ICT and e-learning in higher education in Croatia: strategies and current state

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Abstract. Strategic planning in higher education is an integral part of achieving goals and fulfilling multiple roles higher education institutions hold. This paper examines current state in strategic planning in Croatian higher education institutions considering a special case study. Further on, results of a nationwide survey on ICT and e-learning use in HEI are qualitatively analysed and the current state of e-learning application, as well as expected gains from e-learning on HEI level are presented. Finally, suggestions for further research are laid out, as this paper is only a foundation for further research in this area.

Keywords: e-learning strategy, ICT in education, higher education

1 Introduction

Strategy, similar to many wide-spread terms, can be defined in different ways. (Chandler, 1962) in (Hell & Ershov, 2014) defines organizational strategy as "the determination of the basic long-term goals and objectives of an enterprise and the adoption of course of action and the allocation of resources necessary for carrying out goals". Role of higher education institutions (HEI) has evolved through time. Today, there are several missions HEI are aiming to achieve. (Divjak & Begičević-Ređep, 2015) state that there is a triple mission of HEI based on which their performance is evaluated: teaching, research, and serving to society (outreach). Further, (Watson, 2000) in (Stukalina, 2014) emphasizes extreme importance of university strategy, particularly because it "allows all of its main activities (teaching, research, social and economic service) to be realised". Strategic planning in higher education can be tied to a certain department or job area as well. (Finger & Smart, 2013) have conducted a research on perceptions of young pupils, aged 10-14, that are expected to participate in university studies in 2020, which is an example of shaping strategy around results obtained today. Having multiple roles of HEI in mind, it is clear that a strategy, formed in a certain way, has to be in place to ensure fulfilment of all its tasks and plans. (Labib, et al., 2014) is stating that strategic planning should be done on organizational level, but that „strategic planning is recommended for semi-autonomous segments". Similar is stated in (Stukalina, 2014), where one of the basic principles of elaborated HEI management model included centralized management of the educational environment, but allowing functional areas to have a level of autonomy in "developing and implementing different strategies related to specific organizational domains". Use of ICT in education is influenced by several factors. Some of them are elaborated in (Rogošić, 2015) where the author states that there are two kinds of factors that affect use of ICT in education: technical and socio-psychological. Technical aspects include hardware availability and education of teachers, as well the availble support, while socio-psychological factors cover attitude, self-confidence, and school climate. This research was conducted on elementary school teachers. The complex attitude of teachers towards the use of ICT in teaching is covered in (Unwin, 2007), where the author emphasizes that the change of technology is rapid, which can finally result with hesitance in learning new technologies. E-learning, as an instance of ICT, it is an integral part of teaching and learning today. (Urh, et al., 2015) write that "e-learning is being introduced as a fundamental part of the student learning experience in higher education", and (Divjak & Begičević, 2006) state that e-learning "supports skills needed in knowledge–based society and includes different teaching methods". E-learning can be defined as "the use of technologies in the process of gaining and disseminating knowledge" (Bralić, et al., 2015) or as a "type of learning supported by information and communication technology (ICT) that improves quality of teaching and learning" (Begičević & Divjak, 2006). Wide area computer networks today enable scientists and students to access series of resources at the same time (Hutinski & Aurer, 2009). It has been challenging to identify similar researches to the analysis of the survey that is elaborated later in the paper. Still, it is interesting to note similar research on e-learning done in different regions. For example, (Aoki, 2010) shares results of e-learning analysis in Japan, where "73.1 percent of the higher

education institutions surveyed have implemented ICT in teaching and learning". Most important reasons for use of ICT were: "offering effective instruction to students, offering education efficiently, and responding to diverse needs in learning styles". In (Begičević & Divjak, 2006) advantages and goals of e-learning in higher education are derived. Highest ranked goals of e-learning in higher education included: improvement of educational quality and learning outcomes, innovation and modernization of university education system, and enablement of students for life-long learning. In addition, highest ranked advantages of e-learning in this research were: accessibility of knowledge (on-line access to teaching materials), flexibility of learning, and life-long learning. It is notable that these goals and advantages are related to majority of strategic decisions and plans set by Croatian universities. Finally, we can perceive e-learning system as "a powerful tool for achieving strategic objectives of the university" (Divjak & Begičević, 2006). At the same time, to allow e-learning to help achieve strategic objectives in higher education, it has to be included in strategies of HEI. There is extensive research on importance of strategy and importance and role of e-learning, but there is no research that gathers these two factors in Croatia. The main goal of this paper is to review the state of the art in regards to strategic documents in Croatian universities, set the foundation for further research, and qualitatively analyse the national survey results, conducted by a third party before writing this paper.

Paper is organized as follows: in first section current state of the art in regards to strategic documents covering ICT and e-learning in particular for four universities in Croatia will be examined. Following, survey results will be presented and qualitatively analysed. Finally, limitations and further work plans and suggestions will be covered.

2 State of the art analysis

Knowing the importance of strategic planning and ICT in education, as well as the importance of including ICT in the strategic documents of HEI, a review of current strategies in place was made.

HEI in Croatia are organized as follows: "universities (and their constituents - faculties and academies of arts), polytechnics and colleges. Currently there are 119 higher education institutions in Croatia: 9 public universities (8 when research covered in this paper was conducted), 2 private universities, 68 faculties and art academies and 1 university centre at public universities, 4 private polytechnics, 11 public polytechnics, 22 private colleges, and 3 public colleges" (Agency for Science and Higher Education, n.d.). Universities can, but do not need to be integrated. Integrated universities have constituent units that organize and deliver study programme, but their teachers are employed by the

university that then organizes them in certain constituents (University of Dubrovnik, University of Pula, and University of Zadar). Other universities are not formally integrated and have a certain level of functional integration (Agencija za znanost i visoko obrazovanje, n.d.). Examples of universities that are not fully integrated are Universities of Zagreb, Split, Rijeka, and Osijek, where constituents are legal entities. The organizational structure of universities is an important element when revising documents and strategies. Universities' constituent units have participated in this research expressing individual state, expected gains and plans in e-learning. Still, in this paper, strategies and results on university level are presented, having in mind that constituent units have their strategies in plan as well. Strategies on units' levels should be in accordance with guidelines set on university level. Furthermore, previous research generated multiple criteria for e-learning implementation. (Begičević, et al., 2007) listed five strategic areas to be considered in framework for decision making on e-learning implementation: (1) strategic readiness for e-learning implementation, (2) basic ICT infrastructure for e-learning, (3) specific ICT infrastructure for e-learning, (4) legal and formal readiness for e-learning implementation, and (5) human resources. Analysis in this paper will be made to review whether these strategic areas are covered in universities' strategies to evaluate extent and quality of strategies. By searching web pages of Croatian universities, it was found that all universities do have a strategy in place. To a certain extent, ICT and e-learning is covered in all of those strategies. Here, strategies at four the largest Croatian universities are examined. TEMPUS project EQIBELT strongly influenced e-learning presence and growth in Croatian universities. The project was conducted between 2005 and 2008 and achieved multiple outcomes, including several e-learning strategies, such as "Vision and Mission of E-learning at the University of Dubrovnik", "University of Zagreb E-learning Strategy 2007-2010" and "Strategy of E-learning Implementation on University of Rijeka, 2006-2010" (EQIBELT, n.d.)

2.1 University of Zagreb

University of Zagreb is the biggest University in Croatia, currently enrolling over 60000 full-time undergraduate and postgraduate students and consists of 33 constituent unites. (University of Zagreb, n.d.). Having this in mind, it is expected that it has developed strategies for multiple areas of development, including e-learning. University of Zagreb's e-learning strategy for 2007-2010 (prolonged until 2013) listed strategic goals that should be accomplished by introducing and actively using e-learning: (1) enhance the quality of higher education, (2) enable teachers and students to accomplish new roles in educational process, (3)

increase competitiveness of University of Zagreb and its study programmes, (4) enable students for using lifelong learning technologies. (Sveučilište u Zagrebu, 2007). The E-learning strategy was evaluated in 2012 by the University Committee for E-learning. The new strategy of e-learning has been incorporated into the Strategy for Teaching and Learning (2014-2025) as a separate topic with goals. One of three key strategic initiatives that should result in achieving University mission is "Encouraging creativity, innovation, and motivating learning environment". Within this initiative, 6 goals were formed, one of which is "Improving teaching quality and achieving learning outcomes by establishing appropriate level and quality of e-learning". (Sveučilište u Zagrebu, 2014)

2.2 University of Split

University of Split has created a strategy for 2015-2020, in which numerous strategically important initiatives are covered. Strategic areas for University of Split are: (1) Science and research, art and creativity, (2) Students, study programs, and student standard, (3) University in my environment, and (4) University organization. Within the area students, study programs, and student standard, a strategic goal covering e-learning is stated: "University of Split is planning and conducting lifelong learning programs and distance learning programs", within which two tasks are formed: (1) "To increase percentage of teaching content that students can follow using e-learning" measured by percentage of subjects that have at least 25% content covered with e-learning teaching content and (2) "To organize a joint e-learning system on University level", measured by a clear Yes or No answer (Sveučilište u Splitu, 2015). In addition to the multi-year strategy, an Action plan for 2016 is in place at University of Split. This action plan is listing roles and responsibilities of each of constituent units in regards to the strategic goals and tasks set in front of the University. In regards to the tasks related to e-learning at University of Split, 9 constituent units are dedicated to actions in 2016 to enable fulfilling these tasks (Sveučilište u Splitu, n.d.)

2.3 University of Rijeka

University of Rijeka has several strategies covering e-learning in place. During the time national survey in 2013 was conducted, University of Rijeka already had e-learning strategies in place (for 2006-2010 and for 2011-2015). Main goals of implementing e-learning, as described in Strategy for implementing e-learning at University of Rijeka, are (1) Applying internet based ICT to assist in delivering teaching in study programmes and lifelong learning programmes, (2) Changing teaching methodology; moving from traditional teaching to acquiring knowledge actively, for which e-learning will create better conditions, and (3) Opening University's possibilities to target its activities towards new groups of students. Goals for 2011-2015 strategy were built upon achievements in the earlier period, main goals being, summarized: (1) Improving the quality of university education through developing e-learning application of high quality, (2) Enabling students for lifelong learning through university education, availability of new technologies and by applying new teaching methods, and (3) Creating possibilities to direct University's activities to new target groups by developing programs supported by distance learning. To achieve these goals, University of Rijeka is focused on four main strategic areas and goals within those areas (Sveučilište u Rijeci, 2011). In addition to this strategy, e-learning is an integral piece of the current strategy at University of Rijeka, segment Education; where one of the goals is increasing e-learning participation in study programmes (Sveučilište u Rijeci, 2014).

2.3. University of Osijek

University of Osijek currently has a strategy for 2011-2020 that covers e-learning, in place. One of the strategic areas in this strategy is "Human and Material Resources", in which e-learning is covered. This segment is mostly focused on building a joint information and communication system at the University, which is followed by the set goal. When it comes to e-learning, there is a set goal to "improve existing systems of e-learning and encourage development of new methods and tools for electronic and distant learning" (University of Osijek, 2011). It is unclear if there are further steps, activities or strategic areas to focus on to achieve this goal.

3 Survey Results – analysis

In general, HEI's strategic documents are based on internal and external factors that affect HEI, which is why a thorough analysis of internal factors needs to be made before forming a long-term strategy that can best address opportunities, but also problems and threats. Ministry of Science, Education and Sport (MSES) and University Computing Centre (SRCE) conducted a national survey on applying ICT and e-learning technologies in educational processes in HE institutions, between March and May 2013. The goal of this survey was to evaluate the state of the art, which would become a foundation for strategic planning, as well as creating further activities in improving HEI in Republic of Croatia. (Srce, 2013). The questionnaire was sent to HEIs that were asked to return it via post. It was composed of three main sections: (1) state of the art at the HEI (36 questions with the goal of evaluating current state of e-learning implementation and factors related to it), (2) expected gains from e-learning at the HEI (24 questions that marked benefits of e-learning that were evaluated for

its importance on the scale do 1-5), and (3) e-learning plans at the HEI (11 questions to examine future plans in field of e-learning). HEI is referred to a single constituent unit within a certain university. Introduction included clarification of main terms, and section 4 allowed input of further notes. Project "Development of a methodological framework for strategic decision making in higher education - a case of open and distance learning implementation" (project HigherDecision) is funded by Croatian Science Foundation (HigherDecision, n.d.). MSES gave permission to the project HigherDecision team in 2015 to analyse the gathered data. Detailed results from the survey on University of Zagreb level, published on University's website, were added to the research results as well (Sveučilište u Zagrebu, 2013). In national research 163 HEI were invited to participate in research and 119 of them did, which makes response rate 73,00%. SRCE was removed from analysis. Constituent units from all universities participated in research, with different participation rate in each of universities. Highest participation rate is seen in universities of Zagreb and Pula, where all constituent units participated in research. Figure 1 shows these rates. In addition to these universities, Media University (not existing any more) and Croatian Catholic University have participated in the research and International University in Dubrovnik did not participate.
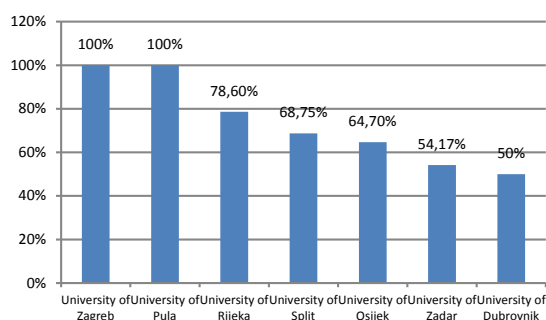

Figure 1: Participation of universities' constituent units *(Srce, 2013)*, *(Sveučilište u Zagrebu, 2013)*

Polytechnics and colleges have also participated in the research. Out of 15 targeted polytechnics, 12 responded to the survey (80%) and out of 30 targeted colleges, 22 colleges responded (73.33%). Survey was filled by vice-deans for academic affairs, or heads of departments in charge of academic affairs (delegated by board members in each university's component), on each constituent unit. Results of this survey are extensive and multiple analyses can be conducted. As mentioned, this paper focuses on qualitative data analysis.

3.1 Overall results

3.1.1. State of the art

The first section of the survey gathered information on the current state of ICT adoption and e-learning implementation at HEI in Croatia. The attitude of HEI governance towards e-learning (ICT) in improving the educational process is important. This research has shown that the attitude of HEI governance towards this matter in Croatia is mainly positive. 76% of participating institutions' governance says that the contribution of ICT to improving the educational process is crucial or essential. Overall, the contribution is seen as extremely important, and the only university whose constituent units perceive this role as irrelevant is University of Split. When further asked to evaluate the current state at HEI for use of e-learning, overall results still show good readiness (74% say that the state is extremely favourable or favourable), as shown in Figure 2, where numbers of institutions opting for each answer is shown.
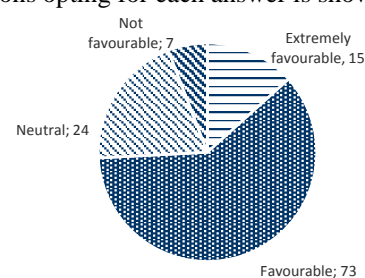

Figure 2: Current state at HEI for e-learning implementation *(Srce, 2013)*, *(Sveučilište u Zagrebu, 2013)*

Results of this national survey show that the overall attitude of teachers towards the above is extremely positive or positive (64%), where the best overall attitude (and use of ICT in teaching) is seen at constituent units of Universities of Osijek and Rijeka. New generations of students usually have positive attitude towards ICT use in education, as ICT has penetrated majority of the regular everyday activities students undertake. Out of surveyed HEIs, 83% feel that attitude of students towards e-learning is positive or extremely positive. Results indicate that the overall attitude of students toward e-learning is more positive than teachers' attitude. Attitude towards e-learning among teachers and students is aligned in constituent units of Universities of Rijeka and Osijek (overall positive), while discrepancies can be found in Universities of Dubrovnik and Pula where there are HEIs whose teachers rarely apply ICT in teaching (33,3% and 20%, respectively), but students' attitude is mostly positive or eventually neutral. LMS (Learning Management System) is an important factor in successful ICT implementation in HE setting. It is therefore encouraging to know that a great majority of HEIs questioned, do have an LMS in use. However, LMS usage differs between constituent units in different universities. Overall use of LMS in HEI across Croatia is shown in Figure 3. Most popular LMS available in individual HEI is Moodle. LMS is

widely used, while VLE (Virtual Learning Environment) is not. Both of the terms are defined in the survey, which diminish the doubt of not having these systems clearly defined.
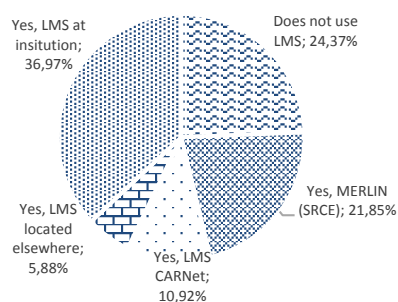

Figure 3: LMS use in HEI *(Srce, 2013)*, *(Sveučilište u Zagrebu, 2013)*

Even though strategies put in place before conducting this survey emphasize the importance of human resources development, majority of HEIs do not evaluate the contribution of teachers in applying e-learning in class. 78% of HEIs do not evaluate this contribution, with University of Dubrovnik's components having that percentage at 100. The research mission of HEI covers criteria for promotion of researchers (Begičević, et al., 2010). Evaluating teachers' contribution in applying e-learning can be an important addition to these criteria. Strategies often cover processes for enabling students to access the digital resources. According to this state of the art analysis, 63% of HEIs have enabled access to digital library/textbooks and other digital educational materials for their students. Important factor in successful e-learning implementation and one of strategic areas in this process (Begičević, et al., 2007) is infrastructure; basic ICT infrastructure for e-learning covers network infrastructure, teachers and students being equipped for e-learning, managed learning environments, and equipped classrooms for e-learning, while specific infrastructure for e-learning covers library management system, exam management system, video and audio streaming, production of video and audio materials, and system for simulation and virtual environment.
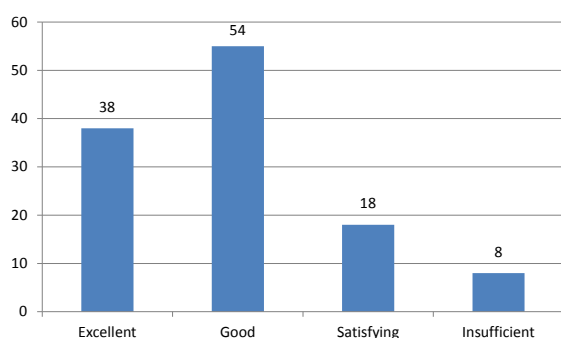

Figure 4: Technical conditions for ICT/e-learning implementation for teachers. Evaluation (Srce, 2013),
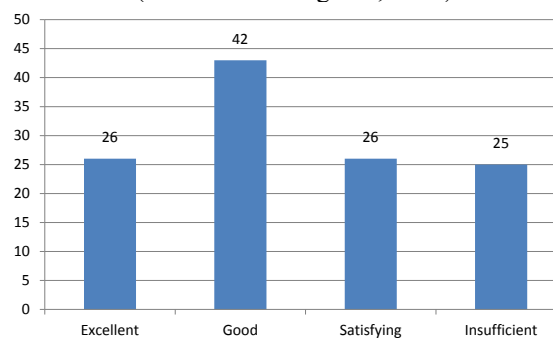
(Sveučilište u Zagrebu, 2013)

Figure 5: Technical conditions for ICT/e-learning implementation for students. Evaluation *(Srce, 2013)*, *(Sveučilište u Zagrebu, 2013)*

It is noted that the perception is that technical conditions are different when it comes to students and teachers, as shown in Figures 4 and 5. Available conditions for students are not evaluated as high as conditions for teachers, but students still have a better attitude towards e-learning.

Complex budgeting is a factor that HEIs have in mind when planning and executing activities related to advancing the learning process, curriculums, teacher education and more. The results of this research show that 84% of survey respondents do not have a dedicated fund for applying e-learning and developing e-learning resources. Three levels of applying e-learning in teaching are defined by University of Zagreb and were included in the survey (with definitions). Basic level (level 1) characterizes basic information about a subject, access to teaching materials, facilitated student-teacher communication, including web, e-mail, e-learning system, and forum. Middle level (level 2) characterizes integration of e-learning system with classic classroom training. Technologies used in level 2 e-learning are e-learning system, e-portfolio system, webinars, and videoconferences. Finally, high level of applying e-learning in class (level 3) marks a shift in educational process, towards a student-centric model, by using e-learning system, videoconferences, webinars, e-portfolio, and other Web 2.0 tools (Povjerenstvo za e-učenje Sveučilišta u Zagrebu , 2009). In regards to particular levels of subjects delivered on constituent units, it is estimated that approximately 86% of them has a certain level of e-learning applied. This is a very high percentage and the authors are suggesting further research in this area. The least represented level is level 3. Introducing higher level of applying e-learning is an opportunity for HEI to develop in this area.

Overall qualitative analysis resulted in several additional conclusions. In HEIs that participated in this research, students' attitude toward e-learning is in general more positive than teachers' attitude. Open access educational materials are rarely published by HEI and more than half of teachers do not use open educational content. Also, social networks in

education are rarely used. In addition to current state, plans in area of e-learning were examined in this survey. It is encouraging that most of the survey respondents' institutions did plan to: (1) create a strategic document that will cover e-learning, (2) financially support development projects in e-learning, (3) use e-learning technologies for creating study programmes that will be delivered mainly online, (4) use e-learning technologies to create study programmes in area of lifelong learning, (5) use e-learning technologies to enter international education market with online study programmes.

3.1.2. Expected gains from e-learning

Through the national survey on ICT and e-learning technologies application in HE educational process, the importance of aspects and possible contributions of e-learning in a certain HEI was evaluated. Figure 1 shows highest ranked advantages/contributions of e-learning for HEIs surveyed. Maximum grade is 6.
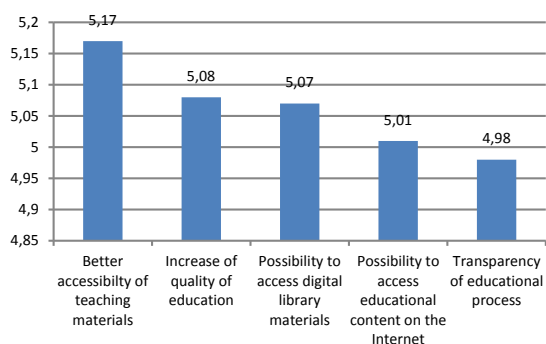

Figure 6: Gains of e-learning *(Srce, 2013)*, *(Sveučilište u Zagrebu, 2013)*

Highest ranked contribution/advantage of e-learning is better/higher accessibility/availability of teaching materials (anytime, anywhere). Most valued contributions are: better accessibility of teaching materials, increase of quality in education, possibility to access digital library materials, possibility to access educational content in the Internet, and transparency of educational process. Lowest ranked contributions of e-learning are: possibility to choose educational modules based on individual needs (average grade 4,17), enabling virtual contacts (communication) of students and teachers with industry experts/experts in practice (average grade 4,04), and possibility to assess knowledge and take exams in virtual environment (average grade 3,78). If a comparison between results and earlier research is made, certain similarities and differences are visible. For example, in *(Begičević, et al., 2007)* model for decision making on e-learning implementation was developed and a questionnaire that assessed importance of advantages and goals of e-learning implementation was created. Maximum available grade was 5. Results of that research have shown that the most important advantage of e-learning was accessibility of knowledge (average grade 4,68), flexibility of learning (average grade 4,48), and preparing students for life-long learning (average grade 4,28). In the nationwide survey, flexibility of learning and life-long learning preparation aspects were not the most important contributions, but did score relatively high (4,78 and 4,89, respectively). Comparing *(Begičević, et al., 2007)* and national survey results, it is visible that in 7 years (from 2007 to 2013) there hasn't been a significant change in expected gains from e-learning. The highest ranked benefit from e-learning is still accessibility of knowledge/teaching materials and flexibility of learning and life-long learning aspect of e-learning are still important gains from e-learning. Lowest ranked advantage of e-learning implementation in *(Begičević, et al., 2007)* is integration of mediums for disseminating information and presentation (average grade 3,97), that is indirectly evaluated in the national survey as well, through contributions such as "exploiting possibilities of new technologies in educational process", "possibility to attractively display teaching material (multimedia and visual)", and "enabling collaborative learning (communication with teacher and colleagues when working on the same problem/project)", all of which scored an average grade higher than 4 in the national survey.

4 Limitations and further research

There are several important limitations that need to be taken intro consideration when analyzing research results. The survey was filled by a single contact at a HEI which means that results may be biased. Also, it is not guaranteed that the individual filling the survey is completely familiar with all evaluated aspects. Further on, there is missing data in some of the filled surveys, which could, if complete, influence results. Survey was conducted in 2013, therefore an up to date analysis is not possible. This qualitative analysis is a foundation for further research and there are several suggestions for it. The research should be expanded to constituent units' level and strategies on this level should be evaluated. Further on, strategies on lower level should be related and compared to units' current state and plans in e-learning. It would be important to notice how big the proportion of constituent units that have strategies covering e-learning in place is and whether these strategies are aligned with guidelines and strategic plans on university level. Also, quantitative research should be made to evaluate correlations between several researched elements. Finally, as mentioned, universities' strategies should be evaluated to confirm whether they include strategic areas important for e-learning implementation, as covered in (Begičević, et al., 2007)

5 Conclusion

Strategic planning is a crucial element of higher education management. E-learning is one of the tools that enable HEI to fulfil their strategic missions and goals, while being one of those goals itself. Croatian HE system is made of units that can be loosely connected set of constituencies. Whether an institution is a constituent unit of an integrated or non-integrated university plays an important role in forming and implementing its strategy. Non-integrated universities in Croatia in general have strategies covering e-learning in place, which serve as guidelines and often binding document for constituent units. National survey on ICT and e-learning application was conducted in 2013 and showed that the current state of e-learning application in Croatia reveals room for progress, even though 86% of subjects at respondents' institutions do use a certain level of e-learning. Also, level of e-learning application differs among constituent units of different universities. Comparing national survey results with earlier research, such as (Begičević, et al., 2007), shows that, when it comes to e-learning, the emphasis in a Croatian HEI is still on the static component of e-learning (such as delivery of material) and often providing a supplement for traditional classroom teaching, rather than opening new aspects of teaching and collaboration that e-learning offers. To echo this, expected gains from e-learning that are ranked the lowest in the survey, are those providing new and creative ways of use of e-learning. Further work is required to put in use additional ways of exploiting e-learning resources in HEI. A strategic approach to revert to limitations and negative elements of current state of ICT application is crucial to build a long-term sustainable ecosystem for teachers and students to benefit from ICT and e-learning as such.

Acknowledgments

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