. The report also said that 100% of schools had computer classrooms out of which 90% were less than 10 years old, that there were on average 17 students per one computer, all schools had local network and Internet access, and 45% of schools had their own web sites. Further on, it was reported that ICT was included in the national curriculum only as a compulsory and elective subject in secondary schools. What was missing in the education was the integration

of ICT into other subjects, i.e. Croatian students learned about ICT and not with and through ICT (UNESCO, 2005).

When it comes to learning about ICT, "Information Science" is taught as an elective subject in primary schools. The statistics of the educational ministry for the school year 2009/2010 showed that this subject was taught in 63.4% of the classrooms in Croatia. The same statistical database also says that approximately 15 pupils shared one computer in primary classroom and 50% of them did not have basic knowledge about the computer usage after finishing primary education (E-Matica, 2009).

However, in line with the European Competence Framework, a new *National Curriculum Framework* from 2010 listed digital competence among the eight key competences for lifelong learning and the status of ICT was changed into an interdisciplinary theme. In other words: "students should use technology in all subjects, in order to communicate, conduct research, exchange ideas, collaborate with co-workers, and learn about technology itself" (MZOŠ, 2010, p. 26). Still, after analyzing the new curriculum and the detailed description of the objectives and goals of specific subjects, one can notice that the use of ICT is mentioned only in a few teaching plans for certain subjects, which in turn means that ICT is not integrated across the curriculum and teachers are not obliged to use it.

In conclusion, the state of ICT in Croatian education can be summarized by applying the UNESCO model mentioned earlier. Ever since the middle 1990s, Croatia has been striving to equip all educational institutions with the basic ICT, to provide Internet access to all students both at school and from home and to provide education to teachers and support staff for the use of ICT. All of this confirms that Croatia passed through the emerging stage of ICT and moved to applying stage with introduction of national strategies and curriculum plans for the use of ICT in educational institutions. However, the road towards the infusing and transforming stage is still long since it demands ICT integration across the curriculum and not only into certain subjects as well as transformation of organization in educational institutions.

1.2 Aim of the study

After having placed Croatian educational system inside the UNESCO model for integration of ICT it is important to determine which factors prevent or enable further progression on that scale.

In line with that, UNESCO (2010) recognized teachers as key mediators in the process of ICT integration. However, a study conducted in Croatia confirmed that in spite of introducing national strategies and plans for ICT integration, an implementation gap was present since 26.1% of teachers did not use computers and 41.1% did not use Internet (Vizek Vidović & Pavin, 2005). This report goes in line with a similar trend noticed in other European countries that have developed strategies for the integration of ICT into educational systems. In fact, around 51% of European teachers never required from pupils to use computers to fulfill tasks. One of the most influential factors held responsible for this implementation gap is lack of continuous professional development of teachers for the ICT integration (EACEA, 2011).

Likewise, in doing an extensive literature review on ICT in education Scrimshaw (2004) concluded that various reports, evaluations and studies mainly dealt with the issues around methodological transformations in teaching such as student-centered approach and its benefits. At the same time, the absence of a wider distribution of ICT in educational systems and the factors that obstruct this innovation from reaching critical mass have been poorly tackled.

Literature review about ICT integration in Croatian educational system reveals the same tendency among Croatian researchers who have been mainly focused on the possible applications of ICT in educational processes and the benefits from it (see for e.g. Hutinski & Aurer, 2009; Marinović & Pavlić 2008; Mesarić, 2007; Nadrljanski, 2006; Rister, 2008 and Topolovec, Čop & Topolovec, 2009). However, some Croatian researchers have recently become aware of this implementation gap between the national policy and school practice (see for e.g. Dukić, 2011 and Jagić & Vrkić Dimić, 2010).

Therefore, the aim of this qualitative study is to offer a comparative perspective on the phases of ICT integration into ITE (initial teacher education) in Croatia. This is done by identifying the factors that enable or obstruct teachers and students included in the ITE programs to apply ICT in their practical work in the lower primary school classroom (grade 1 – 4). The ITE programs at two different faculties of teacher education and the accompanying demonstration schools have been chosen because it is believed that pre-service education of teachers is crucial for building positive attitudes and experience around ICT. In other words, future young teachers are agents of change when it comes to the integration of technology into teaching practice (Teo, 2010). By identifying those factors I believe I will help filling the gap

in the knowledge about the process of integration of ICT into this particular part of the Croatian educational system.

The theoretical and conceptual frameworks developed with the purpose to help identifying those issues around ICT integration are based on two approaches to the area of my interest. Thus I started with a broader framework of the management of educational change developed by Fullan (2007) and Louis (2006). These two authors offered a general perspective on issues around the organization of educational change, its nature, the phases it goes through and the roles of stakeholders involved in it. I found their approach particularly useful since it offers theoretical perspectives on the educational change that are missing from the basic and simplified UNESCO (2010) model for ICT integration discussed earlier. However, since ICT integration is a specific type of a change[2] I also tried to identify those studies that offer insight into factors influencing the course of this educational reform in order to build a conceptual framework supporting my study (see for e.g. Drent & Meelissen, 2008; Scrimshaw, 2004; Stensaker et al. 2007 and Teo, 2010). In that way I hope to offer a fresh point of view on the issues around ICT integration since I have not been able to identify any other work of Croatian authors that used this approach in dealing with the same topic in Croatia.

1.3 Research questions

This is a qualitative study that attempts to compare and analyze how three groups of teachers, namely university teachers, mentor teachers and student teachers, included into the ITE programs for classroom teachers at the two faculties integrate ICT into their teaching and learning practices. As mentioned above, these three groups of participants have been chosen because they represent the core stakeholders in the ITE system. In order to determine what influences their everyday efforts in the ICT integration the following research questions have been formulated:

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[2] Various authors dealing with the educational change use the terms change, reform and innovation interchangeably. However, for the further development of this theoretical framework, I find it necessary to highlight what I believe to be a slight yet significant difference in terminology. Thus, Oxford English Dictionary defines change as "an act or process through which something becomes different" through substitution, alteration, modification or introduction of a novelty. Reform is defined as a change that comes with the purpose of improvement, while innovation is an "action or process of innovating" by introducing new methods, ideas and products into something established (http://oxforddictionaries.com). To put it differently, change is an umbrella term that includes reform and innovation as its subtypes.

1. What are the factors that prevent or enable university teachers, mentor teachers and student teachers to use ICT in their ITE programs?

2. In what way do these factors influence the phases of ICT integration in the two ITE programs?

Fullan (2007) makes a basic distinction between the two approaches to an educational reform. The first one, *innovation-focused* approach looks into the factors connected with the implementation of a specific type of innovation and their role in its success. This approach is very much focused on individuals and it will be applied in the search for answers to the first research question.

The second approach is to look at this issue from the opposite angle to see in what way institutions or in this particular case the two faculties and demonstration schools included in the ITE programs, construct their ability to change and engage in continuous improvement to integrate ICT. The second research question presented above has been oriented towards this *capacity building focus.* According to Fullan (2007) these two approaches are not mutually exclusive but instead complement each other. Therefore, both will be applied in this study in order to gain a deeper insight into the issues around the ICT integration.

The guiding principle behind these research questions is the assumption that the changes in the application of ICT in demonstration schools and at faculties of teacher education are affected by external and internal factors arriving from institutions and individuals. These factors either obstruct teachers and students from fully integrating ICT into their educational system or they make this process easier.

1.4 Scope of the study

In order to gain a comparative perspective on the issues around the ICT integration into the ITE of classroom teachers this qualitative study was carried out at two faculties of teacher education in two different Croatian regions, namely the cities of Rijeka and Osijek. The interviews there were conducted with 10 graduate student teachers and 4 university teachers. Furthermore, 3 mentor teachers in the two demonstration schools included into these ITE programs have also been interviewed in order to gain insight into the practical part of these ITE programs. Although it would be useful to include another comparative perspective by

examining written plans and programs and their actual application in practice, this is not possible here simply due to the limited space predicted for the analysis of data and presentation of findings in this master thesis. Because of it, only the integration of ICT into teaching and learning practice in the two ITE programs is in the focus the study.

While there are nine faculties of teacher education in Croatia it is again beyond the capacity of this study to include all of them, but this time due to the limitations in time and financial resources. Therefore, the purpose of this paper is not to make general conclusions about the state of the ICT integration into ITE programs in the entire country. Instead, the focus is on the similarities and differences between these two programs.

Furthermore, this study is based on the semi-structured interviews conducted with three aforementioned groups of teachers in which they expressed their perceptions and attitudes. This does not necessarily reflect the objective situation inside the two ITE programs since other members of the university and school staffs have not been included in the study, again due to previously stated limitations.

In accordance to that since this study is conducted within the field of comparative and international education, the psychological perspectives and analysis around the participants' accounts and have not been the point of interest.

Nevertheless, in order to better understand the context of the integration of ICT into educational system the following section offers a short overview of teacher education in Croatia.

1.5 ICT and teacher education[3] in Croatia

As mentioned before, teachers are usually recognized as key actors in introduction, implementation and continuation of certain educational practices (Fullan, 2007; Louis, 2006).

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[3] While reading the literature on educational research I noticed that some authors use either the expression "teacher education" or "teacher training", whereas others use both terms interchangeably. However, Spearman (2009) in her historical overview of teacher education remarked that this debate goes back in the 1930s when teacher education gained advantage because it denotes reflection and continuous professional development, while teacher training involves completing routine tasks. For that reason I prefer using the term "teacher education". However, when referring to the research literature of specific authors I will use the terminology that they favor.

This is especially evident when it comes to integrating ICT as an educational innovation, and this is where their education plays a crucial role (UNESCO, 2010).

Initial teacher education (ITE) in Croatia takes places at two different institutions. Subject teachers in Croatia are educated at faculties of philosophy where they attend five year studies and gain the title of "Master of Education in specific subject or subjects". They teach individual subjects in primary schools from grade $5 - 8$ and in secondary schools. Classroom teachers are, on the other hand educated at faculties of teacher education that were called teacher training colleges or academies before the introduction of the Bologna declaration in 2005. Today, their studies last five years as well and they also receive the title of "Master of Education in Classroom Teaching". Classroom teachers are specialized in teaching all subjects in the primary school classroom from grade $1 - 4$. Besides the theoretical part that student teachers learn at the faculties, they also have teaching practice in demonstration schools which constitutes 7-12% of the entire initial education program (Pavin, Vizek Vidović, Miljević-Riđički, 2006).

When it comes to the pre-service teacher education for the integration of ICT a number of faculties of teacher education introduced courses about ICT and how to integrate it in teaching. Batarelo (2005) underlined the importance of these ITE programs for the effective and purposeful use of ICT in the future teaching practice. Tatković and Muradbegović (2008) also concluded that the initial reforms for integration of ICT into ITE and their continuous professional development were launched. Yet, Croatia was still far away from those declarations and reforms that worked on improvement of the quality of teacher education. In a similar manner, Lončarić and Pejić Papak (2009) run an extensive comparative analysis of European and Croatian documents that defined the qualifications and competences of classroom teachers. As a result, the two authors proposed a teacher competence profile which included information and communication literacy as one of the skills that student teachers should acquire at the faculties of teacher education.

Concerning the in-service teacher education for the use of ICT, the Ministry of Science, Education and Sports has in cooperation with Croatian Academic and Research Network (CARNet) provided computer courses for 4,500 classroom and subject teachers (MZOŠ, 2007). UNESCO (2005) also reported that 85% of classroom teachers and subject teachers had elementary computer skills while 15% of them possessed advanced computer skills. The report also stated that 9% of class teachers, 17% of subject teachers and 10% of school

administrators in Croatia had more than 70 hours in basic in-service computer training. When it comes to their attitude, Rončević (2008) reported that 91.3% out of 126 classroom teachers interviewed across the country had positive attitude towards ICT. However, the teachers also emphasized that access and opportunities for continuous professional development were crucial. The author concluded that it was necessary to further develop teachers' awareness of their competence.

To conclude, the state of teacher education for ICT integration can also be described with the help of the model developed by UNESCO (2010). Thus, both in-service and pre-service teachers already went through the emerging and applying stages since they have been learning about ICT at the faculties or at the training courses organized by the educational ministry. In other words, they became aware of ICT tools and their function. Some of them apply their skills and knowledge to teach with and through ICT in particular subjects, i.e. they use different tools to make visual presentations and to communicate with colleagues and pupils. However, infusing and transforming stages have not yet been reached since they imply specialization in the use of ICT, transforming the curriculum and creation of innovative learning environments.

What can be seen from all this is that Croatia is following the world trends and is working on adopting the European strategic frameworks for education and training of teachers in order to develop a Croatian teacher – European professional (Krstović & Čepić, 2010). The following chapter offers a more detailed overview of the theoretical framework and concepts used in this research that go beyond the basic UNESCO (2010) model used only to present the background of ICT integration in Croatia.

2 Theoretical perspectives and literature review

The purpose of the theoretical framework presented in this chapter is to build a structure for the research and development of instruments. The framework will be used later on when presenting the findings of the research with the goal to map them onto the existing theories. However, it is important to underline that the framework itself did not restrict data collection and it was not discussed in the chapter where data analysis was presented in order to avoid subordinating the data to existing theories and concepts that emerged in other studies.

2.1 Analyzing educational systems

When it comes to analyzing schools and educational systems, different organizational theories offer a wide set of perspectives for identification and resolution of numerous problems that appear inside educational institutions. The theoretical framework that I find especially useful in my research is based on the social systems theory summarized by Gaynor (1998). In the focus of this broader framework are *factors* that influence the behavior of individuals in educational organizations, as well as the dynamics and relationships between these two entities. "These factors include those that shape people's perceptions of their jobs, motivate them to fulfill organizational expectations for job performance, and engender stress for them as they seek to meet the expectations that define their roles in the organization" (Gaynor, 1998, p. 53). In other words, an educational system has its own organizational culture and values that pose certain expectations on the roles of individuals and their behavior. The roles that I am particularly interested in are those of university teachers, mentor teachers and student teachers included in initial teacher education programs. The important thing that should be noticed here is that on one hand there is an *organization* – a school or a university, and on the other there are *individuals* – teachers and students. However, what constitutes a system are relationships and interaction among individuals within the organization, i.e. *organizational culture*.

In the further development of the theoretical and conceptual framework I chose to combine two specific approaches to the area of my interest. Thus, inside this broader framework of social systems theory I placed a more focused framework of the theory of educational change.

Then, having in mind that introducing ICT is a specific type of change I looked more closely at the concepts that follow the integration of ICT into the educational context.

2.2 Management of educational change

As well as in the broader framework of social system theory, the division on individuals and an organization is being present in educational change theories. Thus, Fullan (2007) makes a distinction between two levels of change. The first one is defined as local and refers to teachers, principals, students, district administrators, consultants and parents. Change on the regional/national level includes government, institutions for professional preparation of teachers and professional development of educators. Louis (2006) also points out that the elements of the managed change are detected in the structures of an organization and in the leadership of the change. At the same time, she underlines that a change process can be quite chaotic, unpredictable, and hard to control because of the numerous individuals involved, and therefore needs to be open for constant revision and adaptation.

Although Fullan (2007), Gaynor (1998) and Louis (2006) make a clear distinction between an individual on one hand and an organization on another hand they all underline the importance of collaboration between individuals inside the organization in order to implement changes. Hence, Fullan (2007) talks about reculturing teaching profession in a learning community. This should be done by creating new professionalism where the collegial factor among stakeholders plays a crucial role in the process of implementation of a change. Louis (2006) also puts focus on the importance of the professional culture of trust and cooperation among all stakeholders in educational organization, as well as on the importance of cultivating teacher engagement.

Louis' (2006) and Fullan's (2007) theoretical frameworks of educational change can be easily applied to the Croatian context. Thus, educational change that incorporates ICT into educational system is managed because it has been introduced on a national level. On the other hand this process is quite chaotic because it depends on individuals inside the educational system who play a crucial role in accepting the integration of ICT. The intention in this master thesis is to use these theoretical perspectives in a search after organizational culture inside ITE programs in order to determine phases of integration of ICT and thus provide answers to research questions represented earlier.

Furthermore, in order to describe the complexity of the process, the abundance of the stakeholders, levels and factors involved in it, the management of change can be divided into three distinctive phases. Both Fullan (2007) and Louis (2006) agree that this is not a linear process but rather a cyclical one. In other words, it can be hard to distinguish where one phase ends and another begins. As it can be seen in the *Figure 2* taken from Fullan (2007, p. 66)[4], the factors in one phase can influence the other phase and vice versa.

Figure 2 A simplified overview of the change process.
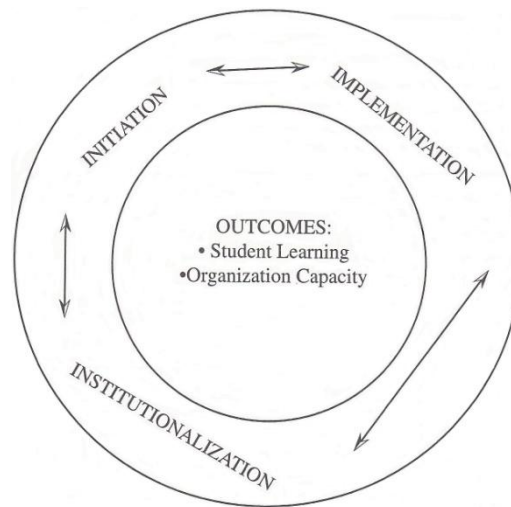
(Source: Fullan, 2007, p.66).

Fullan (2007) believes that this process of managing a change starts with *initiation* which includes decision making, planning and promotion of a certain program or change in an educational institution. This first step involves different actors and various factors which determine the progression of the educational change. Examples of these factors are access to information, teacher advocacy, funds etc. Louis (2006) on the other hand presumes that when talking about organizing for a school change, the change has already been introduced and she skips directly to the next step i.e. implementation, without mentioning initiation. If one looks at integration of ICT into educational system in Croatia, the initiation process has obviously began since the educational ministry introduced policy documents, equipped schools and faculties of teacher education with ICT, and provided training for teachers to use it. The next step should be to fully implement ICT and monitor that process.

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[4] NB: The outcomes listed in the inner circle are randomly chosen examples by the author of the book and are not in the focus of this study since I am not interested in the outcomes but the process of managing the change.

When it comes to *implementation*, both Fullan (2007) and Louis (2006) describe it as the process of putting the reform into practice. At this point Louis (2006) underlines the importance of planning on improvement of a change once it has been introduced. Fullan (2007) on the other hand makes an explicit distinction between three different factors that may influence the implementation: characteristics of change, local characteristics and external factors. He also pinpoints that there is no clear transition from the first step to the second one since the question about the actual need for the change and its significance can emerge again on the implementation level if not resolved beforehand. Once again, if one applies this perspective to the Croatian context it can be hard to distinguish when and if the initiation process has finished and the implementation began since ICT has not been used to the fullest in education. Therefore, the goal in this master thesis is to determine what factors inside the professional learning community of teachers influence on the process of ICT integration at this point.

Finally, if the change has proven to be successful it faces *institutionalization* or continuation of the practice. In other words, a well implemented change gets built into the educational system. Fullan (2007) concludes that the same factors that influence implementation have an impact on institutionalization as well. Louis (2006) shares the same view which is visible from the list of factors she provided. Her synthesis encompasses individual and organizational factors, as well as the characteristics of the change. Unfortunately, this phase has not yet been reached when it comes to widespread use of ICT in the Croatian educational system.

The second part of the theoretical framework looks more closely into the literature that identifies factors which have influence on the integration of ICT into educational systems. The goal is to provide a conceptual framework for answering research questions.

2.3 Integration of ICT

Integration of ICT into an educational system is a special type of educational change. As such, it is influenced by various factors that emerge inside educational institutions and from educational stakeholders. In order to construct a conceptual framework for further development of the research instruments several study reports have been analyzed that identified those factors. Since there is an overwhelming amount of studies dealing with ICT integration it is impossible to present them all. Therefore, the selection of studies presented

here was done in a way that it covers various methods and theories employed in national and international studies and in countries at different level of economic development. The factors that emerge from these studies are either external or internal, depending on their source. External factors are those that are not under direct influence of individuals and exist outside of the individual mind, for e.g. equipment, financial resources or technical support. On the other hand, internal factors stem from individuals' minds and individuals have control over it to some extent. These can be feelings, attitudes, perceptions or knowledge about ICT. Some of these factors also present obstacles to integration of ICT while others enable it.

External factors are also referred to as non-manipulative or exogenous factors (Drent & Meelissen, 2008), infrastructure (Pelgrum, 2001), practical factors (Tearle, 2004) and facilitating conditions (Teo, 2010). Among them the most prominent ones that appear in all reviewed studies and present the basis for ICT integration are the availability of hardware and software, access to them, their reliability, quality and quantity (Cuckle & Clarke, 2002; Pelgrum, 2001; Scrimshaw, 2004; Stensaker et al., 2007; Tearle, 2004; UNESCO 2002a; 2002b; UNESCO, 2011).

These material factors are followed by the support which is seen both as technical support that includes assistance, guidance, advising and help with technical problems and ICT use, and support from the colleagues or school leadership in implementing ICT into the teaching process. (Cuckle and Clark, 2002; Drent & Meelissen, 2008; Pelgrum, 2001; Scrimshaw, 2004; Stensaker et al., 2007; Tearle, 2004).

Among analyzed factors is also management of ICT integration. It is examined together with the coordination of ICT and people (Tearle, 2004) or through the prism of written policies, curriculum development and the attitudes of the leadership towards ICT (Pelgrum, 2001; UNESCO, 2002a; UNESCO 2011). A similar approach is also the one which explores the role of the government and commitment of institutional management to implementing ICT (Stensaker et al., 2007; Drent & Meelissen, 2008) as well as organization of access to ICT (Scrimshaw, 2004).

Funding is a factor that is considered very important in implementing ICT. It covers several areas among which are expenditures on teacher training (Pelgrum, 2001), availability of financial support (Drent & Meelissen, 2008) or economic resources in general (Stensaker et al., 2007).

Another factor that belongs to the group of external factors but it not a material one is collaboration. It is perceived as inner information and communication system of the school and the collegial interaction and reflection (Drent & Meelissen, 2008). In a similar way, UNESCO (2002a) recognizes collegiality, collaboration and networking as the consequences of ICT restructuring the social organization of a school, or it perceives collaboration as the community involvement into implementation of ICT (UNESCO, 2002b; UNESCO, 2011).

One more example on a non-material factor is professional education, but it is also dependant of a material factor such as funding. It is seen as availability of training and support (Scrimshaw, 2004; Tearle, 2004) or as a part of a broader category such as staff development (Pelgrum, 2001). It is also perceived as educational experience (Drent & Meelissen, 2008), an important component of ICT in education policy (UNESCO, 2011) and implementation of ICT curriculum (UNESCO, 2002a).

On the other hand, not all papers that dealt with external factors mentioned internal ones as well. Those that did referred to them as manipulative or endogenous factors (Drent & Meelissen, 2008) and attitude and ethos (Tearle, 2004).

Hence, the attitudes towards ICT are analyzed by searching after general views on using computers (Cuckle & Clark, 2002), motivation and commitment towards ICT (Tearle, 2004) and their influence on pedagogical approach and contribution to education (Drent & Meelissen, 2008). Cuckle and Clark (2002) also investigated attitudes of teachers towards colleagues who used ICT or not. A bit different approach is presented by Teo (2010) who investigated the influence of perceived ease of use and perceived usefulness of ICT on teachers' attitudes towards ICT.

Further on, personal entrepreneurship invested into professional development (Drent & Meelissen, 2008) and collective endeavor to implement ICT in teaching and learning process (Tearle, 2004) are also found important.

When it comes to knowledge about ICT, Tearle (2004) and UNESCO (2002a) relate it to the understanding of how ICT is used and what is its value. Drent and Meelissen (2008) look at it as ICT competence and Scrimshaw is interested in the confidence, awareness and capability to use ICT.

To conclude, most of the studies discussed here are concerned with the integration of ICT into educational systems on different levels from schools to universities. As such these are mainly large and medium scale quantitative studies that report results on national and international level. Those studies that are concerned with individual stakeholders in educational systems and their personal views are mostly run on a small scale and are qualitative in nature. Nevertheless, both types of studies show that external factors that arrive from institutions and internal ones like teachers' perceptions have central role in educational systems either as obstacles to or enablers in the phases of the ICT integration.

Having in mind all that is said, I developed the conceptual framework presented in the *Figure 3*. It is based on Fullan's (2007) and Louis' (2006) theories of educational change, and on the synthesis of the factors influencing the integration of ICT which emerge from the studies disused above.

Figure 3 A conceptual framework for integration of ICT into educational system
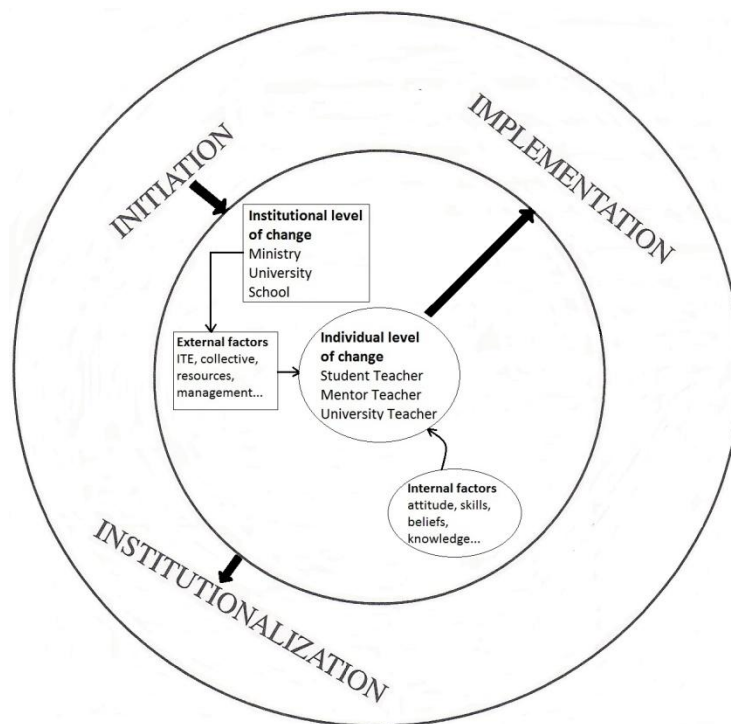
(Source: The outer part of the figure presenting the cyclical nature of the educational change is taken from Fullan, 2007, p.66).

When it comes to the phases of change in educational system, the educational ministry or governmental agencies include ICT as an innovation into the national strategies, policies,

programs and curriculums. Universities and schools are then equipped with ICT and textbooks are supplemented with CD-ROMs. In other words, institutional level of change, which is guided by rigid rules and regulations, and for that reason placed in a rectangle, is in the phase of initialization. These institutions are also sources of external factors that influence stakeholders in the initialization phase such as availability of hardware, software or management. However, the next phase of educational change depends on the individuals inside those educational organizations. In this particular case these individuals are university teachers, mentor teachers and student teachers included into ITE programs. It is expected that they through their practical work in the classroom implement the change, i.e. put the curriculum, theory or policy on ICT into practice. However, the implementation phase on this individual level depends not only on the external factors but also on their personal perspectives, attitudes and opinions. Since these internal factors are flexible and can vary, they are placed in an oval. Finally, there is the institutionalization phase. It depends on the interpersonal cooperation of teachers to integrate ICT as well as on collaboration among institutions in order to create the best possible conditions to continue with the use of ICT.

External and internal factors that are listed in this framework are based on the overview of the studies on a similar topic. They serve only as examples of possible findings and do not in any way constrict the analysis of data in this paper. That is to say, the concepts in this research paper are not transferred from previous studies into this one. Instead, they are built from the accounts of the participants and then compared to the findings in other studies in order to discover similarities and differences.

The following section offers an overview of the research papers published in Croatia in the last decade on integration of ICT into the primary classrooms and ITE programs at the faculties. It also provides a synopsis of the research conducted on opinions and experiences of university teachers, mentor teachers and student teachers about ICT in the Croatian educational system.

2.4 Review of related Croatian literature

Research on teacher education in Croatia is conducted for three different purposes. At macro level the results are usually used to create educational policy and to offer support in decision making at the state/ministry level. Further on, in order to create and improve curriculums

universities and faculties tend to conduct intermediate level research on pre-service and in-service teacher education. Finally, there is research on a micro level with a purpose to evaluate various practices in specific environments like university classrooms or demonstration schools (Vizek Vidović & Domović, 2008). In this literature review I managed to indentify only 15 research papers that dealt with in-service and pre-service teachers and integration of ICT into the Croatian educational system. All these research studies span through the three aforementioned levels of the research.

Hence, from 2003 to 2005 the Institute for Social Studies in Zagreb and the Center for Research and Development of Education participated in the international research project *Enhancing Professional Development of Education Practitioners and Teaching/Learning Practices in CEE Countries*. Sample in the study consisted of 205 teachers who expressed their opinions about teacher education in Croatia. Pavin, Vizek Vidović and Miljević-Riđički (2005) incorporated the results of this quantitative research into the National Report about the current state and future prospects of teacher education in the country. Their findings showed that the teaching profession was perceived as having low social and material status in the Croatian society. Teachers in general believed that the pre-service education should be improved and more focused on acquiring new skills and competencies when it came to ICT. Faculties of teacher education confirmed to be constantly working on the implementation of new curriculums that should provide better learning opportunities in general. At the same time they reported about the obstacles coming from the rigid and hierarchical decision making system when introducing those changes. The need for closer partnerships among the institutions for teacher education on all levels was raised as well. The teachers also underlined the need for more professional development especially when it came to the use of ICT in the teaching practice.

The need for extensive teacher education for the use of ICT was evident in the results of a similar quantitative study on a macro level conducted by Vizek Vidović and Pavin (2005) with the purpose to test the perception of ICT in Croatia on a sample of 1334 classroom teachers and 2134 subject teachers in primary schools, 1044 subject teachers in secondary schools and 949 student teachers at the faculties of education. They reported that 26.1% of teachers did not use computers, 41.1% did not use Internet, 63.5% did not communicate via e-mail and only 1.83% used Internet for lesson preparation. Most commonly used teaching tools were textbooks, workbooks, teacher's handbooks and professional literature.

That the traditional teaching methods and tools still dominated and that ICT was rarely used was also confirmed by Baranović (2006). Further on, Anđić (2006) presented similar findings of a study conducted in three different counties in Croatia. These findings also showed that ICT was still not used as a didactic tool in the classroom teaching practice. Her suggestion was to formulate university curriculums that incorporated ICT into initial teacher education at the faculties and in the demonstration schools, which was also confirmed by Batarelo (2005).

However, according to Ljubić Klemše (2008) those teachers who had at least one computer and an overhead projector in the classroom had more positive opinions about ICT than those who did not have access to computers. She pointed out that teachers had a key role in the implementation of ICT and their education was crucial in that process. What is more, their efforts to use ICT in teaching practice should be recognized and teachers properly rewarded.

How important is the initial education of teachers for building positive attitudes towards ICT is also visible from findings of Stankov, Pilić and Stankov (2000). They carried a quantitative research on a sample of 201 student teachers and classroom teachers in order to determine their views on ICT and the quality of teaching process. Although approximately half of the participants were familiar with the teaching styles that involved computers both groups agreed that ICT could improve the quality of teaching and learning. Similar studies undertaken to examine the attitudes of student teachers towards ICT also confirmed that those students who had the opportunity to learn about ICT at the faculties of teacher education and apply their knowledge in demonstration schools developed positive attitudes towards this type of teaching. (Tomaš, 2009; Radetić-Paić & Ružić-Baf, 2010; Vuković & Dumančić, 2011 and Jukić, 2012).

In a similar way Rončević (2008) looked into the role of the in-service teachers who used ICT and the influence they had on pupils' performance. Her findings showed that 91.3% out of 126 classroom teachers believed that ICT could enhance pupils' performance which reflected their positive attitude toward ICT. The report also underlined that teachers expressed the need for continuous professional education when it came to the use of ICT in their work. The same positive attitude towards ICT and the need for more education was also noticed among 152 student-teachers at the faculties in Rijeka and Pula (Tatković and Muradbegović, 2008). However, the students reported that the university teachers were not open towards communication with the students which suggested that there was a need for change in the teaching style. The conclusion was that although ICT had been introduced into curriculum

more than a decade ago the results showed that concrete steps for the implementation of ICT were not taken.

In a similar manner, the crucial role of mentor teachers attracted attention of Vizek Vidović and Žižak (2011) who underlined the importance of their support to student teachers when it came to the use of new technologies in the classroom.

Finally, Tatković and Močinić (2012) conducted an empirical research at five institutions for teacher education in Croatia on student teachers' perceptions about ICT skills and competencies. The findings indicated that it was necessary to improve the curriculums for initial classroom teacher education in a way that both university teachers and student teachers learned to use ICT in the education process. The researchers also suggested developing high quality strategies for informatization of faculties for teacher education in the country to meet the European standards.

To conclude, the research conducted in Croatia about ICT and education of classroom teachers is mainly quantitative and therefore does not penetrate deeper into the realities of learning and teaching. So far, researchers have not shown much interest in conducting comparative research by using qualitative or mixed methods. What is more, in the overview of relevant literature I have not come across of a research that analyses and compares similarities or differences in two or more initial classroom teacher education programs when it comes to the integration of ICT. The theoretical perspectives in already conducted research did not take into consideration theories of educational change and factors that could influence the implementation of ICT. Therefore I hope that this study will fill the gap in the existing knowledge about the initial teacher education and ICT in Croatia. The next chapter on methodology offers a more detailed insight into the collection and analysis of the data in this study.

3 Methodology

The purpose of this chapter is to describe the methodology applied in this research. Hence, it provides an overview and the rationale behind the choice of the research design, research strategy, method and the instruments applied. Furthermore, it provides a detailed description of the research sites and the ethical considerations that emerged during the fieldwork. The chapter concludes with description of the approaches to data analysis and issues of quality within qualitative comparative research.

3.1 Comparative dimension

Bryman (2008) defines research design as a framework for data collection and analysis. The research design that is applied here is comparative. According to Bryman the comparative design "embodies the logic of comparison in that it implies that we can understand social phenomena better when they are compared in relation to two meaningfully contrasting cases or situations" (Bryman, 2008, p. 58). That is to say, comparative research in education by definition implies finding the differences among similarities or determining the similarities among different educational systems on global, national or local level. Dale (2005) divides the field of comparative and international education (CIE) in two parts. The first one is traditionally oriented towards describing and explaining the differences among various educational systems and providing solutions to eventual problems. The other approach is a response to the globalized world and the knowledge society, and calls the researchers to confront the problems in their context in order to learn from comparisons instead of offering general explanations. Kubow and Fossum (2007) go a step further by replacing the term problem with a dilemma. While problems imply win-lose situation, rigidity, inflexibility and lack of choice, dilemmas "challenge us to look deeply at what people, worldwide, view to be important; what attributes they believe their citizens should possess; and what kind of education is needed to create the kind of societies desired" (Kubow & Fossum, 2007, p. 24).

These approaches goes in line with what Crossley and Watson (2003) call the need for reconceptualization in the field of comparative and international education, i.e. determining the specific context of the research inside the wider scope of global changes. The strength of collaborative studies is specifically important in the contextualization because: "Strengthening partnerships between insiders and outsiders, researchers and practitioners and

policy makers and analysts could thus play an integral part in the reconceptualization of the field as a whole" (Crossley & Watson, 2003, p.128).

As a supporter of the contextual research I have chosen to look more closely at the context of ICT in Croatian education placed in a wider dimension of world trends. Furthermore, I am interested in the use of ICT in the context of classroom teaching and mentoring in two primary schools placed in different regions. Most importantly, I am interested in the context of initial teacher education for the use of ICT at two different universities, and particularly into different perspectives, attitudes, experiences and views of university teachers, mentor teachers and student teachers on ICT in classroom teaching.

 In the same way, I believe in the necessity of building partnerships between teachers and researchers and in the active participation of teachers in the educational research. Moreover, this kind of close collaboration helps constructing a precise understanding of implementation of educational changes triggered by a much wider globalization processes.

According to Crossley and Watson (2003), this type of post-structuralist respect for context is reflected in the growth of qualitative research inside the field of comparative and international education. And it is because of my concern with the context that I have chosen to place my research inside the framework of the qualitative design which will be discussed in more detail in the following section.

3.2 Research strategy and method

Research strategy applied in the comparative research design can be roughly divided into either quantitative or qualitative (Bryman, 2008; Fairbrother, 2007). Since I find this division of the research strategies rather constraining I have chosen to adapt some general characteristics of a qualitative strategy to the context of my comparative design.

Therefore, although I offer a theoretical framework – an approach more common in quantitative research strategy, the framework here does not provide definitive concepts that are then turned into variables and measurable indicators. Rather, I used the theoretical framework as a tool for offering a general explanation of the complexity of the educational change. Inside this framework appeared sensitizing concepts that were discovered by inductively reviewing the national and international literature on implementation of

innovation. These sensitizing concepts are "employed in such a way that they give a very general sense of reference and guidance in approaching empirical instances" (Bryman, 2008, p. 373). The list of sensitizing concepts, i.e. the external and internal factors influencing the use of ICT among teachers, is not determinate but rather opened to modification and amendments through new findings. That is to say, I did not choose the standard qualitative strategy approach to research in which researchers build a grounded theory from their own findings. Instead, I decided to build the findings into existing research knowledge and theories, and thus contribute to the knowledge about the implementation of ICT into the Croatian educational system.

The formulation of research question is in close connection with the approach to theory. Having provided a theoretical framework for the research I have also explicitly stated two research questions. The research questions are based on my preliminary exploration of the problem area in Croatia, conversations with student teachers and university teachers in April 2011, and my own experience as a student and a teacher. However, I would like to point out that although the research questions are precise and specific they are also open and general. The reason is simply because there is already considerable knowledge about the implementation of ICT shared through international literature. On the other hand, there is a present knowledge gap in the Croatian research literature about the factors that have positive or negative influence on the implementation of ICT into the educational system. By having open and general research questions I intend not only to discover those factors that are already stated in the international literature but also create a possibility for adding new ones that are specific to the context of the Croatian educational system. In other words, I also believe that:

> *"To do otherwise risks imposing an inappropriate frame of reference on people. Keeping structure to a minimum is supposed to enhance the opportunity of genuinely revealing the perspectives of the people you are studying. Also, in the process, aspects of peoples' social world that are particularly important to them, but that might not even cross the mind of a researcher unacquainted with it, are more likely to be forthcoming" (Bryman, 2008, p. 389).*

In order to achieve that goal I have chosen interviews as an instrument for data collection. The assumption behind this decision, as well as of the choice of qualitative strategy, was to avoid offering the participants in my research study a set of predetermined answers or choices. I was rather interested to ask them to formulate their own answers that came from their teaching experiences as student teachers, mentor teachers or university teachers.

Three semi-structured interview guides were formulated for these three different groups of participants (see Appendix). Each guide was composed of three sets of questions most of which belong to the types identified by Kvale and Brinkmann (2009). Thus, I began with factual interview consisting of the introductory questions about the professional background of the participant and follow-up questions about their experience in organizational change that involves integration of ICT in their working or studying environment. The second part of the interview is conceptual and it revolves around probing and specifying questions about the external factors that influence their use of ICT. Another purpose of these questions was to make a more comfortable transition to the third set of indirect and direct questions about more personal and individual internal factors that influence the use of ICT. This technique is often employed in the narrative and discursive interviews (Brinkman and Kvale, 2009). All the interviews were recorded. I concluded each interview with my own summary of what had been said upon which the respondent agreed, corrected me or added additional information.

3.3 Research sites

3.3.1 University of Rijeka, Faculty of Teacher Education

In order to fulfill the requirements for conducting a qualitative comparative research I visited two universities and two primary schools in two different counties in Croatia. The fieldwork started at the University of Rijeka situated in the north-western County of Primorje-Gorski kotar. This is both a coastal Mediterranean and mountainous region whose administrative center is Rijeka, the biggest seaport and the third largest city of Croatia.

Since its establishment as a modern university in 1973, the University of Rijeka has gone through series of transformations that were the result of the changes in the national higher education policies. These alterations are also reflected in the history of the Faculty of Teacher Education whose status changed from a professional to university study and finally back to the professional study. In each academic year the faculty in Rijeka admits 45 students to the first year of studies and 20 of them are self-financing students. The admission requirements for the study are the graduation from a four-year secondary school, the achievement at the entrance examination and health capacity for work in the field of education. The study is organized as an integrated five-year study on two levels and it is based on the ECTS credit system. Upon completion of the study each student obtains the academic title of Master of

Arts in primary education with specific specialization in one of the two modules that student teachers choose: Extracurricular activities in primary school classroom education or Literary-linguistic module. These optional modules, together with optional courses are offered during the studies in order to raise the competence level of teachers and as an answer to the growing demands for extracurricular and out-of-school activities.

Since 2011, the education of teachers has been taking place on the new premises of the University Campus. The Faculty of Teacher Education shares the building with the Faculty of Philosophy but it is administratively and physically detached in its own part of the building. The students also have access to the separate library of the faculty and to the computer classroom equipped with 16 computers where part of the classes takes place.

The use of ICT during the studies and the preparation of teachers for the use of ICT are presented in a single course description of the Study Program of the Faculty of Teacher Education in Rijeka (2006). The program offers 3 courses directly connected to the use of ICT in the classroom and there are additional 12 course that have the "technology in education" included in their description (see Appendix for a more detailed account of the courses).

Another important component of the preparation of future teachers is an organized and supervised school practice. The first part of the student practice takes place at the faculty where student teachers attend courses on the methodology of teaching, educational sciences and subjects of profession. The second part, which is closely related to the first one, takes place in seven primary schools in Rijeka where students gain supervised field experience. These schools serve as demonstration schools during the third and fourth year of studies and have in-service teachers specialized as mentors for the students. Each of these schools is also specialized for practicing the methodology of teaching in specific subject such as mathematics, art or language for example. Out of these seven primary schools I randomly picked one, the "Nikola Tesla" primary school to include in my research.

3.3.2 "Nikola Tesla" primary school in Rijeka

The "Nikola Tesla" primary school is located in the center of Rijeka and it a demonstration school for mathematics. Both classroom and subject teaching in the school is organized in the morning hours. Classroom teaching takes place at the first floor of the building but the staff and the pupils share the library, the gym and the teacher staff room with the rest of the school.

Each class has its own room where the teaching takes place and some of the classrooms are equipped with a computer at the teacher's desk. Upon my second visit to the school I was informed that the classroom teaching department had its own separate computer room equipped with 15 computers. The Ministry of Education, Science and Sports has equipped every primary school in Croatia with one computer classroom. However, these classrooms are usually intended for subject teaching, and therefore unavailable to the classroom teaching staff and pupils. In the case of the "Nikola Tesla" primary school, the City of Rijeka donated a separately equipped computer classroom to the classroom teaching department which makes this school an exception. This allowed for the organization of the extracurricular activity "Informatics" that is optional for the classroom pupils, and if necessary, short courses on the use of the computers for the staff. The pupils in turn have to pay a small monthly fee to attend this extracurricular activity and the person teaching these courses is not a classroom teacher but a subject teacher in Informatics in the same school.

3.3.3 Josip Juraj Strossmayer University of Osijek, Faculty of Teacher Education

The second part of my field work took place at the County of Osijek-Baranja situated in the continental north-eastern region of Slavonia. The administrative, cultural and economic center of this lowland region is Osijek, the fourth biggest city in Croatia. The Josip Juraj Strossmayer University of Osijek is the youngest Croatian university consisting of 11 faculties, departments and institutes part of which are situated at the new University Campus that is, like the one on Rijeka, still under construction.

Since its establishment, The Faculty of Teacher Education in Osijek went through the same administrative changes in the professional ranking of the studies and the teaching profession as did the faculty in Rijeka. The first generation of students of Integrated Undergraduate and Graduate University Teacher Studies program based on Bologna process was enrolled in 2005. In the same year the status of the university study was raised to the professional study and the Teacher Training College was renamed into the Faculty of Teacher Education. Out of 60 students enrolled to the new academic year at the faculty in Osijek, 50 of them are financially supported by the Ministry while the rest have to pay the student fee themselves. The entrance requirements include the graduation from a four-year secondary school, the fulfillment of the conditions at the entrance exam and health capacity for work in the field of

education. The study consists of 10 semesters in five years and the progress is based on the ECTS credit system. The students who complete the five year studies receive the title Master of Primary Education with specific specialization in one of the three modules: Foreign Language (English or German), Computer Science, or Developmental Studies (which have additional emphasis on pedagogy, psychology and teaching methods). The purpose of these modules is to train classroom teachers in a way that they are able to independently teach those subjects without the help of the external subject teachers or educational experts.

Since 2011, the education of teachers has also been taking place on the new premises of the University Campus. The Faculty of Teacher Education has its own building and it is administratively independent inside the University. The students also have access to the separate library at the faculty and to the computer classroom equipped with 20 computers where part of the classes takes place. Most of the teaching areas are also equipped with the computers and overhead projectors.

The Study Program of the Faculty of Teacher Education in Osijek (2005) offers an overview of 15 mandatory and elective courses from the modules that consist of teaching and learning about ICT and progress towards teaching on how to teach with and through ICT. There are also 4 additional courses that prescribe the use of computers (see Appendix for a detailed description of all the courses).

As a part of integrated studies, the practical work of student teachers takes place throughout the entire second, third, fourth and first half of the fifth year of studies in two demonstration schools in Osijek. The partnership with these schools and their mentor teachers is regulated through the agreements of the Ministry of Education, Science and Sports and the Faculty of Teacher Education for each new school year. Out of these schools I randomly picked the "Retfala" primary school.

3.3.4 "Retfala" primary school in Osijek

The "Retfala" primary school is located in the Retfala suburb in Osijek. Classroom education takes place at first floor of the building in a separate wing and the classroom teachers also have their own teacher staff room. Each class of pupils has its own classroom where the teaching takes place and some of the classrooms are equipped with a portable projector, and a computer without Internet connection placed on the teacher's desk. As most of other primary

schools in Croatia this school also has one computer classroom. However, this classroom is intended for the upper primary school pupils and teachers, and classroom pupils and staff do not have access to it.

3.4 Sampling and fieldwork

The fieldwork resulted in 17 interviews with participants from the three different groups actively included in teacher education at two Croatian universities. The following table provides the overview of the interviewees and the research sites.

Table 1 *Overview of the interviewees and research sites*

Location	Student Teachers	Mentor Teachers	University Teachers
Rijeka	5	2	2
Osijek	5	1	2
		Total:	17

The subsequent sections provide more detailed explanations for the sampling and fieldwork.

Faculty of Teacher Education in Rijeka and "Nikola Tesla" primary school in Rijeka

My fieldwork started at the University of Rijeka in September 2011 and finished at the end of October 2011 at the University of Osijek. I made a decision to conduct the first part of the research at the university that I graduated from as a teacher and developed a deeper interest in teacher professionalism. Although I did not study at the Faculty of Teacher Education I was familiar with the organizational structure of the studies, I knew some of the university teachers and administration staff working at the faculty, as well as some students that studied there. Therefore I decided to turn to them for help in opening the administrative gates of the institution. Another reason for choosing the university in my hometown was simply to lower the expenses of the research since the project was self-financed.

The academic year at the institutions of higher education in Croatia starts on October 1st. When I arrived at the faculty at the beginning of September 2011 the students had no lectures

and were preoccupied with exams so I started interviewing university teachers. Upon my first arrival to the premises I introduced myself to the administrative staff, informed them about the purpose of the research and presented them the introductory letter from the University of Oslo. They showed great interest for the research and offered their help by providing me with the lecture schedule, list of demonstration schools, telephone numbers, office hours of the university teachers and some useful information about the staff that I should have contacted in relation to my research topic. I visited the institution on several occasions while making the arrangements for the interviews.

The sampling for the interviews with the university teachers was purposive since I interviewed two teachers that held courses on how to use educational technology. The interviews took place at the faculty, during the office hours in the teacher's office. They lasted approximately one hour.

In the second half of the September 2011 I also visited "Nikola Tesla" primary school where I interviewed two mentor teachers. I visited the school on several occasions to arrange and conduct interviews. The headmaster provided me with a list of classroom teachers that were also mentors to the student teachers. I randomly picked one mentor teacher whom I interviewed in a small room where the individual teacher-parent meetings take place. This interviewee introduced me to the subject teacher that holds "Informatics" as an extracurricular activity course and who was kind enough to talk to me as well. Both interviews lasted around 45 minutes.

Finally, the interviewing of the fifth year student teachers took place at the Faculty of Teacher Education in Rijeka at the beginning of October, 2011 once the new academic year started. My first formal encounter with the entire group of around 45 student teachers in classroom education took place in one of the classrooms at the faculty on the first day of the new academic year and prior to one of their courses. I introduced myself, informed them about the importance of the research on teaching profession and the significance of their participation in such research. As master students they were already familiarized with the process of educational research through a university course and were supposed to conduct a small quantitative research for their final master thesis as well. I explained that I am conducting a qualitative research on graduate student teachers in classroom teaching and asked for five volunteers willing to give me an interview. All the interviews took place at the faculty, in the classrooms that were available so that we were undisturbed. Only at the beginning of each

interview did I introduce them with the topic and the purpose of the research. This sampling resulted with interviewing students that took specialization in both modules thought at the faculty. Each interview lasted approximately half an hour.

Faculty of Teacher Education in Osijek and "Retfala" primary school in Osijek

The other part of the fieldwork started in Osijek during the second half of October 2011. It attracted me as a research site because of the long list of university courses connected to teaching and learning about, with and through ICT. In the course of my fieldwork in Rijeka I contacted the administration of the Faculty in Osijek and the person responsible for the creation of the new and improved curriculum in 2005 expressed great interest for the participation in my research.

Upon arrival at the Faculty of Teacher Education in Osijek I introduced myself to the administration staff and to the university teacher that I contacted earlier. This time I started interviewing students first since they were available. The same sampling technique and the same procedure were applied as in Rijeka. The interviews were arranged during the next few days and took place in the empty classrooms before, after or during the breaks in their lectures. Since I did not pinpoint that I am interested in ICT at my introduction to the fifth year class, the sample consisted of students being specialized in each of the three modules described earlier. I was very interested in the factors that influenced their choice of modules, the choice of elective courses and their experiences with ICT. Each interview lasted approximately half an hour.

The next step of the research was to interview the university teachers. Since the faculty in Osijek has many courses there are also several teaching assistants so I randomly picked one. The interview lasted around half an hour and took place at the teacher's office.

The next interview at the Faculty of Teacher Education in Osijek was with one of the head teachers I contacted via e-mail when making arrangements for the field trip. This interview took place in the teacher's office as well and lasted more than one hour.

My final interview took place at the "Retlafa" primary school that I picked randomly from the list of the demonstration schools in Osijek. When I arrived to the school I introduced myself and the purpose of my research to the headmaster of the school. After a short discussion the headmaster agreed to include the school in the research and I randomly picked one mentor

teacher from the classroom teaching department. During the lecture break I introduced myself and the teacher agreed to be interviewed after work. The interview took place in the classroom after the pupils went home and lasted about 45 minutes.

3.5 Methodological limitations

One of the first obstacles I faced with was when trying to identify relevant literature published in the Croatian journals. In the literature review I managed to indentify only 15 research papers on ICT and teacher education in Croatia. Unfortunately, there are still not many electronic journals that publish online reports in Croatia and the university libraries in Croatia have a narrow selection of books that contain relevant data. What is more, the national electronic data offers only abstracts of the relevant articles and books. However, I managed to partly overcome this obstacle by contacting the authors directly and some of them agreed to send me their work.

Furthermore, lack of time presented another limitation to my fieldwork. Although the Faculty of Educational Sciences in Oslo predicted two months for fieldwork I had a bit less time since the academic year in Croatia starts in October. During the fieldwork I managed to reach the theoretical saturation through the interviews with student teachers. However, if I had more time and financial resources I would have tried to interview more university teachers and mentor teachers in the demonstration schools both in Rijeka and Osijek in order to gain a wider perspective on the problems of the integration of ICT into classroom teaching.

Another challenge was certainly to gain participants' trust and boost their confidence to openly talk about the issues at their working place. In general, higher ranked university teachers had no problems with the openness and willingness to talk as well as student teachers who were happy to share some of their problems. However, the teacher assistants and classroom teachers were not that open when it came to the obstacles from the collective or from themselves. After the formal part of the interviews was finished and once I turned off the voice recorder these teachers often continued to talk more openly about the obstacles caused by the school administration. I noted down that additional information after I left the premises. Furthermore, those students who were opened towards the use of ICT and those teachers who were trained to use computers talked more confidently and openly than others.

3.6 Ethical considerations

The research was registered at the Norwegian Social Science Data Service (NSD) and I received an introductory letter from the University of Oslo to present at the research sites (see Appendix). As mentioned earlier I introduced myself to the administration staff both at the faculties and at the demonstration schools, informed them about the topic and purpose of the research and asked for cooperation.

Furthermore, upon the beginning of each interview every participant was informed about the topic and the purpose of the research, and the possibility of withdrawal from the research at any point, even after the interview was finished. I also presented them with the introductory letter, guaranteed them anonymity and protection of data. The interviews started once they gave me their oral consent.

During the interview I tried to avoid inflicting any type of psychological harm. Since I was asking questions that could have been quite personal I did not insist to get the answer if the participant did not feel comfortable. On the other hand, if the participant revealed personal information not relevant for my research I politely steered them back to the topic. If I felt that it was important for them to listen what they had to say I did not interrupt. One of the things that I learned from this research is that the teacher profession is very demanding and there are not many people interested in their problems.

3.7 Method of data analysis

The process of transcribing the interviews started during the fieldwork and helped me adapt the interview guide. I did not manage to transcribe all the interviews by the end of the fieldwork and the process continued through the following weeks.

Another experience that I gained through this research project is that qualitative research strategy is notorious for the amount of data collected and generated. The first three interviews were transcribed by using inductive approach, i.e. word-for-word transcribing. However, this resulted in huge amount of data that was to be analyzed and much irrelevant information as well. Since I did not intend to build a grounded theory, and I already had a general theoretical framework for the research as well as research questions, I decided to apply deductive approach to the transcription process. The objectives of this approach were to eliminate the

data unrelated to the research topic and purpose, reduce the amount of transcribed data to the units that were more manageable for analysis and therefore prepare ground for efficient coding (Bekele, 2011). This resulted in a text that took less space, was more convenient for the analysis and it certainly saved me a lot of time. On the other hand it was challenging to decide what was important and what was not. In order to make sure that all the relevant data was included I listened to each interview recording several times during and after I finished transcribing them. The interviews were treated not only as a sum of individual concepts but also as a whole with a deeper meaning relevant to the research goal.

Once the transcribing had been completed I approached to the data coding process by applying an inductive method. This approach is common in qualitative research whose purpose is to develop theoretical explanations in a grounded theory. Although this was not part of my research aim I believed that an open kind of coding could result in new insights not influenced by theory but which could then be built into the existing theoretical knowledge. Consequently, the coding process consisted of three levels: itemization, conceptualization and categorization (Bekele, 2011). Appendix contains examples taken from the interviews with some participants in order to better illustrate this coding process.

The coding resulted in a list of external and internal factors obtained in the interviews with the three groups of participants. The internal factors are intrinsic and inherent to one individual's mind, for e.g. individual's feelings, attitudes, knowledge or opinions. The external factors on the other hand, come from institutions such as the educational ministry, university, faculty or school and exist independently of individual's mind. In some cases the external factors can also stem from individuals and have influence on other individuals inside one or more institutions. The following tables offer the overview of the factors identified in this research as well as their definitions.

Table 2 *Definitions* of e*xternal factors*

External factor	Explanation
Hardware	Hardware equipment, such as computers, overhead projectors, interactive whiteboards or network devices at the faculties or in demonstration schools, which are used to teach and learn about, with and through ICT.

Software	Software tools, such as operation systems, individual program tools or program packages installed to the computers at the faculties or in schools that are used to teach and learn about, with and through ICT.
Financing	Financial resources provided by the local community, donors, schools, Universities of Rijeka and Osijek, by the Faculties of Teacher Education or the Ministry of Science, Education and Sports for equipping educational institutions with ICT.
Technical support	A service or a team of individuals who provide assistance to pupils, students and teachers when having technical problems with electronic devices.
Mentor teachers' stance towards ICT	Attitude and relationship that mentor teachers in demonstration schools have towards ICT, and which affect student teachers' perception of ICT.
University teachers' stance towards ICT	Attitude and relationship that university teachers at the universities have towards ICT, and which affect student teachers' perception of ICT.
Professional education	Opportunities for professional development and gaining skills and knowledge about the use of ICT provided by the Ministry of Science, Education and Sports or other educational agencies and institutions.
Cooperation	Teamwork and partnership between different institutions i.e. faculties and schools with the goal to integrate ICT into educational systems, and which directly affect the performance of the individuals.
Top-down management	Decision making on a level higher than that of an individual teacher or student, for e.g. ministry, university, faculty, school board.

Table 3 *Definitions* of *internal factors*

Internal factor	Explanation
Individual effort	Effort that individual teachers and students invest in order to gain

	knowledge about ICT and apply that knowledge in practice.
Feeling of disappointment	The feeling of dissatisfaction because of the lack of appreciation for individual's work and personal efforts invested into integration ICT.
Attitude towards ICT	Positive and negative personal attitude that students and teachers express when it comes to ICT.
Attitude towards colleagues	Positive and negative personal attitude that students and teachers express when it comes to their colleagues who use or do not use ICT.
Knowledge	Knowledge and skills about ICT that student teachers gain at the university and which they try to apply in practice.
Collective effort	Effort that a collective of teachers invests in order to integrate ICT into educational system.

A more detail account on these factors is given in the chapter 4 on data analysis.

3.8 Reliability and validity in qualitative research

Reliability and validity are criteria commonly used for measuring the quality of quantitative research. When it comes to evaluating qualitative research methodologists either adjust notions of validity and reliability to the qualitative context or use new criteria developed especially for that purpose (Bryman, 2008; Kleven, 2008). However, Morse, Barett, Mayan, Olson and Spiers (2002) make an interesting point in their article claiming that rejection of reliability and validity in the qualitative research can impose serious threats to the proper evaluation of the study. They state that the strategies introduced by the qualitative methodologists are used to evaluate the study after it has been finished. Instead, the evaluation process should not take place at the end of the study but a researcher should remain focused on the verification process during the entire length of the study. Finding their point quite important I was concerned with the quality of the research from the beginning to its end.

Bryman (2008) defines reliability as being closely connected to the replicability of the study and consistency of its findings. Brock-Utne (1996) on the other hand takes the reliability out of the quantitative context and underlines its fundamental role inside the qualitative educational research. When it comes to the qualitative research based on interviews, Kvale and Brinkman (2009) connect reliability with consistency of the answers received from the respondents. In order to achieve that kind of reliability I avoided leading questions during the interview and asked my respondents for an overall summary at the end of each interview to confirm statements made earlier. During categorization process I paid attention to specific answers and I did not avoid variability of the items. However I tried to objectively fit them into categories included into theoretical framework that I proposed. Furthermore, both Yin (1994) and Lincoln and Guba (as cited in Bryman, 2008) suggest establishing database of the research process in order to increase reliability. My database consists of field notes taken during the interviews as well as observations noted down after the interviews. It also includes the interview transcripts and documents downloaded from the educational ministry web site. Finally, it comprises of the notes connected to the data analysis process as well as of the literature cited in the thesis.

Validity, on the other hand is based on the inferences drawn from the findings (Bryman, 2008; Kleven, 2008). In the context of the qualitative research internal validity stands for a correlation between findings and theoretical concepts (LeCompte and Goetz as cited in Bryman, 2008). To ensure this kind of validity from the very beginning of the research I proposed a theoretical framework based on the existing theories. The findings were then matched with the framework and built in into the existing theories. Another method commonly used to achieve internal validity is triangulation, which requires more than one source of data (Brock-Utne, 1996; Bryman, 2008). Therefore, in order to cross-check my findings I used three different groups of respondents to achieve theoretical saturation and confirm my observations. This process led to achieving external validity as well where the purpose of the qualitative study is "to generalize to theory rather than to populations" (Bryman, 2008, p. 391). Furthermore, Kvale and Brinkman (2009) and Kleven (2008) also underline the importance of the analytical generalization based on the similarities and differences of the findings. I believe this type of generalization is especially applicable in comparative researches such as this one. However, my goal was not to generalize beyond the level of the two faculties but instead analyze and make comparisons based on rich and detailed descriptions of those two cases. This approach is also a constructive part of the

ecological validity which Brock-Utne (1996) finds vital when it comes to accurate representations of the educational settings and teachers' and students' everyday situations.

In order to create this natural social setting and produce findings which reflect real life situations Bryman (20008) underlines the importance of reflexivity. The term refers to the ability of the researcher to be reflective about the employed methods, as well as about decisions and conclusions made throughout the research process. What is more, researchers should also be aware of their own biases, values and social context that are brought into the research. Brinkman and Kvale (2009) offer a somewhat similar term when they talk about reflexive objectivity which in the qualitative inquiry means "striving for objectivity about subjectivity" (p. 242).

To what extent I managed to be objective about the subjective accounts gathered from my respondents will be visible in the next chapter. In it I analyze the data and in the chapter 5 I present what I believe are reliable and valid findings.

4 Data analysis

The purpose of this chapter is to present the data collected at the two faculties of teacher education as well as in the two demonstration schools in Croatia from September to November 2011. As already explained beforehand, the data was gathered through the semi-structured interviews with three groups of participants: the university teachers, the mentor teachers and the student teachers. This data is also supported with my observations and notes made during the fieldwork.

The chapter is divided into three parts that provide an overview of the factors which influence the integration of ICT in the two initial teacher education programs. It begins with analysis of the data collected from the university teachers at the two faculties. The second part deals with the data gathered from the mentor teachers in the two demonstration schools. The last part presents those factors that the student teachers recognized as influential in the ITE programs they are enrolled in. In order to provide an optimal comparative perspective for the reader all the external and internal factors described in this chapter are presented side by side for each group of the participants interviewed at these four research sites.

As already explained earlier, the external factors refer to those coming from institutions such as the ministry, universities, faculties or schools. The internal ones, on the other hand, come from the minds of the individual students and teachers who were involved in the integration of ICT into the pre-service education. This analysis also shows that all factors described here are interrelated and dependable of each other.

4.1 University teachers

During the fieldwork I interviewed two university teachers at the Faculty of Teacher Education in Rijeka and two university teachers at the Faculty of Teacher Education in Osijek. Since all four of them integrated ICT into their subjects the conversation went smoothly. They easily and confidently indentified problems around ICT and shared their attitudes.

4.1.1 External factors

The data analysis begins with external factors that these four university teachers recognized as influential when it came to their working environment.

Hardware

In January 2011 the Faculty of Teacher Education moved into a new building at the university campus. Here is what the first university teacher I interviewed in Rijeka told about their new equipment:

> *When we moved to this new building we got new computers and I have not been quite satisfied with them. These are the same computers that are used in equipping computer laboratories in schools. I requested at least 20 computers since we have 40 students in each year so that I can divide them in two groups. And what I got was a lab with 16 computer terminals and one server.*

In order to equip the classrooms with necessary tools, the university teachers in Rijeka sent their requests to the Ministry of Science, Education and Sports. The ministry then responded in accordance to the budget limits and the needs of the faculty. The first university teacher I interviewed in Rijeka clearly stated disappointment with both number and the type of computers received. The second teacher stated the same dissatisfaction with inadequate hardware equipment. In conclusion, both teachers agreed that the needs of teachers and students at the faculty were not entirely met. This situation left to the teachers to organize their lectures in the best possible way in order to overcome this obstacle so that the students could benefit from them.

As well as the Faculty of Teacher Education in Rijeka, the faculty in Osijek also moved into the renovated building at the new university campus. Here is what the first university teacher I interviewed in Osijek said about the equipment at the faculty:

> *It's good [hardware]. It's quite good. We have two new computer classrooms. All the other classrooms are equipped with overhead projectors and with at least one computer connected to the Internet. This is quite good if one takes into account circumstances in Croatia.*

This university teacher was quite satisfied with the fact that the faculty got its own building. The equipment was not the best of a kind but the teacher expressed understanding due to the financial situation in the country. The second teacher was more specific and reported lack of

hardware. There were 24 computers in the classrooms that the second teacher used for holding lectures to 37 students. However, the teacher concluded that this obstacle could be removed by organizing the lectures differently and thus meet the students' needs.

Software

The obstacle in form of the inadequate hardware at the faculty in Rijeka was reflected in the obstacle in software. The first university teacher offered the following account:

> *Other tools like Photoshop and Flash are installed on the server that students have access to through the terminal. However, when they all access the server simultaneously, and they do that every time we have lectures, these programs open and function extremely slowly. And this Photoshop version is really old; not even a version with CSS. The same goes with Flash. We have a version 5.0 and there are already 12.0 versions.*

Although the ministry provided the faculty with the newest versions of the operating systems and office tools, these could not be installed due to the insufficient hardware memory. The inappropriate hardware caused serious delays and was significantly slowing down the pace of lectures. As our conversation continued the teacher tried to rationalize the use of the older versions because in that way students can at least learn the basics. The other teacher connected the lack of software to the lack of financial resources at the faculty. During our conversations the university teachers were clearly showing disappointment with both hardware and software that they worked with. The fact that they had just moved into the new building and received new equipment that was not functional left them disillusioned, bitter and sarcastic.

The situation with software in Osijek was more or less the same as in Rijeka. This is what the second teacher answered when I asked about the software tools they used:

> *We don't use really old versions but we don't have the newest versions as well. This statistical tool that we have, that is the newest version.*

Their obstacles in a form of the lack of hardware and software were caused by the insufficient amount of the finances they received. However, nothing in the university teachers' responses in Osijek suggested that the student teachers were deprived in any way because of these older versions of software. On the contrary, both teachers were more or less satisfied with the equipment they worked with.

Financing

This is what the first university teacher in Rijeka said about the financial barrier:

> *We could not implement the curriculum as we initially planned it. And the plan was to get for free certain programs but it turned out that these were professional versions and not entirely free. We had to pay 10$ per piece in order to install it on every computer. However, the faculty does not offer an option to pay for it online. And I do not want to pay for it privately. Even if I do that I wouldn't be allowed to use this software here at the university.*

The faculty in Rijeka decided to buy licenses for part of the software and other multimedia programs without consulting with the teachers. This made it very complicated for the teachers to get those tools that they believed they needed in their individual work with the students. In most of the cases they did not have direct access to the finances or more often, there was a lack of financial resources and their requests were turned down.

When it came to the financial obstacles at the faculty in Osijek, the second teacher offered a similar response:

> *We send our requests after software, literature and other things. The funds are sometimes granted and at other times these requirements just wait for approvals.*

The teacher explained that the university paid for the software and some of the licenses were bought by the faculty. The ministry used to buy part of the software tools for them as well but this was not the case anymore. The teacher concluded that the faculty could always spend more financial resources on the equipment in general.

The other university teacher in Osijek offered a bit different answer when I asked about finances and explained how they received enough financial support when introducing the new curriculum:

> *We were very poor at that moment [in 2003 when establishing the ITE program] in a sense that there were no computers in schools. And we didn't have our own personal computers at the university. But I knew that if they [the ministry] had approved the curriculum they would have had to give us the funds for equipment.*

What the teacher was saying here was that they removed the financial barrier on their own. Since the curriculum was that well planned and written it was impossible to turn down the funds for it. In that way the ministry had no choice but to equip the faculty and the

demonstration schools with ICT so that the student teachers could be educated in accordance with the approved curriculum.

Technical support

Here is what the first university teacher in Rijeka said about the technical support acting as an obstacle at the faculty:

> *We used to have our own technician before we moved here. And now, it is a bit unfortunate because of the campus and all that unification of services. We don't have our own man anymore. They constituted a service called… I don't know what exactly… "Information technology service of the university campus"… something like that.*

In order to cut the expenses in the budget the university campus merged all the IT services into one. In that way there were only a few technicians responsible for the information and communication technology at the entire campus. This type of organizing IT services had clear drawbacks for the Faculty of Teacher Education at the time I was there. Other faculties did not yet move to the campus because their buildings were still under construction. The campus waited for all the faculties to be there to form a fully functional IT service and the teacher predicted that they probably would not receive any support in the near future.

The teachers at the faculty in Osijek also complained about insufficient technical support.

> *There is only one person. It would be better if there were more people because there is always something that goes wrong. This technical support isn't in charge of the classroom computers only but of all the computers in the building. So yes, there is a lot of work.*

Again, it is hard not to draw the parallel between the two faculties and notice the same obstacle reflected in the lack of adequate technical support. However, the difference was that the faculty in Osijek had access to at least partly adequate technical support while the one in Rijeka had no support at all during the time of my visit.

Professional education

Here is what one of the university teachers in Rijeka said when asked about the opportunities for professional development:

Our associate dean for science gathers information about professional development and forwards it to the university teachers. However, because of the recession and the situation that has been present during the recent years, everything is reduced.

Both teachers in Rijeka claimed that the lack of finances reduced the opportunities for professional development of university teachers at the faculty. The courses could also be organized by CARNet and funded by the ministry. Teachers could pay by themselves for every other type of course that was not funded by the ministry or the faculty and there was no the possibility of refund. However, both teachers admitted that they did not take enough personal initiative to obtain education and training.

When I asked the university teachers in Osijek about opportunities for professional development in the field of ICT the discussion took a totally different direction than in Rijeka:

We included mentor teachers from primary schools into our program at the faculty. Mentor teachers need to have access to professional development. They need to observe our work and cooperate with student teachers. A few days ago we organized an online conference about computers in the classroom teaching where people from five different cities in Croatia were included in live streaming. We did that in cooperation with the ministry so that they could learn from our faculty's experiences as well. We as scientists and researchers need to encourage the methodology teachers to transfer their knowledge to those teachers that work in schools.

I was surprised to discover that the Faculty of Teacher Education in Osijek actually created and enabled learning opportunities for teachers not just in their community but even wider, all the way to the state level. The university teacher also continued describing how they learned a lot about the obstacles mentor teachers faced. In the same way, the mentor teachers learned from the university teachers about things they did not have the possibility to read, hear or see before. All in all, this factor generated another very important aspect that I discovered in Osijek and not in Rijeka – excellent cooperation.

Cooperation

When I asked the first university teacher in Rijeka about the integration of ICT into other courses inside the curriculum the answer was:

No. There is no such initiative in the sense of integration of computers definitely… I think that my colleague in the office next door also integrated computers in the methodology course. I believe this teacher uses e-learning system.

The other teacher tried to offer reasons behind the poor cooperation:

> *All the faculties and departments here are autonomous. Even the courses are independent. I teach computer science courses and I have no idea… I mean… I couldn't even name five other courses taught at my faculty, which is ridiculous. We are all supposed to be working together.*

There was no cooperation at the Faculty of Teacher Education in Rijeka on the integration of ICT simply because it was not obligatory. In other words, every department and every teacher worked individually on the creation of each course. As a result of this obstacle teachers were not informed about their colleagues' plans and programs about the integration of ICT.

Another example of the poor cooperation is among the faculty and the demonstration schools in Rijeka.

> *Practice is always a problem [when it comes to the use of ICT]. Practice is always a problem because it doesn't take place here but there [in schools]. Last year we asked our students if they were able to use computers in their practice and only two of them did. It's because they have to adjust themselves to the school. Since the school doesn't predict the use of computers, the students simply cannot use them.*

The university teacher explained that the student teachers who arrived to the schools were seen as inexperienced. All mentor teachers had their own carefully planned programs for each class and stick to them throughout the entire school year. The student teachers were expected to fit their lessons into these programs and to follow them according to the mentor teachers' expectations. In that way the lack of cooperation between the demonstration school and the faculty presented the obstacle for the student teachers to integrate ICT.

On the other hand, the cooperation among the schools and the faculty serves as an enabler to ICT integration in Osijek.

> *We all cooperate and discuss on what we are going to do next year and what we did last year [when it comes to ICT].*

This is how the second university teacher in Osijek described the creation of new curriculums for ICT courses and the improvement of the existing lesson plans at the faculty. The teacher also explained how the students also have an important role in this process:

> *We change things all the time. We communicate with the students to find out what they would like to learn.*

What is more, the first teacher also talked how they took the cooperation to the international level by organizing a few symposiums about ICT in education and publishing reports in several languages which could be found in American databases. The teacher explained how it was important to get the whole cooperation process developing from the primary schools, pupils, the faculty, students and researchers towards the wider community in order to enable ICT integration.

Top-down management

This is how one of the university teachers in Rijeka described the creation of a new curriculum that included ICT:

> *There is no law or statute that prescribes how the curriculum at the faculty should look like. When we develop our teaching and learning program we write it down in a form of a project that is sent to the educational ministry. The ministry has its own councils for curriculums that check those programs, review them and send them back to make necessary changes. After we make those changes we send it back to them and they take a look at it again. This process goes in a circle until they accept our curriculum.*

This comment offers some insight into the autonomy of higher education in Croatia and the creation of curriculums. Although faculties formulate their own curriculums, the Ministry of Science, Education and Sports gives the final approval. When it comes to a curriculum that includes ICT it is essential to shorten this process as much as possible. Otherwise the curriculum quickly becomes outdated because of the changing nature of ICT and its quick evolution. When I asked what happens with such outdated curriculum the teacher responded that they had to come up with a new one.

The second university teacher I interviewed at the faculty in Osijek confirmed the existence of the same obstacle coming from the state level that the first university teacher in Rijeka described.

> *When it comes to ICT, we change, update and introduce new things all the time in our curriculum. Unfortunately, it isn't that easy to implement those changes because it takes time. Those programs need to get all kinds of approvals, which complicates things. But we are sending new curriculum plans to the ministry all the time. The problem is that the curriculum becomes outdated by the time the ministry gives approval for it.*

The university teachers, the mentor teachers and the student teachers in Osijek also saw poor top-down management practiced by the ministry as a major obstacle to ICT integration. This poor top-down management is then reflected in the outdated curriculum, insufficient finances for new equipment and up-to-date opportunities for professional development of all individuals involved in the process of integration of ICT into ITE. However, the collective of teachers in Osijek invested a lot of effort to overcome this obstacle.

4.1.2 Internal Factors

The following section deals with the internal factors that are the result of the university teachers' personal initiatives, efforts, attitudes and opinions.

Individual effort

Although the university teachers in Rijeka admitted not taking personal initiative to learn more about ICT all four university teachers that I interviewed underlined the individual efforts they invested into putting the focus on ICT at the Faculties of Teacher Education in Rijeka and Osijek. Here is what the first teacher in Rijeka said:

> *My goal is to explain to them [student teachers] that I don't expect from them to write a program code. Instead, they should use computers as didactic tools, in the same way they use a blackboard, or a CD player.*

The teacher made it clear that the initiative to put focus on ICT in pre-service education came from those teachers who designed ICT courses. The teacher also continued explaining how the students were introduced to web sides with educational content and in what way they were encouraged to participate in various online discussions. The second teacher in Rijeka also made a similar comment about personal effort invested into teaching students to use computers not only for administrative purposes but also to create educational content and thus enable ICT integration.

In a similar manner the first university teacher in Osijek described the personal effort and role in enabling the introduction of ICT into their curriculum:

> *In the period from 2003 until 2005 the college grew to be the Faculty of Teacher Education. At that time the Bologna declaration was introduced into higher education and PISA was in the focus as well. I took that opportunity to introduce computer literacy into the teacher education program.*

The university teacher explained how it was not easy to introduce ICT at the faculty in Osijek because other university teachers did not feel comfortable using technology. Nevertheless, the teacher pointed out that someone needed to take the initiative and start these changes. Soon after the other colleagues saw the benefits and supported the creation of the new curriculum. This is where the collective effort played a crucial role in creating and enabling the learning environment that student teachers would benefit from in the future.

Feeling of disappointment

This is the internal obstacle that I identified only when talking to university teachers at the Faculty of Teacher Education in Rijeka. Here are their accounts:

> *I don't receive any kind of reward for what I do. I will always receive the same amount on my paycheck. It doesn't make any difference if I am sitting at the table and reading to my students or if I create excellent hypermedia presentation that I upload on the Internet. It's all the same. No difference.*

The first teacher described disappointment caused by the absence of financial reward for invested personal effort into improvement of the status of ICT at the faculty. In addition, the second teacher underlined the lack of appreciation inside the collective:

> *Nobody appreciates that [personal effort] in our educational system. I won't receive a higher wage or a better position at work. It won't be visible in my life at all. The only thing I have is personal satisfaction because I know I did something good for the student teachers.*

The second teacher also took this statement outside the educational context and concluded that teachers in general were not appreciated at all in the Croatian society. Besides the disappointment with lack of appreciation, the university teachers also showed open disappointment with the hardware and software equipment at the faculty as well as financing.

Collective effort

The internal factors presented so far have originated from the individuals. However this internal factor is coming from the inside of one individual collective – the collective of university teachers at the Faculty of Teacher Education in Osijek. The influence of this internal factor on several other external factors was already described earlier (see Professional education, Cooperation and Top-down management). Here is what the first university teacher

I interviewed said in general about their collective effort as an enabler for the introduction of ICT into the student teacher education and classroom teaching:

> *The ministry decided to make an experiment with ICT in a few schools in Zagreb. Therefore they introduced computer science as a separate subject in classroom teaching departments in 2003. Textbooks were printed and equipment and subjects teachers provided. But we, who really wanted to properly integrate ICT into educational system, we told them this was not the right way. Our idea was to educate classroom teachers and implement ICT into all subjects to raise the quality and improve performance.*

As the teacher explained it took two years before the university teachers in Osijek convinced the ministry to promote the purposeful use of ICT, i.e. not only teaching about ICT but with and through ICT. Their struggle continued and they managed to introduce a new type of curriculum at the faculty that offered specialization in different fields to the student teachers. In that way these future teachers would not only be regular classroom teachers but could also teach to classroom pupils those subjects that normally subject teachers do. The need for external teachers in classroom teaching would be completely eliminated as well as the danger that the classroom teachers might gradually lose their jobs. The result of this collective effort at the Faculty of Teacher Education in Osijek was a group of fifth year student teachers that were able not only to teach pupils computer literacy, but also teach them all the other subjects with and through ICT.

4.2 Mentor teachers

During the fieldwork in Rijeka I interviewed two mentor teachers working in the primary school "Nikola Tesla", a demonstration school for teaching mathematics. Since the first teacher I interviewed did not use ICT in the classroom teaching process it was quite challenging to talk about ICT. During our conversation I found out that there was a subject teacher who taught "Informatics" as an extracurricular subject to the same group of classroom pupils. Therefore I interviewed this mentor teacher as well to gain a deeper understanding about the use of ICT in the classroom teaching and the opportunities it offers to the student teachers. Having a degree in computer science this second teacher talked more openly and elaborately about issues around ICT. In "Retfala" primary school in Osijek I interviewed only one mentor teacher. This classroom teacher was actively engaged in integrating ICT into the educational process in this school.

In the next part I will present and analyze the factors that these mentor teachers recognized as either obstacles or enablers when it came to ICT in their working environment.

4.2.1 External factors

The analysis of data collected in the primary schools starts with the external factors that three mentor teachers identified.

Hardware

The lack of hardware or no access to it presented obstacles to ICT integration in both demonstration schools. Here is what the first mentor teacher in Rijeka said about the equipment in their school:

> *There is only one computer in each classroom. Is that enough? No. And there is no access to Internet. How can a child look up for something online?*

This mentor teacher also continued describing how there were only a few overhead projectors in some of the classrooms. To gain access to the projector it was necessary to plan a lesson far in advance, and make arrangements with a colleague to switch for classrooms. When it came to interactive whiteboards, there was only one placed in the physics classroom but the classroom teachers did not have access to it.

However, this school classroom department had its own computer lab. The first teacher who was in fact classroom teacher did not have access to these computers since the subject teacher took over pupils during these lessons. What is more, when I asked about the number of computers in the classroom, the subject teacher also said that there were only 16 computers so pupils had to use them in pairs. Insufficient number of computers made it hard to use them for pupils and for these two mentor teachers.

The mentor teacher in Osijek also complained about the lack of hardware:

> *We don't have computers. We use our personal laptops and there are only three laptops that belong to school. However, every classroom was equipped with overhead projector last year.*

This is how the mentor teacher described situation with hardware in their demonstration school. When I asked if the student teachers had access to these laptops during their practice,

the teacher responded that due to the significant number of student teachers and a small number of laptops, the students were advised to bring their personal laptops. Those students who did not own their own laptops could borrow them from the school. But, as the mentor teacher concluded, this obstacle always created problems both to the student teachers and classroom teachers in the school when it came to organizing the classes.

Software

> *CD-ROMs are designed in a way that I cannot make any alterations. I can use them but then I have to try to adjust them somehow to my lesson plan, which is quite difficult.*

Certain textbooks include a CD-ROM with multimedia content connected to the one in the textbook. However, the classroom teacher in Rijeka who stated the above mentioned comment believed that this content was not always adequate for individually developed lesson plans and therefore did not use them. Another reason for not using them was the lack of overhead projector in the classroom.

However, the mentor teacher in Osijek decided to overcome this obstacle by creating own learning tools:

> *Some colleagues use the materials that arrive on CR-ROMs with textbooks. I and several other colleagues, we create our own presentations, quizzes. We apply our knowledge.*

However, this classroom teacher in Osijek had an overhead projector in the classroom which made use of digital content easier. Nevertheless, these above mentioned comments illustrate why it is useful to educate student teachers how to develop their own multimedia content and then use it in class. It also proves how individual effort as an internal enabler can influence the external obstacle such as software.

Professional education

Here is what the mentor teacher in Rijeka had to say about opportunities for the professional education for the use of ICT.

> *The ministry used to organize courses about the use of computers [for administrative purposes]. And the state financed those courses. We were divided into groups and*

there were five teachers in each group. But at one point they stopped financing that. I didn't get the chance to attend the course, but it was obligatory while it lasted.

The purpose of this course described by the classroom teacher was to learn about the basic use of computers for word editing, using e-mail, or searching the Internet. The intention of the ministry was to create basic knowledge so that computers could be used as teaching tools in future. Furthermore, the subject teacher in computer science in Rijeka showed open resentment towards the organization of such courses:

I studied computer science for four years and they forced me to take this course in basic use of Word. Ridiculous! One could go crazy just sitting there and listening to one person speaking. How can teachers learn like that? No individual work at all. Such a waste of time and money.

The subject teacher continued describing the course that lasted only four hours. There were more than 50 teachers in one classroom without enough sitting places. There was also only one presenter who demonstrated the content to them using a laptop and an overhead projector. After the course was finished the teachers received a certificate. This type of computer training was obviously introduced by the ministry in order to cut down the expenses. However, their comments offer another example of the poor top-down management acting as an obstacle to professional education. While the classroom teacher without the knowledge and skills about ICT did not get the chance to attend the course, the subject teacher in computer science had to attend the same basic course and found it completely useless.

The classroom teacher in Osijek shared the same experience about these courses and lack of opportunities for professional education in using ICT which presented a serious obstacle:

The school doesn't send me anywhere. I can always take private courses or online courses. We had some sort of education in computer literacy several years ago. It was obligatory for five teachers from each school to take a CARNet course so they sent me.

This mentor teacher complained that nothing useful could be learned there. The course had strict schedule and those who wanted to learn more did not get the chance because there was not enough time. The teacher concluded that the course did not improve teaching skills and knowledge in any way. However, this mentor teacher talked about the personal interest for computers and efforts invested into learning about ICT.

Financing

> *If I want to learn about web design for example I need to take private courses and pay for them.*

This is what the subject teacher in Rijeka said when asked about more appropriate computer training. The majority of teachers could not afford private classes due to constant cuts in the wages that they already found too low. Besides obvious lack of finances that caused the lack of proper teacher education for ICT use, the subject teacher also added:

> *We used textbooks three years ago. To tell you the truth we used them because they were for free. Now that parents have to buy textbooks, we don't use them anymore.*

Free textbooks for primary school were also one of the victims of the financial crisis in the country. Among these textbooks were especially those for the extracurricular subjects like "Informatics" that classroom pupils are not obliged to attend. Working without textbooks may not be so hard for an experienced mentor teacher. However, student teachers most often rely on these textbooks and used them as guidelines when they prepare lesson plans.

The situation with lack of finances presented the same obstacle in Osijek. When asked in what way was the lack of financial resources reflected in the classroom the mentor teacher responded shortly:

> *I don't have Internet connection in classroom.*

This mentor teacher explained that the school board decided not to finance Internet connection in classroom which created a direct obstacle for integrating ICT in the classroom teaching. As well as in primary school in Rijeka, the lack of financial resources influenced on the availability of the teaching tools and the educational opportunities for mentor teachers in Osijek. Further on, the lack of finances is also the barrier responsible for the lack of technical support and it can influence the decisions that school management makes.

Technical support

Since the classroom teacher in Rijeka did not use ICT in the classroom I could not obtain any information about technical support in the school. The subject teacher in "Informatics" was on the other hand responsible for small reparations. The school would call for an external service to repair everything else that the subject teacher could not.

The following answer was provided when I asked about technical support at primary school in Osijek:

> *We try to fix everything ourselves. One of the colleagues in the classroom teaching department knows a bit more about computers and from time to time takes those laptops home to fix them. Sometimes I do that as well. We don't have any kind of technical support.*

However, the lack of technical support that the teacher described here resulted in an internal enabler i.e. in increased collective effort that teachers invested into overcoming this external obstacle.

Cooperation

> *To tell you the truth I have no idea. What they learn there I honestly don't know.*

This is the answer that the classroom teacher in Rijeka gave me when I asked what pupils did once they left the class and moved to the computer lab with the subject teacher. However, the absence of information on the use of ICT went beyond the mentor teacher level. This is the answer I got when I asked the classroom teacher about the student teachers' knowledge on ICT and its application in practice:

> *I have never talked about that with student teachers. Never.*

To my surprise, the subject teacher also had no idea that there was a course at the faculty named exactly the same as the subject that this teacher taught to classroom pupils. The reason is simply because although being a mentor, this subject teacher did not have any contact with the student teachers during their practice. Consequently, the lack of cooperation among teachers on all levels reflected directly on the student teachers' practical education in this demonstration school. This was especially evident later on when I interviewed student teachers who were not even aware of the existence of an additional computer lab for classroom pupils in this demonstration school. This is again an example how one external obstacle such as lack of cooperation triggers another external obstacle such as lack of access to computers

On the other hand, the mentor teacher in Osijek confirmed the existence of cooperation between the faculty and the demonstration school which enabled ICT integration:

We are in contact all the time. At the beginning of each school year there is a meeting where university teachers and mentor teachers engage in discussion. This is where we agree on what we expect from student teachers.

The teacher also talked about previous lack of cooperation that had serious consequences for student teachers. However, both university teachers and mentor teachers realized that it was crucial to start the communication process and agree upon expectations they had from the student teachers. In that way theory from the faculty was successfully merged with practice in the classroom.

Top-down management

The classroom teacher in Rijeka did not have anything positive or negative to say about the school management and their support for the integration of ICT. The subject teacher stated that the school management simply did not interfere into teaching about and with ICT.

On the other hand, the classroom teacher in Osijek complained about an obstacle caused by poor school management:

I don't have access to the computer lab because they [school management] are afraid that small kids might damage computers. So I don't have Internet access as well, and that is a problem. That is why I feel that I don't have support.

The mentor teacher mentioned the importance of Internet access in the classroom and the lack of it on several occasions in the interview. Only when I turned off my voice recorder did the teacher talk openly about the poor school management and their lack of understanding for the classroom teachers' needs. The teacher explained that it took the classroom teachers a lot of time to convince the management of the school to equip all the classrooms with overhead projectors at first place.

4.2.2 Internal factors

The following section contains the internal factors such as attitudes, efforts or opinions expressed by mentor teachers in two demonstration schools in Osijek and Rijeka.

Attitude towards ICT

What is the purpose of a computer in the classroom? To play games? They play enough aggressive games at home. To type on it? I don't know…

This negative attitude that the classroom teacher in Rijeka expressed was in connection with the lack of computers. Since there was only one computer in the classroom without the Internet connection, without an overhead projector and with poor speakers, the teacher saw no purpose in using it. It was also the consequence of the lack of training in the computer use. Therefore, the teacher had an opinion that there was no point in integrating ICT into curriculum, and that it was a good thing that the ministry did not insist on it. Obviously, this kind of environment and attitude could hardly stimulate the use o ICT among the student teachers during their practice.

In contrast, the mentor teacher in Osijek had a positive attitude towards ICT:

> *Kids nowadays are not satisfied with pen and paper only. I use a lot of different didactic tools but this [ICT] is their reality. They are growing up with it. We cannot ignore that. We have to adjust educational system to them because ICT offers extraordinary possibilities.*

Throughout the interview the teacher talked enthusiastically how ICT is used in teaching practice in this school. This positive attitude was also visible from the individual effort to introduce ICT into the collective that then turned it into a joint project to enable ICT integration.

Attitude towards colleagues

When I asked the subject teacher in Rijeka about the biggest obstacle in the working environment I received a straightforward answer:

> *Computer illiteracy among my colleagues.*

The subject teacher talked openly about the frustration caused by the amount of work needed to be done in order to help other teachers. Since most of them did not have basic knowledge on how to use computers for the administrative purposes this subject teacher spent a lot of time running these small errands. These included typing, creating various tables, printing, etc. Again, this factor was a direct result of lack of finances for proper education of classroom teachers. Furthermore, it is a well known fact that teachers are overwhelmed with the amount of job to be done in schools. This extra job presented an obstacle by taking a lot of time that could have been spent on helping the student teachers to learn more about ICT in the school. Instead, this mentor teacher was not even in touch with the student teachers.

The mentor teacher in Osijek was focused on own work and did not have any objections when it came to colleagues and their use of ICT.

4.2.2.3 Individual effort

The subject teacher in Rijeka talked about monthly workshops in the school that all classroom teachers attended to synchronize their lesson plans. Although it was not mandatory the subject teacher was present at those meetings.

> *I coordinate my lesson plans with theirs. The content that I teach is in close connection with the content they [pupils] learn with classroom teachers. I'm not obliged to do that but I do it anyway.*

This was a one way initiative that partly served as an enabler to ICT integration. As I described earlier, the classroom teacher was not informed about the lesson plans and educational content created by the subject teacher. Since other the classroom teachers in the school did not show interest for the integration of ICT, the cooperation was not present. This in the end presented an obstacle to creation of an optimal learning environment for the student teachers and their efforts to include ICT in the practice.

When it came to Osijek, here is what the mentor teacher answered when I asked whose initiative was it to introduce computers in the classrooms:

> *Mine. I have been promoting computers in the classroom for several years. I'm trying now to set up a computer lab for the classroom teaching department. I received several older computers as a donation from the faculty and I'm trying to adjust them to our needs.*

This classroom teacher also introduced "Informatics" as an extracurricular subject for the pupils from first to fourth grade. The class also had its own web page that the teacher created and its own Facebook profile where parents and pupils could communicate with the teacher. In that way computers became natural part of the student teachers' practice in this demonstration school, even before the computers in education were introduced at the faculty. This is a great example of an internal enabler such as the personal effort used to overcome external obstacles like the lack of hardware.

Collective effort

As well as with the university teachers in Osijek this enabling factor appeared only during the semi-structured interview with the mentor teacher in Osijek and not in Rijeka. Its influence on other external factors like Technical support, Cooperation and Top-down management in this school is also visible. Here is what the teacher in Osijek said in conclusion at the end of our conversation:

> *This is one big process. I introduced it [ICT] and there were other colleagues who accepted it. We continued to cooperate together and managed to raise interest so that other teachers joined us too. And the management has to understand that we really work like that, that we need all that equipment in our work.*

This collective effort that was a result of the cooperation helped creating opportunities for the student teachers to experience in what way ICT could be integrated into the teaching practice.

4.3 Student teachers

The third part of this chapter consists of data analysis based on the semi-structured interviews with the graduate student teachers at the Faculties of Teacher Education in Rijeka and Osijek. Ten student teachers who were interviewed were specialized in one of the modules offered at their faculties. The following sections offer the list of external and internal factors they recognized as either obstacles or enablers in their studying about use of ICT in education.

4.3.1 External factors

The overview again starts with the external factors that the student teachers recognized as influential in their use of ICT at the faculties and in the demonstration schools. The presentation of the each individual factor begins with Rijeka and ends with Osijek.

Hardware

The first student teacher I interviewed in Rijeka was the only one who confirmed the use of ICT in one of the lessons they held in order to be graded for the practical work in demonstration schools.

I used ICT [in one of the demonstration schools] because I brought my own laptop and I borrowed the only projector in school for the lesson I prepared. Classrooms are not equipped at all.

The other four student teachers did not use ICT and also reported about the lack of hardware in schools as the biggest obstacle. Most of the classrooms were not equipped with computers, overhead projectors, interactive whiteboards and Internet connection. Those student teachers who had their own personal laptops could use them providing the mentor teacher agreed. When I asked the student teachers about the equipment at the faculty in Rijeka I identified the lack of hardware as well:

The situation at the faculty is not much better than in demonstration schools. We have a computer lab with approximately 20 computers. But the problem is that there are 46 fifth year students and even when we are divided into two groups there aren't enough computers. Some of these computers are broken down or just don't work properly.

This is what every student teacher in Rijeka said about the hardware equipment using more or less the same words. Since there were not enough computers for individual work, it was not possible to learn about the different software tools from one's own trial and mistake.

When it came to the demonstration schools in Osijek all of the five student teachers interviewed confirmed that there was lack of hardware. This is what the fourth student teacher said:

Schools in Osijek are badly equipped, at least those that I saw during practice. And I'm talking about Osijek, not some villages or suburban areas around the city.

All the other student teachers also talked about the lack of ICT in schools. One of them even mentioned that they had learned about interactive whiteboards at the faculty but never got the opportunity to see or use them in practice. Despite the lack of hardware in schools all five teachers incorporated ICT into their lessons during the school practice because they brought their own laptops and borrowed projectors. By doing this they managed to partly overcome this external barrier.

When it came to hardware at the faculty in Osijek here is what the third student teacher said:

We are divided into groups so that there are enough computers. They [university teachers] organize it in a way so that we all have our own computer for individual work.

All student teachers in Osijek expressed satisfaction with the new equipment that was much better than the one they had before moving to the new building. They did not even mind the older versions of software because they found them completely functional. Not one of them reported any kind of problem with the equipment at the faculty.

Cooperation

> *University teachers and mentor teachers do not have the same expectations. I wrote my lesson plan with the help of my mentor teacher but my university teacher did not want to approve it. That is the problem.*

Lack of clear and homogenous guidelines, which should be created by the mentor teachers in cooperation with the university teachers, presented an obstacle for the student teachers when they needed to plan a lesson and be graded. Not only the first student teacher in Rijeka talked about this barrier but others also reported that it could be difficult to find a middle ground. Furthermore, none of the student teachers I interviewed was familiar with the additional computer lab in "Nikola Tesla" primary school.

> *I didn't know that. We are in the same classroom whole the time during our practice in demonstration school. Mentor teachers just say: "They [pupils] have computer science classes now so you can take a coffee break". Subject teacher is not even aware that there are student teachers at school having practice so that we are not invited to observe. I had practice in "Nikola Tesla" primary school but I didn't see that [computer lab].*

The fourth student added that it is not only the mentor teachers to blame for this lack of cooperation. It is how the entire school system works in which school subjects are independent.

When it came to Osijek, the first student teacher I interviewed there talked about the collaboration as an enabler to ICT integration on several levels:

> *There is one university teacher at the faculty who is in charge of the practice in demonstration schools. This teacher explains to us everything we need to know. We receive information about each individual subject and then we go to schools.*

The student teacher also described the cooperation of their university teachers with teachers from other faculties as well as with mentors in schools. Furthermore, all students reported that they advised and helped each other when it came to integration of ICT. What I found particularly interesting was that during my visit to the faculty a group of classroom pupils

were having lessons there. One of the students I interviewed explained that the student teachers went to demonstration schools to work with pupils but the university teachers also arranged that pupils came to their environment at the faculty where the students could also teach them about and with ICT. Unlike in Rijeka, the student teachers in Osijek did not complain about the lack of or poor cooperation between the demonstration schools and the faculty as an obstacle to the ICT integration.

Professional education

> *Courses about ICT should be in every semester. I've forgotten everything I learned during the first and second year because I don't apply that knowledge.*

Not only the second student, but every student that I interviewed in Rijeka came to the same conclusion that there should be more courses at the faculty where they can learn about pedagogical use of ICT. Even those who had negative attitude towards ICT concluded that it is because they were not educated enough on how to apply ICT in their teaching practice. All of them expressed the need for more school practice in general.

When it came to the student teachers in Osijek, they also expressed the need for more courses about ICT at the faculty.

> *I think that there is lack of courses at the faculty where we can learn how to use computers as teaching tools.*

This is what the first student teacher said but all the others, no matter if they chose Informatics module or not, also pointed out that they would like to learn more. Their request can be particularly interesting when one takes a look at the two university curriculums in Rijeka and Osijek (see Appendix) because student teachers in Osijek have 5 times more ICT courses than students in Rijeka. Besides the need for more ICT courses the students in Osijek also expressed the need for more school practice as well.

Mentor teachers' stance towards ICT

> *Mentor teachers don't use computers. I'm not sure how much they are in touch with ICT. They don't have much experience with it and therefore they don't suggest us to use it.*

This is what the first student teacher in Rijeka responded when I asked about the use of ICT in demonstration schools. Observing mentor teachers and their teaching styles is an important

part of student teachers' practice in demonstration schools. How much influence it has on student teachers can be visible from the following:

It never occurred to me to use ICT during practice because mentor teachers don't use it.

That is the answer that the fifth student teacher in Rijeka gave when I asked about ICT use during the graded lessons in demonstration schools. The student pointed out how it was important that mentor teachers set a positive example of ICT use. The lack of demonstration in the use of ICT obviously deterred this student teacher from using ICT and hence presented a serious barrier.

On the other hand, all student teachers in Osijek had the opportunity to observe how their mentor teachers applied ICT.

There [in the classroom] were two computers and a TV. The teacher also ordered an interactive whiteboard. They [pupils] used computers to listen to music, to watch videos in science classes and movies in Croatian language classes. That was phenomenal. I really liked how the teacher merged all these media so that kids could see how the same topic was represented in a book and in a movie. Really integrated teaching.

This is how the fourth student teacher described personal experience and impressions gained during the observation period in one of the demonstration schools that served as enablers in integrating ICT. All student teachers in Osijek confirmed that they observed their mentor teachers and learned from them on how to incorporate ICT in their lessons. What is more, they all said that the faculty demanded to include ICT into their teaching, especially during the math lessons so that every student teacher did that.

University teachers' stance towards ICT

I used PowerPoint presentation when I was a first year student. The [university] teacher told me that it looked childish, that there were too many colors, that it was distracting, that it was all play and no work, etc. This methodology teacher is "old school".

This is what the second student teacher in Rijeka said when asked about the university teachers' expectations for the integration of ICT into their presentations at the faculty and into the lesson plans in schools. The first student teacher I interviewed also reported that there were a lot of the university teachers that did not use ICT. This student also described their

style of teaching as traditional and ex cathedra which was an obstacle to ICT integration. The third student teacher also said that some university teachers insisted on taking notes during lectures instead of looking at PowerPoint presentations, which university teachers believed were distracting. The student teacher concluded:

> *This [ICT] is something that didn't exist when they [university teachers] were young. They don't understand or they don't want to understand. If only they could understand that it was easier for us to learn like that, that it would be more interesting, we would perform better…*

All of the student teachers interviewed in Rijeka reported that those university teachers who were not trained on how to use ICT had negative attitudes towards it and avoided using it. The students also said that only few university teachers knew how to use online course management system which presented a barrier to their learning.

The position that university teachers in Osijek had about ICT is clearly visible from the level of integration of it ICT at the faculty. All student teachers confirmed that cooperation among their teachers when it came to ICT subjects and mathematics was on especially high level.

> *They all have the same goal and that is to digitalize the content of the subjects they teach.*

This is what the fourth student teacher in Osijek said about all the other teachers that worked at the faculty but did not teach ICT subjects. As the student explained all university teachers used the online course management system to exchange information with students and to communicate with each other and thus enabled them to learn in a much easier way.

4.3.2 Internal factors

The analysis of data ends with the presentation of the internal obstacles and enablers that graduate student teachers at the Faculties of Teacher Education in Rijeka and Osijek identified when talking about ICT in their initial teacher education.

Knowledge

> *I get frustrated when I have to do something and I don't know how. And I know I should know it because we learned about that option and it's somewhere here but I don't remember where exactly. Then I spend three hours doing something that takes three seconds. That's frustrating!*

This is how the third student teacher in Rijeka described the lack of knowledge as an obstacle to creating lesson plans. As the student explained further on, this factor is the result of discontinuous learning about ICT at the faculty. Four out of five student teachers in Rijeka that I interviewed expressed difficulties when trying to plan a lesson that included ICT due to their lack of knowledge about ICT.

On the other hand, student teachers at the faculty in Osijek all felt quite confident when it came to their knowledge about ICT. Here is what the fifth student teacher answered when asked about applying knowledge:

> *One cannot apply absolutely everything we learn here [at the faculty]. But all kinds of games can be useful to make a lesson more interesting. I used Bingo, association games and PowerPoint. It depends on the content. It doesn't necessarily have to be mathematics; it [ICT] can be used in all other subjects. If I conclude that I can I apply everything that I've learned here then I do it.*

All five student teachers were quite detailed when talking about lessons they held during practice in schools. They all named several different ways of incorporating ICT into teaching and compared their practice with the knowledge gained at the faculty. Students also admitted that due to the lack of equipment in demonstration school they did not always have the opportunity to apply everything they learned about ICT.

Individual effort

When I found out that the first student teacher I interviewed in Rijeka used ICT during the lesson in demonstration school I asked whose idea was to use ICT. The student teacher responded:

> *It was my idea. I asked if I could use it, if they had a projector, if it was allowed.*

Out of five student teachers I interviewed only this one used ICT in school. The others did not feel confident about their knowledge or did not trust to the equipment in schools. Some of them gave up on using ICT when they found out that they had to bring their own equipment or borrow it from other teachers. However, this student took initiative, brought own laptop and removed this external barrier.

The situation at the faculty in Osijek was completely different. Every student teacher was obliged to use a computer during practice in a demonstration school when holding mathematics class. However, all of them used computers in all the other classes they taught.

> *I used computers all the time. I asked my mentor teacher if I could spend more time with pupils. When I saw that they had had positive reactions when mentor teacher used ICT I also decided to do the same.*

All five student teachers in Osijek admitted taking initiative for using ICT in all subjects they taught in demonstration schools, sometimes by bringing their own equipment. Furthermore, they all had positive attitude towards ICT which enabled ICT integration.

Attitude towards ICT

This is how the first student teacher in Rijeka reasoned the use of ICT when preparing and giving a lecture in a class:

> *It [ICT] helps to improve the quality of the lesson and work in general. It is easier to demonstrate pictures, short video clips, movies, music, animation [than using a blackboard only].*

This is the only student teacher that had a positive attitude towards ICT throughout the entire interview. When I asked about using ICT in future the student teacher expressed both motivation and determination to integrate it into teaching if circumstances at work allowed for it.

All the other student teachers in Rijeka had a negative attitude towards ICT.

> *I never used ICT when giving a lecture [in demonstration school]. I'm to skeptic. I'm afraid that something might go wrong.*

This is what the second student teacher said when I asked about experience with ICT when holding a lecture. Since the student was not confident in the skills and knowledge obtained at the university, it did not seem appropriate to take the chance and possibly end up with a lower grade in the practical part. The third student was skeptic towards usefulness of ICT and benefit in real life situations since schools were badly equipped. Fourth student talked about pupils using computers for playing games during the brakes between classes which left bad impression. The student simply did not see the purpose of a computer in the class without a

projector and Internet connection. In conclusion, their negative attitude towards ICT presented a significant obstacle for the future integration of it.

However, all student teachers in Osijek expressed positive attitude towards ICT in education.

> *Children find it [ICT] very interesting. And it is easier for me. I mean, it can take more time to prepare a lesson but it pays off. The lesson is more dynamic; not only chalk and blackboard. It raises the quality of teaching and learning. When I start working I will continue to use it.*

My question to the students was why they decided to use ICT in their lessons. This was what the fifth student responded but all the others offered almost identical answers. Only the third student admitted to have negative attitude towards ICT at the beginning but that changed after gaining more knowledge about ICT at the faculty, applying it in practice and getting back a lot of positive reactions from pupils in school. This is an example how positive examples create positive attitudes that enable ICT integration.

4.4 Summary

As it can be seen from this analysis, all the external and internal factors identified in this study are interconnected and mutually dependant. Relations among them will be discussed in the next chapter and then mapped onto the theoretical framework proposed in chapter 2. However, for the sake of easier understanding and comparison of the data gathered at the research sites in Rijeka and Osijek the following table offers a general overview of the factors divided into either obstacles to ICT integration or enablers of it.

Table 4 *Overview of factors identified in this study*

External and internal factors	ITE program in Rijeka	ITE program in Osijek
Hardware	O	O
Software	O	O
Financing	O	O
Technical support	O	O
Top-down management	O	O
Professional education	O	O

Mentor teachers' stance towards ICT	O	E
University teachers' stance towards ICT	O	E
Cooperation	O	E
Individual effort	O	E
Feeling of disappointment	O	--
Attitude towards ICT	O	E
Attitude towards colleagues	O	--
Knowledge	O	E
Collective effort	O	E

Legend: O – obstacle; E – enabler, -- – not mentioned.

All in all, the number of the external factors that appear in each group of the participants is higher than that of the internal ones. Out of nine external factors identified, six present mostly obstacles to integration of ICT both in Rijeka and Osijek. Hence, hardware and software are the most obvious obstacles because of their lack in schools and at the faculties, limited or no access to them, or simply because they are outdated or inappropriate. The same is with the lack of professional education and technical support that is either missing or insufficient both in the schools and at the faculties in Rijeka and Osijek. These four obstacles are interpreted as a direct consequence of the other two external obstacles. Thus, the lack of financial resources and poor top-down management, which among other things makes decisions about allocating finances, approving curriculums and putting the policy into practice, are considered responsible for generating other obstacles.

The other three external factors, i.e. cooperation, university teachers' and mentor teachers' stance towards ICT act as enablers in Osijek but not in Rijeka. Thus, all three groups of teachers in Osijek reported about mutual help and cooperation reflected in their positive stance towards ICT, which in turn serve as enablers for student teachers to integrate ICT in Osijek. However, university and mentor teachers in Rijeka did not cooperate and some of them even had negative stance towards ICT. Because of that student teachers interpreted those external factors as obstacles to ICT integration both in the demonstration school and at the faculty in Rijeka.

The differences in the obstacles and enablers to ICT integration is even more obvious when it comes to the internal factors that in Rijeka present barriers to ICT integration but not in Osijek. Hence, all three groups of the teachers in Osijek confirmed that they invested personal effort into integrating ICT, improving their knowledge, and building positive attitude towards ICT that resulted in the collective effort for cooperation and integration of ICT. Conversely, the teachers in Rijeka expressed lack of knowledge, negative attitude towards colleagues, feeling of disappointment and lack of personal effort, which are major barriers to ICT integration.

After the external and internal factors that influence the integration of ICT have been identified, presented and analyzed, the findings will be discussed in the following chapter.

5 Discussion of findings and conclusion

Starting from the premise that the changes in the integration of ICT in demonstration schools and at faculties of teacher education are affected by factors arriving from institutions and individuals, the following research questions were formulated:

1. What are the factors that prevent or enable university teachers, mentor teachers and student teachers to use ICT in their ITE programs?

2. In what way do these factors influence the phases of ICT integration into two ITE programs?

The aim of this chapter is to provide the answers to the proposed research questions. The first part offers an overview of the factors presented in the chapter four. The identification and analysis of these factors showed that these are not independent units which prevent or enable ICT integration. Therefore, the relationships among them are compared and graphically represented with the aim to be built into the proposed framework.

The second part will provide some explanations for the findings using the theoretical framework based on the organizational theories. The complexity of the educational change caused by the factors influencing it and differences in the two ITE programs are comparatively discussed through the prism of managing and organizing ICT integration.

5.1 Factors that influence ICT integration and relationships among them

As mentioned in the introduction chapter, ICT covers a wide variety of devices used for storing and exchanging information. However, this study reveals that the range of ICT tools used for teaching and learning in the two ITE programs is quite narrow. More precisely, the teachers and the students used only personal computers and projectors when these were accessible at the faculties and in the demonstration schools.

The first problem that was raised by the university teachers and the mentor teachers in Rijeka and Osijek had to do with the lack of hardware equipment at the faculties and in the

demonstration schools. The university teachers in Rijeka also expressed dissatisfaction with the existing type of equipment that they considered inappropriate. In addition to that, both classroom teachers in Rijeka and Osijek stated that they had no access to the existing computer classrooms in their schools. This was confirmed by the student teachers who complained about the lack of computers in schools and no access to it as well. These findings corroborate what Tearle (2004) stated that this category contained most of negative comments and further requirements when it came to the access to computers, while Pelgrum (2001) put it at the top of the list of his implementation indicators. Cuckle and Clarke (2002) also found that practical considerations, such as number of and access to computers, can have huge impact on student teachers and their use of ICT in practical part of their education. What is more, this study supports the findings from Croatia that underline the need for informatization of faculties in order to meet the European standard (Tatković & Močinić, 2012).

As already explained, the issues around inadequate hardware extended to the nonfunctional software at the faculty in Rijeka. Apart from that, both the university teachers in Rijeka and Osijek stated that they were working with the outdated software equipment. While the teachers in Osijek did not mind that, the teachers in Rijeka were quite unhappy. In relation to that, Scrimshaw (2004) listed 'full access to hardware and software at all times' as one of the most important enablers in ICT implementation. This is especially evident in the two demonstration schools included in this study where the mentor teachers expressed lack of access to hardware and therefore to software as well. One more issue that came up in the interviews was software not adequate enough to be included in the mentor teachers' lesson plans. Pelgrum (2001) also noticed the same problem in several countries and listed the following obstacles to ICT implementation: 'software curriculum incompatible' and 'software not adaptable enough'. However, the issues around the lack of or inadequate software have not been tackled so far in the Croatian research literature.

Besides hardware and software UNESCO (2011) also listed technical support as a key component in putting the ICT policy into practice. However, at the time of my visit, the university teachers in Rijeka reported that they had no ongoing technical assistance at their faculty. The university teachers in Osijek were in a slightly better position since they had it but considered it to be insufficient. When it came to the demonstration schools, the lack of technical support was present at both research sites. According to UNESCO (2011) this can have direct influence on teacher training for which it is crucial to provide assistance in

managing hardware and software, as well as help integrating ICT across the curriculum. In the same way Scrimshaw (2004) and Stensaker et al. (2007) listed 'technical support' as an important ICT enabler while Pelgrum (2001) noticed that 'lack of technical assistance' and 'lack of technical support' had great negative impact on ICT implementation. However, the problems around the lack of technical support were not specifically mentioned in the reviewed Croatian studies.

Another factor found important for the ICT integration is professional education of teachers. While the university teachers in Rijeka complained about the lack of opportunities for professional development, their colleagues in Osijek created their own professional learning environment. At the same time, all mentor teachers in the demonstration schools expressed disappointment with the lack of or inadequate professional education. Numerous examples about the positive impact of the professional education of teachers and its decisive role in the ICT integration can also be found in the conceptual framework (Pelgrum, 2001; Scrimshaw, 2004, UNESCO 2002a; UNESCO, 2002b; UNESCO 2011). What is more, this study supports the extensive research previously done in Croatia about the need for improving in-service teachers' ICT skills in order to improve the implementation of ICT (Anđić, 2006; Baranović, 2006; Ljubić Klemše, 2008; Pavin, Vizek Vidović & Miljević-Riđički, 2005; Rončević 2008; Vizek Vidović & Pavin, 2005). When it comes to the student teachers, all the participants in Rijeka and Osijek expressed the need for more courses at the faculty and practical experience in schools for ICT integration. Once again, these findings confirm previous research results from Croatia on pre-service teachers and the need for improvement of programs and curriculums at the faculties of teacher education (Batarelo, 2005; Tatković & Muradbegović, 2008; Radetić-Paić & Ružić-Baf, 2010; Tatković & Močinić, 2012; Vuković & Dumančić, 2011).

Furthermore, as it can be seen from the participants' responses, they all assumed that the professional education should have been organized by the university or the school management. Besides that, they also saw top-down management as an obstacle to ICT integration in their working environment. Thus, the university teachers complained about slow and inefficient work done in the educational ministry when it came to approving new curriculums. In line with that, UNESCO (2011) emphasizes the importance of continuous work on curriculum development from introduction courses about ICT to integrating it across the entire curriculum. More precisely, it is the leadership at the institutional level that has the

central role in resolving the issues around ICT (Stensaker et al., 2007). In Croatia, Pavin, Vizek Vidović & Miljević-Riđički (2005) and Batarelo (2005) also noticed the same problems with poor top-town management when it came to developing curriculums. Moreover, the poor top-down management extended to the demonstration schools as well when it came to financing. Thus, the mentor teacher in Osijek complained that the school management refused to finance Internet access in classrooms. Pelgrum (2001) recognized such 'lack of support from school board' as one of the most influential obstacles to ICT integration as well.

Out of the external factors discussed so far, 'financing' stood out as having the biggest influence on other factors. Thus, the participants held the insufficient financial resources responsible for the lack of or inappropriate hardware, software, technical support and professional development both at faculties and in the schools. Pelgrum (2001) identified the same external factors and called them material conditions which presented obstacles to the implementation of ICT into schools, with an exception that he included lack of technical staff into non-material conditions. However, in the case of this study, the participants stated specifically that the lack of technical support is the direct consequence of lack of finances, together with other above mentioned factors. A number of other international studies also confirmed that the availability of financial resources is crucial for ICT integration process (OECD, 2010; Stensaker et al., 2007; Tearle, 2004; UNESCO 2011). Furthermore, the findings in this study also go in line with Pavin, Vizek Vidović & Miljević-Riđički's (2005) results that lack of finances presents one of the biggest obstacles to ICT integration into the teacher education programs in Croatia.

The differences in influence of the external factors presented so far in Rijeka and Osijek were not too vast since the factors mostly presented obstacles to integration of ICT. However, there are other external factors that differ significantly in the two ITE programs by being either obstacles to ICT integration at one research site or enablers of ICT at another research site. One of them is cooperation. University teachers in Rijeka reported about the lack of cooperation for ICT integration among different departments at the faculty, as well as lack of cooperation with the demonstration schools. This was also confirmed by the student teachers and the mentor teachers in the demonstration schools. On the other hand, all three groups of the participants in Osijek talked about the cooperation for ICT integration developed on several levels, from individual departments, different faculties, schools, ministry, to the international level. UNESCO (2002a) points out that collaboration is an integral part of

professional education of teachers for ICT integration and it is the leadership inside the educational institution that should take on the responsibility to develop it. On the other hand, ICT is also perceived as a tool used for communication and building collaboration among teachers on a local and global level (UNESCO, 2002b; UNESCO, 2011). As it can be seen from the data analysis, both these goals were achieved in Osijek but not in Rijeka. However, on an national level a similar need for building closer partnerships and collaboration among institutions for teacher education was also recognized by Baranović (2006), Batarelo (2005) and Pavin, Vizek Vidović & Miljević-Riđički (2005).

Another external factor that differed significantly in Rijeka and Osijek was the university teachers' and the mentor teachers' stance towards ICT. Thus, the student teachers in Rijeka reported that negative stance of their teachers at the faculty and in demonstration schools had negative influence on ICT integration into their studies and practice. On the other hand, the student teachers in Osijek confirmed that positive attitude and good examples set by their teachers motivated them additionally to integrate ICT. These results are in contrast with Cuckle and Clark (2002) who concluded that there was no connection between mentor teachers' stance to ICT and the influence it had on student teachers since there were other obstacles that had more weight, for e.g. lack of access to ICT. However, the results do go in line with Anđić (2006), Baranović (2006) and Vizek Vidović and Pavin (2005) who reported quite low ICT use among in-service teachers and the negative impact it might have on setting good examples for student-teachers. A similar need for a change of teaching style at faculties of teacher education was reported by Tatković and Muradbegović (2008) as well as the need to raise the level of active support from mentor teachers to use ICT (Vizek Vidović & Žižak, 2011).

While the external factors in the two ITE programs in most of the cases present obstacles to ICT integration, the differences in the internal factors in Rijeka and Osijek are even more apparent. Thus, all the university teachers interviewed in Rijeka and Osijek invested a lot of their personal effort to integrate ICT. However, the teachers in Rijeka talked about integration of ICT into their individual courses while the university teachers in Osijek described how their individual work contributed to the incorporation of ICT into the curriculum in general. The impact of their individual efforts on the external factors, such as hardware and software, is visible in the fact that the teachers managed to convert them from obstacles into enablers. This difference is even more noticeable when it comes to the mentor teachers. Hence, the

mentor teacher in Rijeka admitted not using ICT and not even trying to integrate it while the mentor teacher in Osijek actively used ICT and demonstrated to the student teachers how to integrate ICT into lessons. The lack of individual effort of the university and mentor teachers invested into ICT integration is mirrored onto the student teachers in Rijeka as well. Out of five students only one used ICT, while in Osijek all five student teachers integrated ICT even when they were not obliged or expected to do so. However, I believe that it is important to emphasize at this point that unlike the mentor teacher in Osijek, the mentor teacher in Rijeka did not have any kind of formal training about the use of ICT. What is more, the student teachers in Osijek had five times more courses on ICT integration than the students in Rijeka. Therefore, it can be concluded that the amount of professional education that teachers receive has significant influence on their efforts to use ICT. The lack of individual effort or 'lack of interest of teachers' was also recognized by Pelgrum (2001) as one of the obstacles to ICT integration. In a same manner, Drent and Meelissen (2008) noticed that 'personal entrepreneurship' is a key factor in the integration of innovative use of ICT. Unfortunately, Croatian researchers did not recognize the importance of individual effort in ICT integration and there are no studies so far that focus on the motivation of teachers who use ICT.

Further on, Drent and Meelissen (2008) also concluded that the personal entrepreneurship factor indirectly influences the attitude towards ICT. However, in the case of this study it is the other way around. Those teachers that were more educated had a more positive attitude towards ICT and in turn invested more individual effort to integrate ICT. Thus, due to the lack of hardware and professional education the mentor teacher in Rijeka had negative attitude towards ICT and simply did not understand the purpose of it. In contrast, the mentor teacher in Osijek was more educated, had more experience with ICT integration, was quite enthusiastic about ICT integration and talked positively about it. The situation with the student teachers was not much different as well. Four out of five students in Rijeka showed skepticism towards ICT because of the lack of hardware or no access to it. Conversely, all five graduate student teachers in Osijek expressed positive attitude towards ICT based on their positive experiences during the practice in schools and the opportunities to learn about ICT at the faculty. Once again, this example shows how the external factors, such as access to hardware or to professional education, can have strong influence on the internal factors such as positive attitude towards ICT in educational systems. The decisive role of ITE in building positive attitudes towards ICT among student teachers was recognized by UNESCO (2002b). This can be also traced down in Teo (2010) who found that perceived usefulness of ICT and

perceived ease of use of ICT gained through the professional education creates positive attitude towards ICT. Interestingly, Tearle (2004) did not find any evidence that negative attitude towards ICT acts as a barrier to ICT integration in the practical setting since social obligation had strong influence on ICT usage among teachers. This type of social obligation as an external factor was not present in Rijeka but it was in Osijek since the student teachers were expected to integrate ICT into their lessons, but these students already had positive attitude towards ICT. Nevertheless, the external factors such as access to ICT seem to have decisive role in building positive attitudes to ICT among Croatian in-service and pre-service teachers (Jukić, 2012; Ljubić Klemše ,2008; Rončević, 2008; Tomaš, 2009; Vuković & Dumančić, 2011) as well as permanent teacher education (Radetić-Paić & Ružić-Baf, 2010).

Another internal factor that was triggered by the lack of finances, professional education and cooperation is negative attitude towards colleagues. This factor appeared as an obstacle to ICT integration only in the demonstration school in Rijeka since the effort to integrate ICT into the curriculum came from only one mentor teacher. This teacher complained about lack of teamwork and cooperation among colleagues, their lack of ICT skills and the need for constant help because of their inability to perform simple tasks on their own. Negative attitude towards colleagues not using ICT did not appear as a factor that presented barrier to ICT integration in any of the studies reviewed in this paper. However, UNESCO (2002b) underlines the importance of professional support of colleagues in a teacher community but this enabling factor is described in the context of cooperation and teamwork which was not present in this demonstration school. Instead, there was no reciprocity in giving and receiving help in ICT integration.

In a similar manner, the university teachers in Rijeka identified the feeling of disappointment as a factor that stood in the way of further integration of ICT in their working environment. The lack of reward and appreciation for personal efforts invested into ICT integration were not mentioned as barriers at the faculty and in the demonstration school in Osijek. These findings go in line with Pavin, Vizek Vidović and Miljević-Riđički (2005) who reported that teaching profession was perceived as having low social and material status in Croatia. Moreover, Ljubić Klemše (2008) also pinpointed that there is a need for recognition of good practice and proper rewarding of teachers in Croatia who invest their personal efforts into ICT integration. Moreover, UNESCO (2002b) advises incorporation of reward structures and

recognizing the application of ICT in teaching and learning as essential conditions for implementation of ICT at the faculties of teacher education from the early stages.

One more factor named by the student teachers that turned out to be an obstacle in Rijeka and an enabler to ICT integration is the knowledge on how to integrate ICT. Thus, the student teachers in Rijeka expressed the lack of knowledge and skills for implementing ICT in their teaching practice which they attributed to the lack of courses on ICT at the faculty. Meanwhile, the students in Osijek had confidence in their skills and knowledge which they regularly applied during school practice. Pelgrum (2001) also addressed self-assessment of knowledge and ICT skills and found a correlation between low level of knowledge and internal information exchange (exchange of information about ICT on courses, staff meetings and inside ICT working groups). His findings suggest that those teachers who apply ICT in everyday working environment think of themselves as better equipped with knowledge and skills. Moreover, Scrimshaw (2004) believes that adequate training is crucial for building confidence and the feeling of competency among teachers. Similar results to those in this study were presented by Vuković and Dumančić (2011) who showed that more ICT courses at the faculty of teacher education created more positive attitudes towards ICT among student teachers who then felt more ready to apply their knowledge and skills.

Finally, the most obvious difference between the two ITE programs was the presence of collective effort of teachers used to overcome the external obstacles and to integrate ICT at the faculty and in the demonstration school in Osijek, and lack of the same effort in Rijeka. What is more, the existence of this strong collective effort in Osijek was reflected in a far better cooperation among institutions for ITE in Osijek than in Rijeka. Tearle (2004) also came to similar conclusions that a culture of collaboration and collective endeavor have central role as enablers in helping institutions to integrate ICT. Likewise, Stensaker et al. (2007) concluded that introduction of strategies and providing access to ICT did not necessarily imply that ICT would be integrated. Instead, individuals should understand the purpose of ICT, change their pedagogical approaches accordingly and create links inside the collective. Although the collective effort of teachers seems to have decisive role in overcoming the external obstacles to ICT integration this issues was not discussed by Croatian researchers focused on ICT.

In conclusion, the factors discussed in this study and relationship among them seem quite complex. Moreover, there are certain differences in these relationships at the research sites in

Rijeka and Osijek. Therefore, for the purpose of easier understanding the following figure provides graphic representations of the factors and relations among them. It also offers a more elaborative representation of the concepts build into inner circle of the Figure 3 in the theoretical chapter. However, the reader should also bear in mind that this figure is still a rather simplified overview of much more complex and entangled relations that exist among these factors in real life classroom situations described in the analysis of data.

Figure 4 Factors influencing ICT integration and relationships among them
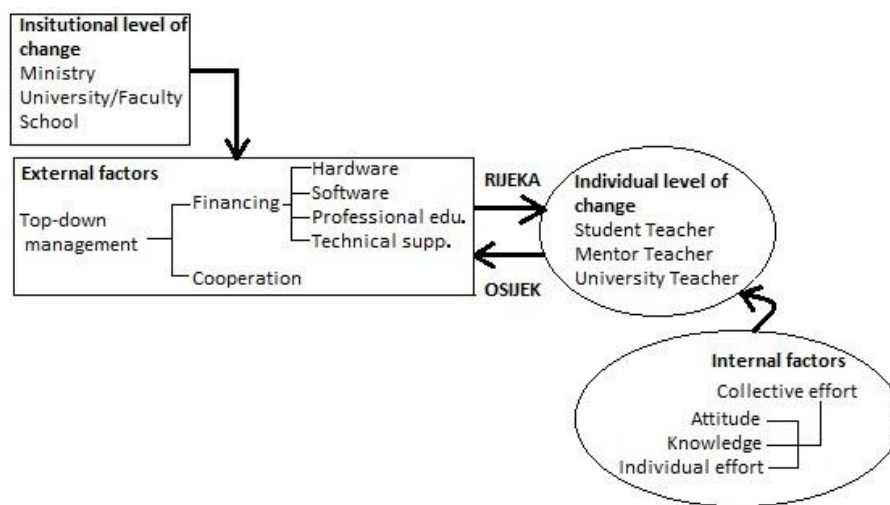
As it can be seen, this figure fits comfortably into that part of proposed theoretical based on concepts from relevant studies. Thus, as supposed, there are several external factors that stem from the institutions and have influence on the individual level of ICT integration. The most prominent among them is the top-down management practiced by the Croatian educational ministry, leadership at the universities/faculties of teacher education and demonstration school boards. It is responsible for the decisions that influence the level of cooperation among these institutions as well as on the distribution of financial resources inside each of them. The amount of finances then directly influences on the availability of hardware and software equipment, access to professional education and the existence of technical support. All these external factors have significant influence on the university teachers, the mentor teachers and the student teachers included in ITE programs both in Rijeka and Osijek.

Furthermore, these stakeholders also have their own individual internal factors that influence their use of ICT: attitudes towards ICT and their colleagues, knowledge, feelings, individual and collective efforts invested into ICT integration. However, these internal factors are under

great influence of the external factors. Hence, the poor management, the lack of hardware or limited access to it, the outdated software, the lack of professional education and technical support, and the shortage of cooperation result in teachers and students that lack knowledge and skills about ICT. This is then source of their negative feelings and attitudes towards ICT which is in turn reflected in the lack of effort invested into ICT integration. The analysis of the factors and relationship among them showed that that was the case with the ITE program in Rijeka.

The university teachers, the mentor teachers and the student teachers included in the ITE program in Osijek identified almost the same external factors as obstacles to their ICT integration. Nevertheless, their internal factors were not under the negative influence of the external barriers. Instead, the university teachers and the mentor teachers employed their individual efforts to influence on the top-down management to gain access to finances, created their own professional learning environment and teamed to share knowledge and experiences. Both students and teachers applied knowledge and took advantage of the existing hardware and software and shared positive attitude towards ICT. They also joined their individual efforts into a collective one and developed cooperation on several levels and with different institutions. In other words, they used the internal factors as enablers for overcoming the external obstacles.

All in all, the analysis of factors and discussion of the relationships among them showed that the influence of the internal factors on the externals one is much higher in the ITE program in Osijek than in Rijeka. In what way different circumstances in the two ITE program influence the phases of ICT integration will be discussed in the next section.

5.2 Phases of ICT integration in the two ITE programs in Croatia

The reforms regarding the integration of ICT into the Croatian educational system were launched by the government and the educational ministry at a very general level and without any specifications. The aim of introducing this type of innovation, as explained in the national policy documents and strategies, was to follow the European standards and worldwide trends in education but the actual purpose was left out. Schools were equipped with computer classrooms and the ministry introduced basic computer usage courses for teachers and

administration staff. Similar courses on learning about ICT and teaching with it were introduced at the faculties of teacher education as well. All these elements suggest that Croatian educational system stepped into what Fullan (2007) calls initialization phase of educational change. According to him, the most prominent change agents who introduce such reform projects in this phase arrive from national or regional level and represent top-down management of the educational change. However, he also underlines that it is crucial at this initial point to insist on the clarity of the newly introduced programs and explain the meaning of the change to all stakeholders in the system so that it can be accepted. Unfortunately, this type of clarity and purpose behind the ICT integration has been missing from the Croatian national strategies and policy documents as well as from the curriculums at the faculties of teacher education studied here.

The effects of the lack of clearly defined purpose behind the ICT integration and its role are visible on a practical level in the demonstration school and at the faculty in Rijeka. Thus, the first mentor teacher in the primary school and four out of five student teachers at the Faculty of Teacher Education in Rijeka admitted not seeing any point in using computers in the classroom. The interviewees revealed that they found lack of access to resources and lack of information, were responsible for their negative attitude towards the ICT integration. The student teachers were not even familiar with the national policies while the mentor teachers in Rijeka found them too general, unclear, prescriptive and non-binding, which according to Fullan (2007) are typical characteristics of changes introduced from a state or ministry level. On the other hand, the mentor teachers in the demonstration school in Osijek accompanied by the university teachers at the faculty of teacher education were actually the ones who introduced this type of change independently from the ministry by developing their own curriculum and lesson plans that included ICT. In that way the change was introduced from bottom-up. The results were that they understood the purpose, meaning and goals behind introducing an innovation such as ICT since they exchanged information about it. This example of the ITE program in Osijek also corroborates the viewpoint that the combination of synchronized top-down initialization coming from a higher level and bottom-up introduction coming from collective of individuals, the so called middle-out approach, brings far better results (Fullan, 2007; Louis, 2006).

These findings from ITE program in Osijek also support Fullan (2007) who underlines that the key factor in the development of an educational innovation in this initialization phase is

personal access to information about it, which should be achieved through "proliferation of networks, partnerships, collaboratives, and other agencies that have transformed the infrastructure of opportunities to access and work interactively with others on common themes over a period of years" (Fullan, 2007, p. 73). These partnerships on a general faculty level as well as cooperation with schools were not present in Rijeka when this study was conducted. However, the two university teachers, the other mentor teacher in the demonstration school and the one student teacher included in the ITE program in Rijeka accepted the change on an individual classroom level by introducing ICT into their teaching and learning on a daily basis. Yet, both Fullan (2007) and Louis (2006) emphasize that the interaction with and support from other teachers plays a key role in obtaining a wider scope of the change and moves it from the initial phase towards implementation. As already stated, this type of support from their colleagues or the leadership was not present in Rijeka but it was at the faculty in Osijek which may explain the difference in the level of acceptance of the change in the initial phase.

All of this supports Fullan's (2007) and Louis' (2007) standpoints that the change process is quite complex and hard to manage. Because of this it can be difficult to distinguish when and where one phase ends and the other begins. This also supports their theory of the cyclical nature of the change where issues from the one level, if not resolved, appear later on (see Figure 2).

Hence, the issues around integration of ICT, which has been introduced from a national level and out of the political necessity to follow international educational trends, are transferred to the phase of implementation in which this innovation should be put into use. However, if the purpose of the change is not clear, the next step towards implementation can be left out due to the lack of a deeper interest for the genuine problem solving and understanding of the true meaning of the change (Fullan, 2007). Because of that, the integration of ICT in the ITE program in Rijeka does not bring significant changes into the educational system and primary school classroom in particular since it is accepted on a general level but not applied in practice. This phenomenon is known as the organizational fit rather than change and very rarely leads to full institutionalization of the change (Louis, 2006).

Besides the issue around the purpose of the change, the overarching obstacles that appeared in all interviews were the unavailability of the equipment and financial resources in the schools and at the faculties, which presented serious threat to implementation of the ICT policy in

practice. Both Fullan (2007) and Louis (2006) call this phenomenon *adaptation* which happens instead of implementation, and it is the result of hasty initialization that does not present clearly set goals and does not resolve practical issues around the availability of resources and information at the very beginning. Louis (2006) also underlines the importance of assistance and repeated training in the implementation phase. However, the findings in this study showed that again, due to incomplete initialization, technical and professional support and continuous professional development were not available to teachers. As they explained, the ministry introduced basic courses on computer use but that practice was abruptly interrupted due to the lack of finances, and therefore not all teachers got the opportunity to learn. Because of that, it can be pointless to monitor the process of implementation and work on its improvement since ICT is not used on a daily basis.

Another factor that Louis (2006) finds important at the implementation phase is stable leadership for change. The analysis of the factors influencing ICT integration showed that mentor teachers in both demonstration schools expressed the lack of it. This was especially evident in Osijek where the teacher struggled to get the support from the principal to initiate and implement ICT usage in the classroom. Fullan (2007) finds the supportive role of the principal crucial for implementing changes and sees principals as facilitators of change who interact with teachers and understand their concerns: "The principal is the person most likely to be in a position to shape the organizational conditions necessary for success, such as the development of shared goals, collaborative work structures and climates, and procedures for monitoring results" (Fullan, 2007, p. 96). Instead, the principal in this demonstration school presented an obstacle to ICT integration, which as explained in the initialization phase, might be the direct consequence of the lack of information about the purpose of the change.

In line with that, Louis (2006) also emphasizes the importance of the supportive organizational setting. In both cases of the demonstration schools in Rijeka and Osijek the stable school leadership was missing in the implementation phase. While the principal in Rijeka was indifferent to ICT integration, the principal in Osijek presented an impediment. However, the mentor teachers in Osijek managed to build their own supportive environment by collaborating. At the time of my visit the mentor teacher described how classroom teachers were exchanging ideas about ICT integration in their lesson plans, helping each other when encountering technical obstacles, constantly looking for donations to acquire new or used equipment and most importantly supporting each other ideas, efforts and needs in front of the

school leadership. The same type of collaboration and collegiality among teachers was found at the Faculty of Teacher Education in Osijek. Both the university teachers and the student teachers there were exchanging their experiences and ideas and moved beyond the individual effort to integrate ICT. Unfortunately, this primacy of the personal contact, which Fullan (2007) finds extremely important in the implementation phase, was not present at the faculty in Rijeka where the university teachers and the student teachers still worked on the individual level keeping all their positive and negative experiences for themselves. However, both Fullan (2007) and Loius (2006) point out that the individual teacher interest for introduction and implementation of innovations is simply not enough in a long range. Instead, teachers should share values and beliefs, innovate together and support each other which are the characteristics of strong professional learning communities. These communities, believe those two authors, do not stop at the teacher level but also include other stakeholders inside the institution, like for e.g. a principal. Such a professional learning community did not exist inside the ITE program in the demonstration school and at the faculty in Rijeka since there were only several teachers integrating ICT on an individual level. When it comes to ITE program in Osijek, the professional learning community that had all the characteristics as described by Fullan (2007) and Louis (2006) was under development in the demonstration school since it included teachers but not others like the principal. However, the Faculty of Teacher Education in Osijek could serve as an excellent example of that professional community where all stakeholders from the student teachers to the university teachers where actively included into integrating ICT and thus actually implementing the change in practice.

Furthermore, it is important to emphasize that these two professional learning communities in Osijek, one in the school and the other at the faculty, did not stand on themselves. Instead, they created a network of collaboration not only with the teachers and the students inside these two educational institutions and their learning communities but also with the educational ministry and other international stakeholders. A vivid and concrete example of this dynamic teamwork was a group of primary school pupils escorted by mentor teachers and parents that were visiting student teachers and university teachers at their faculty after regular school hours to improve their mathematical skills by using ICT. Fullan (2007) particularly finds this cross-institutional collaboration of different professional learning communities decisive in implementing a change and leading it towards institutionalization, or to quote him: "In large-scale reforms, isolated professional learning communities are verboten" (Fullan, 2007, p. 152). In order to achieve these organizational communities that help implement a

change both Fullan (2007) and Louis (2006) agree that it is necessary to develop professional culture for learning within schools. These cultures of trust and cooperation where present in the demonstration school and at the faculty in Osijek where teachers and students where sharing the same values towards ICT, relying on mutual feedback, reflection, problem solving, developing new skills and creating curriculum. On the other hand, this type of collegial teacher engagement and professionalism was not present among the stakeholders included in the ITE program in Rijeka.

All this leads to the conclusion that implementation of ICT demands consistency, careful observation and constant development of collaboration culture among teacher communities in the two ITE programs in order to move to the phase of the institutionalization of a change. However, both Fullan (2007) and Louis (2006) state that the same factors that influence implementation if not resolved in time have impact on the continuation of the practice as well. This means that in order to reach continual use of ICT in their educational practice, the university teachers, the mentor teachers and the student teachers included in the ITE programs in Rijeka and Osijek should overcome numerous obstacles created by external sources or generated inside their own collectives and themselves. As the findings showed, students and teachers in Osijek are in a slightly better position than those in Rijeka since they moved on a bit further into the implementation phase by nurturing collaborative culture.

5.3 Conclusion

In order to explore the phases of ICT integration into ITE programs at the two universities in Croatia, the present study identified the factors acting like obstacles and enablers that the university teachers, the mentor teachers and the student teachers faced in their teaching and learning process.

The study found that participants in both ITE programs in the demonstration schools and at the faculties of teacher education found the external factors such as lack of hardware and software equipment, and insufficient professional education and technical support to be the biggest obstacles to the successful ICT integration in their teaching and learning activities on a daily basis. They saw poor top-down management in their institutions or at the ministry as the main source of these barriers since they found it responsible for allocating financial resources and managing cooperation on several levels.

Nevertheless, significant differences appeared in roles that internal factors had in ICT integration in the two ITE programs. Hence, interviewees in Rijeka held the aforementioned external obstacles to be responsible for their lack of knowledge and feelings of disappointment, that in turn resulted in negative attitude towards ICT and lack of individual effort to integrate it. On the other hand, participants included in the ITE program in Osijek described how they used their internal factors, such as positive attitude, knowledge, individual and collective effort, as enablers of ICT integration and thus tried to eliminate external barriers.

Moreover, what appeared to be one group's internal factor was in fact another group's external factor. Thus, negative attitude of university teachers and mentor teachers towards ICT in Rijeka turned out to be an external barrier for student teachers in their attempts to integrate ICT. Conversely, positive attitude of teachers in ITE program in Osijek served as the external enabler for student teachers' endeavors in ICT integration into their learning and teaching practice in the demonstration school.

Classification of factors that influence ICT integration in two ITE programs showed that they are highly interconnected in way that is unique for specific environment. Stakeholders in both ITE programs agreed that in the initial phase of ICT integration it was important to ensure access to material resources in order to make a change. In other words, even a small step, like unlocking the doors of a computer lab or connecting the only computer in the classroom to an overhead projector and Internet could bring significant improvements. The other significant thing that emerged in this study was the importance of explaining the purpose, meaning and goal of the change to all stakeholders in this initial phase. Otherwise they would not be interested in accepting it, as it was the case with the mentor teachers and the student teachers in the ITE program in Rijeka.

But in order to move to the next phase and fully implement an innovation proactive leadership and its support turned out to have a significant role as well. In other words, the individual initiative to integrate ICT coming from teachers and students inside one institution is not sufficient. Instead, the implementation of ICT turns out to be more successful when teachers and students join their efforts and interests and establish a professional learning community, as it was the case with the ITE program in Osijek. They linked the faculty with the demonstration school and developed a unifying strategy for ICT implementation. In contrast,

the ITE program in Rijeka proved that separate strategies and efforts, if exist, do not function, and do not lead to the institutionalization of a change.

In terms of theoretical implications, findings of this study fit comfortably into the proposed theoretical framework. The first reason is simply because the educational change theories by Fullan (2007) and Loius (2006) offer quite a broad and universal background for analyzing and monitoring any type of change process. Therefore, the findings of this study confirmed their rather general position that networking of collaborative environments brings success in managing and organizing for a change in an educational system.

The second reason is that the conceptual framework of this study was build on a broad selection of research reports and studies that dealt with integration of ICT. Some of them took into consideration factors as either obstacles or focused only on enablers; some were small scale studies while other reported findings on an international level, and some where qualitative while other applied qualitative methods or both. Nevertheless, these studies showed that environment in each educational system is specific and under influence of particular factors. In that way, this study is no exception and its findings cannot be built into only one of these studies since it consists of a combination of factors that uniquely represent the environment of the two ITE programs in Croatia. And precisely for that reason, this study cannot be generalized at a national level.

However, because of its comparative nature and specific focus on a poorly investigated area in the Croatian educational system, it opens some questions that need further investigation. Hence, in order to improve the understanding of ICT integration in the Croatian educational system it may be useful to look into the incentives behind teacher motivation for establishing professional learning communities, what keeps the teamwork and collaboration in these communities alive and what difficulties do these partnerships face while trying to maintain their innovativeness.

With the aim of gaining answers to these questions it may be helpful to conduct comparative quantitative and mixed method studies on a larger scale that include other professional learning communities and their stakeholders, like principals, government officials, regional and local administrators, and ministers. In that way a wider perspective on a more general level could be achieved that is not offered in this study due to its qualitative nature and a small number of participants.

References

Anđić, D. (2007). Obrazovanje učitelja i suvremena obrazovna tehnologija u području odgoja i obrazovanja za okoliš/održivi razvoj. [In English: Teacher education and contemporary educational technology in the field of education/education for sustainable development]. *Informatologia, 40*(2), 126-131. Retreived March 5, 2013, from http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=20500

Cuckle, P. & Clarke, S. (2002). Mentoring student-teachers in schools: views, practices and access to ICT. *Journal of Computer Assisted Learning 18*(3), 330-340. doi: 10.1046/j.0266-4909.2002.00244.x

Čop, M. & Topolovec, V. (2009). Upotreba informacijske i komunikacijske tehnologije (ict) u obrazovanju djece s posebnim potrebama. [In English: The Implementation of information and communication technology in educating children with special needs]. *Informatologia, 42*(4), 304-313. Retrieved August 11, 2011, from http://hrcak.srce.hr/index.php?show=toc&id_broj=3521

Baranović, B. (2006). Nastavni programi iz perspektive nastavnika i učitelja. [In English: Teaching programmes from the perspective of teachers]. In B. Baranović (Ed*.) Nacionalni kurikulum za obvezno obrazovanje u Hrvatskoj: različite perspective* (pp. 107-179). Zagreb, Croatia: Institute for Social Studies. Abstract obtained from Croatian Scientific Bibliography database. Retrieved January 25, 2012, from http://bib.irb.hr/prikazi-rad?&rad=280729

Batarelo, I. (2005). Priprema nastavnika za korištenje obrazovne tehnologije u nastavi: međunarodna iskustva. [In English: Teacher training for educational technology use: International practice]. In V. Vizek Vidović (Ed*.) Cjeloživotno obrazovanje učitelja i nastavnika: Višestruke perspektive* (pp. 197-202). Zagreb, Croatia: Institute for Social Studies. Abstract obtained from Croatian Scientific Bibliography database. Retrieved January 25, 2012, from http://bib.irb.hr/prikazi-rad?&rad=245925

Bekele, T.A. (2011). EDU4350 Advanced applied research methods: Qualitative data analysis, Part II [PowerPoint slides]. (Available from University of Oslo, Tavle Web site)

Brock-Utne, B. (1996). Reliability and validity in qualitative research within education in Africa. *International Review of Education, 42*(6), 605-621. Retrieved April, 11 2013, from http://www.africavenir.org/uploads/media/BrockUtneReliability_06.pdf

Bryman, A. (2008). *Social research methods* (3rd ed.). Oxford: Oxford University Press.

Crossley, M. & Watson, K. (2003*). Comparative and international research in education: Globalisation, context and difference*. London: Routledge.

Dale, R. (2005): Globalisation, knowledge economy and comparative education. *Comparative Education, 41*(2), 117-149. doi: 10.1080/03050060500150906

Drent, M. & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively?. *Computers & Education 51*(1), 187–199. doi: 10.1016/j.compedu.2007.05.001

Dukić, D. (2011). E-learning: Perceptions of students at the Josip Juraj Strossmayer University of Osijek. *Informatologia, 44*(2), 94-100. Retrieved August 11, 2011, from http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=105638

EACEA (2011). *Key Data on Learning and Innovation through ICT at School in Europe*. Brussels: EACEA P9 Eurydice. Retrieved April, 10 2013, from http://eacea.ec.europa.eu/education/eurydice/key_data_en.php

E-Matica. (2009). Zagreb: Matica Hrvatske. Retrieved March 20, 2013, from https://matice.mzos.hr

Fairbrother, G.P. (2007). Quantitative and qualitative approaches. In M. Bray, B. Adamson & M. Mason (Eds.) *Comparative education research: Approaches and methods*. Hong Kong: Springer.

Fullan, M. (2007). *The new meaning of educational change*. New York: Teachers College Press.

Gaynor, A.K. (1998). *Analyzing problems in schools and school systems: A theoretical approach*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Hutinski, Ž. & Aurer, B. (2009). Informacijska i komunikacijska tehnologija u obrazovanju: stanje i perspektive. [In English: ICT academic education: Present state and perspective. *Informatologia, 42*(4), 265-292].Retrieved August 3, 2011, from http://hrcak.srce.hr/index.php?show=toc&id_broj=3521

Jagić, S. & Vrkić Dimić, J. (2010). Samoprocjena računalnih znanja i vještina srednjoškolskih učenika i nastavnika u kontekstu njihovog komunikacijskog razvoja. [In English: Self – evaluation of high school students' and teachers' computer knowledge and skills in the context of their communicational development]. *Informatologia, 43*(3), 189-197. Retrieved *August 11, 2011*, from http://hrcak.srce.hr/index.php?show=toc&id_broj=4627

Jukić, T. (2012). Facebook kao medij za aktivno učenje u visokome školstvu. [In English: Facebook as a medium for active learning in higher education]. In N. Hrvatić & A. Klapan (Eds.) *Pedagogija i kultura* (pp. 183-189). Zagreb, Croatia: Croatian Pedagogical Association. Retrieved March 5, 2013, from www.pedagogija.hr/wp-content/uploads/2012/09/KNJIGA-1.pdf

Kleven, T.A. (2008). Validity and validation in qualitative and quantitative research. *Nordisk Pedagogik, 28*(3), 219-233. Retrieved April 11, 2013, from, http://www.idunn.no/ts/np/2008/03/validity_and_validation_in_qualitative_and_quantitative_research

Kovačič, M.P., Zgrabljić Rotar, N. & Erjavec,K. (2012). Information literacy in Croatia: An ideological approach. *Journal of Language, Identity & Education, 11*(3), 151-166. doi: 10.1080/15348458.2012.686372

Krstović, J. & Čepić, R. (2010). Theoretical-conceptual dilemmas of teacher education: Between Croatian and European qualifications framework. *Informatologia, 43*(3), 240-245. Retrieved January 27, 2012 from, http://hrcak.srce.hr/index.php?show=toc&id_broj=4627

Kubow, P.K. & Fossum, P.R. (2007). *Comparative education: Exploring issues in international context*. Upper Saddle River, Ohio: Pearson and Merill/Prentice Hall.

Kvale, S. & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing* (2nd ed.). Los Angeles: Sage.

Lončarić, D. & Pejić Papak, P. (2009). Profiliranje učiteljskih kompetecija [In English: Profiling teacher competencies]. *Odgojne znanosti, 11*(2), 479 – 497. Retrieved April, 9 2013, from http://bib.irb.hr/datoteka/450386.Loncaric_PejicPapak_2009_Profiliranje_uciteljskih_kompetencija.pdf

Louis, K.S. (2006). *Organizing for school change*. London: Routledge.

Ljubić Klemše, N. (2008). Gledišta učitelja o novoj obrazovnoj sredini − učionici s jednim računalom. [In English: Teachers' views of the new educational environment − the one-computer classroom]. *Napredak, 149*(4), 426-441. Retrieved March 5, 2013, from http://hrcak.srce.hr/index.php?show=toc&id_broj=6686

Mesarić, J. (2007). Integracija znanja u obrazovanju. [In English: Integration of knowledge in education]. *Informatologia, 40*(3), 216-222. Retrieved July 11, 2011, from http://hrcak.srce.hr/index.php?show=toc&id_broj=1978

Morse, J.M., Barett, M., Mayan, M., Olson, K. & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods, 1*(2). Retrieved from https://ejournals.library.ualberta.ca/index.php/IJQM/article/viewArticle/4603

MZOŠ (2005). *Education sector development plan 2005 – 2010.* Zagreb, Croatia: Ministry of Science, Education and Sports. Retrieved March 20, 2013, from the Ministry of Science, Education and Sports Web site: http://public.mzos.hr/fgs.axd?id=14194

MZOŠ (2007). *Overview of achievements 2004 – 2007.* Zagreb, Croatia: Ministry of Science, Education and Sports. Retrieved March 21, 2013, from the Ministry of Science, Education and Sports Web site: http://www.draganprimorac.com/wp-content/uploads/2010/05/Overview-of-Achievements-2004-2007.pdf

MZOŠ (2010). *National curriculum framework*. Zagreb, Croatia: Ministry of Science, Education and Sports. Retrieved March 20, 2013, from Ministry of Science, Education and Sports Web site: http://public.mzos.hr/Default.aspx?sec=2501

Nadrljanski, Đ. (2006). Informatička pismenost i informatizacija obrazovanja. [In English: Computer literacy and computerisation of education]. *Informatologia, 39*(4), 262-266. Retrieved August 11, 2011, from http://hrcak.srce.hr/index.php?show=toc&id_broj=896

OECD (2001). *Thematic review of national policies for education: Croatia*. Retrieved January 27, 2012, from OECD Web site: http://www.see-educoop.net/education_in/pdf/oecd-review-cro-enl-t05.pdf

OECD (2009). *Guide to measuring the information society 2009*. Retrieved January 16, 2012, from OECD Web site: http://www.oecd.org/dataoecd/25/52/43281062.pdf

Pavin, T., Vizek Vidović, V., Miljević-Riđički, R. (2006). *National report – Croatia*. Zagreb, Croatia: Institute for Social Studies. Center for Research and Development of Education. Retrieved March 5, 2013, from http://www.see-educoop.net/education_in/pdf/workshop/tesee/dokumenti/book/Croatia.pdf

Pelgrum, W.J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. *Computers & Education, 37*,163–178. Retrieved March, 18 2013, from http://www.sciencedirect.com/science/article/pii/S0360131501000458

Radetić-Paić,M. & Ružić-Baf, M. (2010). Uporaba ICT-a i neprimjeren učinak korištenja računala iz perspektive budućih učitelja i odgojitelja. [In English: Use of ICT and inappropriate effects of computer use – Future perspectives of teachers and child-care teachers]. In M. Plenković (Ed.) *Society and Technology: Proceedings of XVII. International Scientific Conference, Zadar, Croatia, July 28-30, 2010* (pp. 305-3012). Zagreb, Croatia: Croatian Communication Association and NONACOM. Abstract obtained from Croatian Scientific Bibliography database. Retrieved March 6, 2013, from http://bib.irb.hr/prikazi-rad?&rad=477227

Rister, D. (2008). E-učenje za darovite srednjoškolce – kako e-učenje u obliku on-line tečaja može zadovoljiti specifične potrebe darovite djece. [In English: E-learning for gifted high school students – how e-learning in the form of an on-line course can meet the specific needs of gifted children]. *Edupoint: časopis o primjeni informacijskih*

tehnologija u obrazovanju, 8(62),6-13. Retrieved August 11, 2011, from http://edupoint.carnet.hr/casopis/cimages/edupoint/ep_62_1.pdf

Rončević, A. (2008). Uvjerenja učitelja o multimedijima i ishodi učenja kod učenika [In English: Teacher's convictions to the multimedia and learning outcomes of pupils]. In M. Cindrić, V. Domović & M. Matijević (Eds.). *Pedagogy and the knowledge society* (pp. 315-324). Zagreb, Croatia: Faculty of Teacher Education, University of Zagreb. Retrieved March 6, 2013, from http://bib.irb.hr/prikazi-rad?&rad=398761

Scrimshaw, P. (2004, June 1). Enabling teachers to make successful use of ICT. *British Educational Communications and Technology Agency (BECTA)*. Retrieved March 19, 2013, from http://dera.ioe.ac.uk/1604/1/becta_2004_enablingsuccessfuluse_litrev.pdf

Spearman, M. (2009). O.L. Davis, Jr., and the History of Teacher Education. In B.S. Stern (Ed.) *Curriculum and teaching dialogue, 11*(1&2), 53-59. Charlotte, North Carolina: Information Age Publishing, Inc. Retrieved March 21, 2013, from http://www.questia.com/library/1G1-234999767/chapter-8-o-l-davis-jr-and-the-history-of-teacher

Stankov, S., Pilić, S. & Stankov, S. (2000). Računalne tehnologije u školi: Gledišta studenta i učitelja [In English: Computer technology in school: Students and teachers point of view]. *Informatologia, 33*(1), 52-56. Abstract obtained from Croatian Scientific Bibliography database. Retrieved March 6, 2013, from http://bib.irb.hr/prikazi-rad?rad=40281

Stensaker, B., Maassen, P., Borgan, M., Oftebro, M. & Karseth, B. (2007). Use, updating and integration of ICT in higher education: Linking purpose, people and pedagogy. *Higher Education 54*, 417-433. doi: 10.1007/s10734-006-9004-x

Study Program of the Faculty of Teacher Education in Rijeka (2006). *Integrated undergraduate and graduate university teacher study*. Rijeka: Faculty of Teacher Education. Retrieved March, 24 2012, from Faculty of Teacher Education in Rijeka Web site: http://www.ufri.uniri.hr/index.php?option=com_content&task=view&id=29&Itemid=38&lang=en

Study Program of the Faculty of Teacher Education in Osijek (2005). *Integrated undergraduate and graduate five-year university class teacher studies*. Osijek: Faculty of Teacher Education. Retrieved March, 24 2012, from Faculty of Teacher Education in Osijek Web site: http://www.ufos.hr/DATA/studijski_programi/bologna.php

Tatković, N. & Močinić, S. (2012). *Učitelj za društvo znanja. Pedagogijske i tehnologijske paradigme bolonjskoga procesa* [In English: Teacher for the knowledge society. Pedagogical and technological paradigms of bologna process]. Pula, Croatia: University of Juraj Dobrila in Pula, Department of Pre-School and Primary School Teaching. Abstract obtained from the Croatian Scientific Bibliography database. Retrieved March 6, 2013, from http://bib.irb.hr/prikazi-rad?lang=en&rad=595982

Tatković,N. & Muradbegović, A. (2008). Technological aspects and dimensions of lifelong learning and sustainable development. In V. Uzelac & L. Vujičić (Eds.) *Lifelong learning for sustainable development* (pp. 315-320). Rijeka, Croatia: Faculty of Teacher Education, University of Rijeka. Retrieved March 7, 2013, from www.ufri.uniri.hr/data/book_2.pdf

Tearle, P. (2004). A theoretical and instrumental framework for implementing change in ICT in education. *Cambridge Journal of Education, 34*(3), 331-351. doi: 10.1080/0305764042000289956

Teo, T. (2010). A path analysis of pre-service teachers' attitudes to computer use: Applying and extending the technology acceptance model in an educational context. *Interactive Learning Environments, 18*(1), 65-79. doi: 10.1080/10494820802231327

Tomaš, S. (2009). Primjena sustava Moodle u nastavi učenika od prvog do četvrtog razreda osnovne škole [In english: Moodle in primary school students' teaching process]. In D. Bouillet & M. Matijević (Eds.) *Curriculums of early and compulsory education: Proceedings of 3rd scientific research symposium Zadar, Croatia, November 12-14, 2009* (pp. 367-380). Zagreb, Croatia: Faculty of Teacher Education, University of Zagreb.

Topolovec,V., Marinović, M. & Pavlić, M. (2008). Information and communications technologies and the transformation of learning and teaching process for the 21st

century. *Informatologia 41*(4), 293-303. Retrieved April 10, 2013, from
http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=54581

UNESCO (2002a). *Information and communication technology in education: A curriculum for schools and programme of teacher development.* Paris, France: Division of Higher Education, UNESCO. Retrieved March 17, 2013, from
http://unesdoc.unesco.org/images/0012/001295/129538e.pdf

UNESCO (2002b). *Information and communication technologies in teacher education: A planning guide.* Paris, France: Division of Higher Education, UNESCO. Retrieved March 17, 2013, from http://www.unescobkk.org/en/education/ict/online-resources/e-library/elibrary-themes/training-of-teachers/ict-in-teacher-education/

UNESCO (2005). *Indicators of ICT application in secondary education of South−East European countries*. Moscow, Russian Federation: UNESCO Institute for Information Technologies in Education (IITE). Retrieved March 20, 2013, from
http://iite.unesco.org/pics/publications/en/files/3214637.pdf

UNESCO (2010). *ICT transforming education: A regional guide.* Bangkok, Thailand: Asia and Pacific Regional Bureau for education, UNESCO Bangkok. Retrieved March 20, 2013, from http://portal.unesco.org/ci/en/ev.php-URL_ID=30862&URL_DO=DO_TOPIC&URL_SECTION=201.html

UNESCO (2011). *Transforming education: The power of ICT policies.* Paris, France: UNESCO. Retrieved March 17, 2013, from
http://www.unesco.org/new/en/education/resources/online-materials/single-view/news/transforming_education_the_power_of_ict_policies-1/

Vizek Vidović, V. & Domović, V. (2008). Researching teacher education and teacher practice: The Croatian perspective. In B. Hudson & P. Zgaga (Eds.) *Teacher education policy in Europe: A voice of higher education institutions* (pp. 303-313). Umeå, Sweden: University of Umeå, Faculty of Teacher Education. Retrieved April 11, 2013, from www.pef.uni-lj.si/tepe2008/documents/a-voice-from.pdf

Vizek Vidovic,V. & Pavin, T. (2005). Komparativna studija obrazovanja učitelja i nastavnika i percepcija sustava inicijalnog obrazovanja učitelja i nastavnika u Hrvatskoj. [In

English: Comparative Study of Initial Teacher Education and Perception of Croatian Teacher Education System]. In A. Murn, D. Nenadić-Bilan, R. Bacalja & M. Klarin (Eds.) *Proceedings of Prema novom kurikulumu u odgoju i obrazovanju, Zadar, Croatia 21-25 May 2005* (pp. 59-69). Zadar, Croatia: University of Zadar, Department of Pre-School and Primary School Teaching. Abstract obtained from the Croatian Scientific Bibliography database. Retrieved January 25, 2012, from http://bib.irb.hr/prikazi-rad?&rad=207177

Vizek Vidović, V. & Žižak, A. (2011). Uloga mentora u profesionalnom razvoju učitelja. [In English: The role of mentors in the professional development of teachers]. In V. Vizek Vidović (Ed.) *Učitelji i njihovi mentori* (pp. 97-151). Zagreb, Croatia: Institute for Social Studies. Abstract obtained from the Croatian Scientific Bibliography database. Retrieved April 11, 2013, from http://biblio.irb.hr/prikazi-rad?&lang=ENCroatianScientificBibliographyCROSBI&rad=549048

VRH (2006). *Strategic development framework 2006 – 2013*. Zagreb, Croatia: Central Office for Development Strategy and Coordination of EU Funds. Retrieved March 20, 2013, from the Ministry of Science, Education and Sports Web site: http://public.mzos.hr/fgs.axd?id=15378

VRH (2008). *Plan provedbe programa e-Hrvatska za 2008. godinu*. [In English: Plan for the implementation of e-Croatia Program in 2008]. Zagreb, Croatia: Središnji državni ured za e-Hrvatsku. Retrieved March 20, 2013, from the Ministry of Science, Education and Sports Web site: http://public.mzos.hr/fgs.axd?id=14397

Vujičić, L. (2007). Mijenjanje odgojno-obrazovne prakse – prema kvalitetnim promjenama. [In English: Changing of educational praxis – Towards quality changes]. *Informatologia, 40*(3), 229-233. Retrieved March 20, 2013, from http://hrcak.srce.hr/file/33853

Vuković, G. & Dumančić, M. (2011). Uloga informacijsko-komunikacijske tehnologije u radu buducih učitelja. [In English: The role of ICT in the work of future teachers]. In D. Čišić, Ž. Hutinski, M. Baranović, M. Mauher &L. Ordanić (Eds.) *Proceedings of MIPRO 34th International Convention, Opatija, Croatia 23-27 May 2011* (pp. 478-482). Opatija, Croatia: MIPRO.

Yin, R.K. (1994). *Case study research: Design and methods* (2nd ed.). Los Angeles: Sage

    Publications.

Appendix

Interview guide for university teachers

The purpose of my research and this visit is to get familiar with the challenges that students face when it comes to the use of ICT in the educational system. *It is not an evaluation of you*, the university program, the university or school teachers. I would like to know more about the teacher education program and practice for the use of ICT. For that reason I have a number of questions to ask.

1. Background
   a. Name
   b. Job title (or role)
   c. Thumbnail sketch of your job; what you do and who you work with?
   d. How long have you been teaching this subject?
2. *Change (organizational and individual)*. I am interested in the *integration* of the new course at the faculty, namely "Computers in class teaching".
   a. Can you describe in short the curriculum for ITE for the use of ICT?
   b. Whose obligation is it to formulate the curriculum and fulfill its objectives?
   c. Can you think back of the time when training for the use ICT was introduced:
      - When was that?
      - Why did the faculty get involved?
      - How did you personally get involved?
      - What did you expect?
      - What do you think students / teachers supervisors / principals/ rector expected?
   d. What is the purpose of introducing ICT as a tool for teaching?
   e. What is the role of the teacher supervisor in elementary school when it comes to ICT?
   f. What is the learning culture of the faculty? Is it collaborative? Is it adaptive? Are there other teachers who teach about the use of ICT in practice?
3. *External factors*. I am interested in the challenges that students face when using ICT.
   a. What can you say about the equipment at the faculty?
   b. Are you familiar with the state of the equipment at school where practical part of the training takes place?
   c. What would you change in the course that you teach?
   d. What can you say about software or materials that you use?
   e. What would you change at the faculty?
   f. Whom do the students turn to when they need help with the use of ICT in practice?
   g. What can you say about the supervision in schools?
   h. Do you think that your course is sufficient for the successful use of ICT? Why?
   i. What can you say about student' level of skills when it comes to the use of ICT in practice?

Internal factors

       j.   What can you say about the interest that students show for your course?
       k. How easily do they find ICT to use? Do they find it complex?
       l.   How useful do they find ICT and your course?
      m. Can you tell something about their intention to use ICT in teaching practice at the school?
       n. How well would you say they are acquainted with the use of ICT?
       o. What might be the reason that they hesitate to use ICT?
       p. Do they share their experiences with you? For example?
       q. What can you say about their progress when it comes to ICT?

4. Other

       a. Is there anything else that you would like to add?

Interview guide for mentor teachers

The purpose of my research and this visit is to get familiar with the challenges that students face when it comes to the use of ICT in the educational system. *It is not an evaluation of you*, the university program, the university or school teachers. I would like to know more about the teacher education program and practice for the use of ICT. For that reason I have a number of questions to ask.

1. Background
   a. Name
   b. Job title (or role)
   c. Thumbnail sketch of your job; what you do and who do you work with?
   d. How long have you been teaching?
2. *Change (organizational and individual)*. I am interested in the *implementation* of ICT in the teaching practice?
   a. What is the role of the teacher supervisor in elementary school related to ITE?
   b. What can be said of the leadership of the school and the role of senior management?
   c. Does the organisational structure appear open and exible when it comes to ICT?
   d. What is known about the school's informal decision making processes?
   e. What is the school's position with regard to students'/pupils' access to computers?
   f. What can you say about the collaboration between faculty and schools where practice takes place?
   g. How would you describe the learning atmosphere in school? Do teachers collaborate or adapt to use ICT?
   h. How do you use ICT? For what purpose (administrative/pedagogical)? Are there other teachers who use of ICT in teaching practice?
3. *External factors*. I am interested in the challenges that students face when using ICT.
   a. What can you say about the equipment in school where practical part of the training takes place?
      - Is there sufficient number of computers?
      - Where are they located and how is access arranged?
      - Are they reliable?
      - Is there enough time to use ICT during the lecture?
      - What can you say about software or materials that students use?
      - What happens if problems with equipment appear?
      - Can you try the equipment before class starts?
   b. What can you say about the university course for the use of ICT?
      - What would you change in the course on ICT?
   c. What would you change in your school?
   d. Whom do the students turn to when they need help with the use of ICT in practice?
   e. What is your opinion on the supervision in schools?
   f. Is ICT course at the university enough for the successful use of ICT?

g. What can you say about students' level of skills when it comes to the use of ICT in practice?
4. ***Internal factors***
    a. What can you say about the interest that students show for the use of ICT in practice?
    b. What can you say about their progress when it comes to ICT?
    c. Do they share their experiences with you? For example?
    d. How easily do you find ICT to use? Do you find it complex?
    e. How useful do you find ICT course?
    f. Can you tell something about your intention to use ICT in teaching practice at the school?
    g. How well would you say you are acquainted with the use of ICT?
    h. What might be the reason that you hesitate to use ICT?
    i. How do you perceive your peers who want to use ICT?
    j. Do you feel that you have a sense of control over the use of ICT?
    k. How students understand how ICT can enhance teaching and learning and see the value in using it?

5. ***Other***
    a. Is there anything else that you would like to add?

Interview guide for student teachers

The purpose of my research and this visit is to get familiar with challenges that students face when it comes to the use of ICT in the educational system. *It is not an evaluation of you*, the university program, the university or school teachers. I would like to know more about the teacher education program and practice for the use of ICT. For that reason I have a number of questions to ask.

1. Background
   a. Name
   b. Job title (or role)
2. *Change (organizational and individual)*. I am interested in the *implementation* of the new course at the faculty, namely "Computers in class teaching".
   a. Can you describe in short the course for the use of ICT?
   b. What is the purpose of this course?
   c. What is the role of the teacher supervisor in elementary school?
   d. What can you say about the collaboration between faculty and schools where practice takes place?
   e. How would you describe the learning atmosphere at the faculty? Do teachers collaborate or adapt when it comes to ICT?
   f. Are there other teachers at the faculty who teach about the use of ICT in practice?
3. *External factors*. I am interested in the challenges that students face when using ICT.
   a. What can you say about the equipment at the faculty?
   b. What can you say about the equipment at school where practical part of the training takes place?
      • Is there sufficient number of computers?
      • Where are they located and how is access arranged?
      • Are they reliable?
      • Is there enough time to use it?
      • What happens if problems with equipment appear?
      • Can you try the equipment before class starts?
      • What happens if it does not work during your lecture?
   c. How useful do you find the course on ICT?
      • What would you change in the course on ICT?
      • What can you say about software or materials that you use?
   d. What would you change at the faculty or at school?
   e. Whom do the you turn to when they need help with the use of ICT in practice?
   f. What can you say about the supervision in schools?
   g. Do you think that ICT course is enough for the successful use of ICT?
   h. What do you think about your level of skills when it comes to the use of ICT in practice?
4. *Internal factors*
   a. How motivated and committed are your peers in general towards ICT use?

b. How do you perceive your peers who want to use ICT? What can you say about how they see you if you want to use ICT?
c. What can you say about your interest for ICT course?
d. How easily do you find ICT to use? Do you find it complex?
e. How useful do you find ICT in teaching practice?
f. How well would you say you are acquainted with the use of ICT?
g. What might be the reason that you hesitate to use ICT?
h. Do you share your experiences regarding ICT with teachers supervisors or university teachers? For example?
i. What can you say about your progress when it comes to ICT?
j. Do you feel that you have a sense of control over the use of ICT?

5. Other

Is there anything else that you would like to add?

ICT in the Study Program of the Faculty of Teacher Education in Rijeka

"Information science" is a compulsory course in the spring semester in the first year of studies and consists of 60 hours of lessons. The purpose of the course is to familiarize the students with the basic use of computers and the importance of ICT. This course is related to the compulsory "Computer in the Primary School Classroom Education" course held in the autumn semester during the second year. The course consists of 45 hours of teaching and the main aim is to enable students to use information technology in their future teaching practice in order to obtain specific educational objectives in a lower primary classroom. "Extracurricular Informatics and Technical Activities" is an optional course offered within the module of extracurricular activities. The course is held in the spring semester of the fifth year of studies and consists of 45 lecture hours. The basic aim, as described in the program, is to familiarize the students with the dynamics of ICT and instruct them in how to stay informed about the latest technological developments in education.

The term "technology of education" is furthermore brought up in the description of "Didactics" course and the course on "Education of Children with Special Needs" but without specific explanation on what it is and how it should be used. The use of computers is briefly mentioned in the description of the following courses: "Art Culture", "Reading in Primary School Classroom Education", "Methodics of Mathematics I and III", "County Heritage", "Methodics of Natural and Social Sciences II", "Methodics of Kinesiology III", "Media Culture", "Extracurricular Natural Science Mathematical Activities" and "Introduction to Logics and Sets" but again without detailed elaboration of the use and purpose of the computers.

ICT in the Study Program of the Faculty of Teacher Education in Osijek

Mandatory and elective courses in the first year of studies from the Computer Science module include five courses. "Word processors" is the course held during the winter semester that focuses on historical overview of word processing software and helps students to master the use of a certain text editor. It consists of lectures and practice on the computers. "Spreadsheet calculator" takes place during the summer semester and consists of practice on the computers with the purpose to teach students how to use one of the programs for calculations. "Introduction to computer science" is an elective course from the summer semester with the purpose to familiarize the students with the basic computer science terminology, architecture of the computers and their role in everyday life. The course consists of lectures and practical part. "Educational music software" is an elective course held in the summer semester that teaches students about sound formats and sources, how to process sounds, play, record and produce music with the help of a computer. "Computational practicum" is another elective course in the summer semester with the objective to teach about basic installation and maintenance of computers and networks.

During the second year of studies students have the following three courses connected with the ICT. "Educational packages" is a mandatory course in the winter semester with the purpose to familiarize the students with those software packages useful in the preparation and conduct of classes. "Computers in education" is a mandatory course in the summer semester that makes students familiar with the advantages and drawbacks of the information technology in education. It consists of both lectures and computer practice. "Graphics, animations and films software" is the only elective course in the second year and it is held in the summer semester. Its purpose is to teach students about the basics of image, animation and digital video processing, and consists of both lectures and practice.

In the third year of studies there are three ICT courses. "Internet resources in education" is both winter and summer course that teaches about computer networks, search engines, electronic mail and real-time communication. "Web programming" is an elective course in the winter semester that teaches students about the basics of four different web programming languages, static and dynamic web sites, and server-client communication. "Computers in teaching courses" is an elective course in the summer semester with the objective to

familiarize students with the acquisition of multimedia content from the Internet and the presentation software and tools for the use in the teaching process.

During the fourth year of their studies the students are offered the following two ICT courses. "Logo – programming language" is a mandatory winter semester course that introduces the students to the programming in LOGO language and prepares them to teach LOGO in upper primary classes if necessary. "Computer data bases" is an elective course in the summer semester that familiarizes students with the data base language, the creation and use of data bases.

Finally, in the fifth year of studies two ICT elective courses are offered. "Algorithms and data structures" is a winter semester course with the objective to teach students the algorithm fields, complexity and analysis. "Computers in leisure" is a course held during the summer semester. The aim of the course is to present the basic and most frequently used software and Internet sites dedicated to fun and activities like drawing, calculating etc.

Additionally, the computers are mentioned in "Media studies", a mandatory course in the summer semester of the first year that familiarizes students with the use of various technologies as teaching tools. The mandatory "Statistics course" held in the winter semester of the third year teaches students how to use computers for statistical calculations. Another useful elective course is "English for computer users I and II" that during the third and fourth year of studies acquaints the students with the computer terminology in English.

Letter of Introduction

UiO : Department of Education
University of Oslo

To whom it may concern

Date: 25.08.2011
Your ref.:
Our ref.:   k.e.jensen@ped.uio.no

Assistance in the conduct of fieldwork

This is to confirm that the Croation student **Marijana Kelentric**, born 08.04.1980, is a second year student in the Master programme in Comparative and International Education at the Department of Education at the University of Oslo, Norway.

In the second year our students are required to write a Master Thesis of 50 to 80 pages. This thesis should preferably be based on field studies conducted in countries outside of Norway. The fieldwork may incorporate interviews with educational practitioners and decision-makers, classroom observation and documentary analysis. The type of data gathered should of course be discussed with the relevant authorities. It is our hope that the work produced by the student will not only benefit her in her academic career but also be of use in the future.

Marijana Kelentric will be conducting her fieldwork in Croatia, Rijeka, Gospic, between the months of September and November 2011.

We kindly ask you to give her all possible assistance during her fieldwork in Croatia.

Best regards,

Kjerstin Eek Jensen

Kjerstin Eek Jensen
CIE Administrative Coordinator
Senior Executive Officer
Department of Educational Research
University of Oslo
tel.: +47 22 85 82 77

The coding process

The following table offers some examples of the coding process that I applied in this research.

Original text	Item	Concept	Category
Q: Is "Computer science" a compulsory subject in the first year? A: Yes. And the "Computers in the classroom instruction" in the second year. Q: What do student learn there? A: They learn how to use Word, Excel, PowerPoint... Which is in my opinion ridiculous. Q: Why? A: Well, I taught that in the elementary school. The same thing. When I worked in the school I taught that in the fifth, sixth, seventh grade. The same thing is taught in high school and now at the faculty. Q: So, all first year students are already familiar with everything? A: Yes. They have to be.	Irrelevance of the Course	Attitude	Internal factor
Q: What about computer programs that are not for free? Like Photoshop? Do you use older versions or newer ones? A: Yes. Q: Older versions? A: Pirated ones. (laughter). And what? Who is going to buy it to us? Q: Faculty? A: Oh no! Noooooooooooo! Students are supposed to do a research in order to write their thesis. So we needed "Statistica". And we had to buy just a few versions and that's it. Either this	Lack of Finances	Financing	External factor

or wood for heating. (sarcasm).			
Q: What about your colleagues? Do you share the computer lab with others? A: No! No! They don't use it! Nothing! As far as I know! I' m in the computer lab and nobody else comes in. I cannot even put up a fight over whose turn it is to use it. Nothing! Never! I don't even find the chairs to be differently arranged.	No Individual Cooperation	Cooperation	External factor
Q: So, Faculties and Departments are quite autonomous here? A: Departments, and courses and everything…everything! So what I do in Computer Science…I have no idea…I couldn't even name five other courses at this Faculty. Which is ridiculous. We should all work together.	No Institutional Cooperation	Cooperation	External factor