

Teacher Competencies for Incorporating ICT into Classroom Practice: A Survey from Slovenia

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One of the outstanding goals of a knowledge-based society is to enable everyone access to information and communication technology (ICT). This requires teachers to take on new tasks and respond to new demands. With regard to the above, we were interested in the use of ICT in classroom practice of Slovene teachers. The results based on a survey administered to a sample of 468 educational staff, mostly classroom teachers, show only a medium use of ICT in classroom practice. It is used mostly for revision and consolidation of the subject matter, and motivation of pupils, and less for examination and assessment of knowledge. We can conclude that training teachers for the use of ICT, which started in Slovenia in the seventies, yielded some positive results, while the development of competencies for using ICT in classroom practice is a process which has to be continued both with pre-service and in-service teachers.
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Key words: teachers, competencies, classroom practice, information and communication technology (ICT)

Anotácia: *Kompetencie učiteľa pre začlenenie IKT do vyučovacej praxe: výskum v Slovinsku. Jedným z mimoriadnych cieľov vedomostnej spoločnosti je umožniť každému prístup k informačným a komunikačným technológiám (IKT). Od učiteľov sa preto požaduje, aby prijali nové úlohy a reagovali na nové požiadavky. V tomto rámci nás zaujímalo, ako učitelia v Slovinsku používajú IKT vo svojom vyučovaní. Výskumu sa zúčastnilo 468 učiteľov, väčšinou učiacich vo svojej triede všetky predmety. Výsledky ukázali priemerné využívanie IKT vo vyučovaní; IKT sa využíva najmä pri kontrole ovládania učiva žiakmi a pri jeho upevňovaní ako aj pri motivovaní žiakov. Naopak, málo sa používa pri skúšaní a kontrole vedomostí žiakov. Možno konštatovať, že výcvik učiteľov v používaní IKT, ktorý sa začal v Slovinsku v sedemdesiatych rokoch minulého storočia, priniesol isté pozitívne výsledky, avšak proces rozvoja kompetencií používať IKT vo vyučovaní musí pokračovať, a to ako u študentov učiteľstva tak i u učiteľov v praxi.*

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Kľúčové slová: učitelia, kompetencie, vyučovacia prax, informačné a komunikačné technológie (IKT)

Introduction

With informatisation, the knowledge-based society has put forward new demands for teachers. It has brought about a certain revolution in teaching as well as a revolution in learning (Cohen, Manion, Morrison, 1996, p. 15). A competence based teacher profile has been developed, which includes, as one of the three key teacher competencies, the capacity of using ICT in classroom practice. The necessary teacher competencies are: work with others, with knowledge, technology and information, and work within and for society (Common European Principles for Teacher Competencies and Qualifications, 2004). Our research focused on the competence of Slovene teachers in their use of ICT in classroom practice; how frequently it is used and in which phases of the teaching process. We were also interested to know whether there are differences in the use of ICT in terms of teacher's gender and age, since there is a belief that younger teachers are more skilled in the use of ICT than older ones and that men are better at using technology than women.

Teacher Competence Profile

European Union documents place great emphasis on teacher education and training (European Report...2000, p. 6). There are of course differences among European countries in terms of the duration of studies and in the relationship between the theoretical and practical part of education. What is common to both, however, is the need for higher qualification of teachers, where one should focus on their ongoing professional development. In the modern knowledge based society, the teacher not only transfers knowledge, but acts as a moderator, organiser of an encouraging learning environment, mentor and promoter of independent learning etc. He therefore needs to be trained for lifelong learning and has to know how to train his/her students or participants in education to do the same. Teacher profession has thus become a profession which successfully masters the teaching process and is capable of reflection, research and modification of teaching practice in the direction of higher quality and efficiency. Modern society enables teachers to be more mobile and to work within different cultures. It also demands of them to be more flexible and to respond to the needs and expectations of their learners and society in general.

The ability to "work with knowledge, technology and information" is one of the three key competencies listed by the Common European Principles for Teacher Competencies and Qualifications (2004), which require teachers to be capable of accessing, analysing, evaluating, reflecting and transferring knowledge with effective technology, while their know how of ICT enables them to effectively include ICT into their classroom practice. At the same time, the document requires teachers to be able to steer their learners in the right

direction and help them with networks and virtual learning environments of cooperation and learning. Teachers are required to develop new competencies if they want to teach their students in the right way (Dawson, 2004), and in order to successfully apply ICT into their classroom practice, they have to be not only technologically competent but also information literate.

The European Commission document, entitled the Common European Principles for Teacher Competencies and Qualifications (2004), presents the common European principles referring to the teacher profession, which is a profession based on good education, embedded in the framework of lifelong learning, mobile and based on different partnership liaisons. It highlights the key teacher competencies, which the DeSeCo Project has classified in three broad categories (The Definition and Selection on Key Competencies, 2005). In the document it is said that individuals need to be able to use a wide range of tools for interacting effectively with their environment: both physical ones such as information technology and socio-cultural ones such as the use of language. They need to understand these tools well enough to adapt them for their own purposes and to use them interactively. In an increasingly interdependent world, individuals need to be able to engage with others and interact in heterogeneous groups. They also need to be able to take responsibility for managing their own lives, place their lives in the broader social context and act autonomously. These categories are interrelated, and collectively form a basis for identifying and mapping key competencies.

Competence category 1, which is relevant for our research, is using tools interactively (The Definition and Selection on Key Competencies, 2005). This document explains that using tools interactively requires more than having access to the tools and the necessary technical skills. Individuals need to create and adapt knowledge and skills which requires a certain familiarity with the tool itself as well as the understanding of how it changes the way one can interact with the world and accomplish broader goals.

In 1999, Finland defined ICT competencies at three levels: elementary, advanced and special competencies (Ristimäki et al., 2006). Almost all special competencies, i.e. the competence for participatory learning and teaching and for one's own development (participating in web communities), innovative work with ICT and research, for creativity in the development of digital learning multimedia sources and materials, have since then become the basic competencies teachers use in teaching and learning, for evaluating their own teaching practice, as well as for their professional development.

The development of competencies begins during initial teacher education, while further on the responsibility for the development and quality of competencies becomes part of the ongoing teacher education and training. In Slovenia, the Ministry of Education and Sport is responsible for ongoing

professional teacher training, and every year it offers different programmes of such training. In the seventies, special programmes of computer literacy, intended for professionals to use ICT in education, were introduced to equip teachers with computer literacy. Recently, attention has been focused on training models with emphasis on a long term training process rather than on one time seminars only (Istenič Starčič, 2008).

New ICT competencies for teachers include new knowledge, skills, actual use in practice as well as a different understanding of the whole ICT issue. Teachers need to change their understanding of the school as a place where knowledge is acquired. Instead, they should see it as a place where one learns how to learn (Tareef, 2005, p. 55).

Modern society encourages and tries to develop new partnerships, which function at different levels. Within institutions, there are liaisons in form of team or participatory work, which includes joint planning, joint execution of classroom practice and joint evaluation of results and work. It is the use of ICT in classroom practice that impacts team work, because it brings together teachers of different study areas, including computer technicians. With ICT support, teachers can interact with other teachers. Through the Internet, intranet, e-mail, websites, etc. they can communicate and present opinions or express attitudes and in this way enrich their everyday teaching, be it preparation, execution or evaluation of classroom practice.

The Use of ICT in Classroom Practice

In teaching, the learner-centred approach or the approach "from teaching to learning" has been gaining ground. Within this approach, the role of ICT is relevant for encouraging learning at the level of the curriculum as a whole and for all the subjects, not only at the level of individual subjects, with the fundamental skills of the knowledge-based society being incorporated. ICT has all the potentials for promoting the learner centred approaches, for interactive abilities, for creativity based on multimodal use of audiovisual communication means which enable the development of basic – transferable competencies (such as communication, participation, critical thinking, problem solving, learning to learn) in all learners and in all subject areas. In this way the learners can adopt a more active role in knowledge acquisition and become more responsible for their own learning. They can even become experts in a certain area. The teachers, on the other hand, need to become more sensitive to the individual needs of their pupils and have to provide for good leadership and support in the learning process.

The advantages of using ICT in classroom practice are also in the achievement of interdisciplinary goals (Tong, Trinidad, 2005). With the use of ICT, the learners acquire different competencies formerly connected with

individual subjects. Learners can collect data in cross-subject areas, analyse and organise them, present their results, participate with their peers and in this way acquire various social skills. ICT also enables the production of authentic work (ibid.) since learners can create their own web site, make and write their own postcard etc.

There are, however, also some objections to the use of ICT in classroom practice. These claim that learners using ICT in class do not learn the subject matter because they focus on the visual effects and graphics (Jones, 2006), that authenticity is sometimes questionable, the richness of expression of pupils decreases as does the use of libraries etc (Young, 2005).

ICT is an important factor and should not be disregarded in today's society. We need to change our mind set, moving from learning with computer support (behaviouristic model) to the social and constructivist model of ICT use, which sees teaching and learning in a transformational role of changing one's understanding and personality (Dawson, 2004).

Research on ICT use in Classroom Practice in Slovenia

We have already mentioned that ICT does have some tradition in the Slovene school system and that it has become indispensable in everyday life. In our survey we sought to answer the following questions: (1) how ICT is actually used, (2) in which phases of the teaching process it is used the most frequently, (3) whether there are differences in the ICT use in terms of gender, and (4) whether younger teachers use ICT more frequently than older ones etc.

The data were collected with the questionnaire which included numerical 5-points scales ranging from 5 (major use) to 1 (minor use) and some closed and open ended questions. Reliability of the questionnaire (Cronbach alpha) was 0.95.

The Sample

The questionnaires were completed by 468 educators, of which 89.9 % were classroom teachers (who teach all subjects), 5.5 % were subject teachers, 4 % were pre-school teachers and only 0,7 % of respondents were pedagogues who do not teach pupils (e.g., social workers, psychologists etc.). Since classroom teachers prevailed and since the survey focussed on them, we will continue using the term classroom teachers, taking into account the fact that the number of other respondents was insignificant.

As for the qualification and education of participants, the majority had university education (251 or 55.9 %). The proportion of teachers with a higher education degree was smaller (192 or 42.8 %), while the number of participants with secondary education only was the smallest, only 6 or 1.3 % (one was a classroom teacher and the other five pre-school teachers). These numbers show

that at the classroom level of primary education there are more teachers with university degrees than with only higher education degrees and that those with only secondary education are an exception and are mainly pre-school teachers.

According to our expectations, the majority of respondents were women (435 or 95.2 %) with a far smaller proportion of men (22 or 4.8 %). Less than half the men were employed at the classroom level, more than half at the subject level and none of them were either pedagogical staff or teachers at the pre-school level.

The average age of the respondents was 38.4 years, ranging from 23 to 60 years, standard deviation being 7.98. For data processing purposes we divided the teachers into three groups, the younger teachers (from 23 to 30 years), middle aged teachers (from 31 to 45 years) and older teachers (from 46 to 60 years).

The average number of years of service was 15.1 years, ranging from 1 to 40 years of work in school, the standard deviation here being higher, 9.04.

Data processing

The paper presents the results expressed in descriptive and bivariate statistics. The t-test for independent samples was used, and the variance analysis was used under the assumption of equal variance. In some sections of the text the results are illustrated by verbal statements of respondents in the survey.

Results and Interpretation

Teaching Methods

In the Table 1 we can see that according to respondents ICT is used mostly for consolidation (Mean = 3.52) and revision (Mean = 3.45) of the subject matter. The results confirm the opinion of some experts (Batagelj, 1999) that ICT is more appropriate for the deepening and consolidation of pupils' knowledge and for the individualisation of classroom practice.

A similar finding was in other studies where the majority of schools used ICT for practicing and not for the construction of knowledge (Law et al., 2000; Tong and Trinidad, 2005). Brown (2000) claims that we need to find out the purpose behind the use of ICT, whether it is for the construction of knowledge with the support of technology or only for compiling information with the help of the computer. Our results show that the average use of ICT in the explanation of new subject matter is somewhere mid-range (Mean = 2.78), which points to a certain concordance of concerns about what the teachers might have had in mind as the explanation of new subject matter or the compilation of data or the construction of knowledge. It is believed (Lonergan, 2004) that when ICT is used for more demanding purposes it has a positive effect on pupils' learning. This author also discovered that teachers in less

developed schools use ICT for revision and drill more than for research and communication, the latter being more frequently the case in better developed schools. The approach can be justified on the assumption that pupils first have to develop the lower learning strategies through practice in order to reach higher learning activities. Unfortunately these pupils often do not have the opportunity to make progress in the development of higher knowledge levels. The author believes that lower and higher levels of knowledge and thinking are not separated and that effective classroom practice has to take this into account and combine both levels of learning and knowledge.

Table 1: Differences in the use of ICT according to aims of instruction and the teacher's gender

Use of ICT for:	Mean	Gender	n	Mean	SD	Levene's test		t-test		
						F	R	t	df	2p
motivation	3.08	W	430	3.09	1.04	0.685	0.408	-0.621	450	0.535
		M	22	3.23	1.11					
explanation of subject matter	2.78	W	426	2.77	0.95	0.045	0.832	-0.895	446	0.371
		M	22	2.95	1.09					
consolidation	3.52	W	428	3.53	1.14	1.772	0.184	1.017	448	0.310
		M	22	3.27	1.31					
revision	3.45	W	427	3.46	1.15	2.010	0.157	1.287	447	0.199
		M	22	3.14	1.36					
examination	2.22	W	427	2.20	1.14	3.815	0.051	-1.169	447	0.243
		M	22	2.50	1.44					
assessment	1.89	W	426	1.88	1.05	1.716	0.191	-1.326	446	0.186
		M	22	2.18	1.22					

Note: W – women, M – men; the scale ranged from 5 (major use) to 1 (minor use); n – number of respondents; SD – standard deviation; F-value; t-value; df – degrees of freedom; 2p – statistical significance

In our research, sufficient representation of ICT was reached for the motivation of pupils for learning (Mean = 3.08). Brown (2000), for example, presents five ways of learning: (1) learning through work, (2) learning through research, (3) learning by reflection, (4) learning by construction, and (5) learning through visualisation with the support of ICT, which is based on the visualisation supported by the use of video and television. This kind of learning provides for more motivation. A similar opinion was expressed by some of the teachers using ICT in their classroom practice. It is believed (Henigsmann, 2009) that learning with computer support enables the search for information. It focuses on the process and not solely on the results of learning. An example is given (ibid.) that in Slovene pupils learning bears a negative connotation and releases negative feelings since it is connected with a sedentary position behind a desk covered with books and is accompanied by the fear of lack of knowledge. On the other hand, pupils find learning with the help of a computer more

interesting and diverse. One teacher from our sample expressed an opinion that: *"When using a computer, pupils are more motivated and more interested. Perhaps the reason for this is the fact that in schools computer is still some kind of novelty and pupils have not as yet got used to it. They are bored by the frontal teaching method."*

Another opinion: *"All these years schools have been using the same teaching aids – blackboard and chalk and (if the children are lucky) also a poster or two. Such lessons are monotonous, and towards the end of the year the children become bored. The ideal solution would be to enhance classroom practice by using diverse teaching aids, something that is not so very ordinary and in this way draw the attention of the children and get them to work. Then they could remember the new subject matter better and find the lessons more attractive."* In order to reduce the monotony of lessons as much as possible, the Slovene schools are increasingly implementing interactive blackboards.

There was, however, also a contradictory opinion: *"It is difficult to motivate some pupils for a specific task, because they only want to play games (on the computer)." This shows that motivating pupils is not easier with the help of the computer, and it has to be carefully planned, as well as other activities on the computer so that pupils do not switch over to the use of the computer they are well acquainted with in their spare time.*

The lowest average results were achieved for the examination (Mean = 2.22) and assessment of knowledge of pupils (Mean = 1.89), although there was also the opinion that ICT is: *"very useful for examination or consolidation"*.

There is some assumption that ICT is not suitable for "alternative conceptions" of education, e.g. for Waldorf schools. However, one of the teachers at the Waldorf school wrote: *"Teachers at the Waldorf school are using ICT a great deal. Without the Internet it is almost impossible to survive nowadays ... in this way we gain information and knowledge which we pass on to our pupils."*

One can speculate about what the teachers had in mind while answering the questionnaire items; whether they understood ICT to be a means for writing and making copies of written tests or whether they had in mind new ways of examination and assessment, such as portfolio and other substitutions of paper-and-pencil tests.

Teachers included in the survey believe that the use of ICT for the examination and assessment of knowledge of pupils is closer to the information society where authentic assessment is carried out (Tong and Trinidad, 2005) and also: *"It is the computer that is examining the pupils and not the teacher."*

Interactive blackboards offer teachers numerous possibilities for quick and simple examination of pupils if, of course, the teachers are able to use them for

this purpose. Unfortunately, there are still many teachers who focus more on learning how to use the technology and not on how to use the technology for learning (Brown, 2000).

Differences between Female and Male Teachers

Our results (Table 1) show that in terms of gender, no statistically significant differences have been found between teachers, though the arithmetic mean is higher with men (with the exception of consolidation and revision).

This is in contrast with some of the past research which has shown that women use the Internet less than men (European Report on Quality Indicators of Lifelong Learning, 2002, p. 57). The data of the Statistical Office of the Republic of Slovenia showed only a relatively lesser use of the Internet by women than by men (44.4 % men as opposed to 42.0 % women who use the Internet). According to the Eurostat research, the differences between the genders in the use of the Internet are decreasing (Statistics in focus ..., 2007). The results of the research on the digital divide in Europe point to a decrease of the digital divide between the genders (Statistics in focus ..., 2005). Similar results were found in the research about the use of ICT in Slovene households from 2004 (Uporaba..., 2005).

Differences in terms of Teachers Age

Table 2 shows that there was no statistically significant difference in terms of teachers' age and their use of ICT in classroom practice. The use of ICT in classroom practice is probably the result of systematic computer literacy programmes in Slovenia. The result can also be confirmed by the number of pedagogies attending programmes of ongoing teacher training. The research, carried out in Slovenia in 2004/05 found that even the pedagogical workers with several years of work were attending education and training programmes and no decrease in attendance was noted, on the opposite, the numbers were increasing, which we attributed to "renewed susceptibility to influence." (Cencič, Polak, Devjak, 2005, p. 106)

In connection with the above, it is not surprising that the variance analysis did not show any statistically relevant differences between the participating teachers and the use of ICT in classroom practice with regard to the work they perform and the level of their qualification. We can conclude that the training of teachers for the use of ICT brought about positive results but that the development of the competence for using ICT in class is a process which needs to be continued at the undergraduate as well as postgraduate levels of studies, and it has to continue within ongoing professional teacher education and training programmes of information literacy, focusing especially on the task of how to best include ICT in classroom practice. ICT is not only a means of motivation but rather a means for designing or constructing new knowledge

and should therefore be implemented at all levels of the educational process; in the process of the acquisition of new knowledge, for its consolidation, examination and assessment.

The results in Table 2 are interesting since they are different from those of some other research (e.g., Lonergan, 2004), where younger teachers, who had grown up using the computer and were introduced to its use, use ICT more than their older colleagues. In the already mentioned research about the use of ICT in Slovene households (Uporaba..., 2005) the data showed that the computer and the Internet were mostly used by the young persons in the household and that with age the use tended to diminish.

Table 2: Results of the variance analysis in terms of teacher's age

Use of ICT for:	Teacher's age	n	Mean	SD	Levene's test for equality of variance			Variance analysis		
					F	df ₁	df ₂	p	F	p
motivation	younger	101	3.00	1.077	0.009	2	442	0.991	0.785	0.457
	middle a.	318	3.10	1.041						
	older	26	3.27	0.962						
	total	445	3.09	1.045						
explanation of subject matter	younger	100	2.80	0.995	0.136	2	438	0.873	0.130	0.878
	middle a.	315	2.78	0.945						
	older	26	2.69	1.011						
	total	441	2.78	0.958						
consolidation	younger	101	3.44	1.252	2.184	2	440	0.114	0.386	0.680
	middle a.	316	3.53	1.111						
	older	26	3.62	1.203						
	total	443	3.52	1.148						
revision	younger	101	3.31	1.223	0.688	2	439	0.503	1.016	0.363
	middle a.	315	3.50	1.133						
	older	26	3.46	1.174						
	total	442	3.45	1.156						
examination	younger	101	2.06	1.121	0.395	2	439	0.674	1.316	0.269
	middle a.	317	2.26	1.174						
	older	24	2.33	1.167						
	total	442	2.22	1.163						
assessment	younger	100	1.77	1.004	0.770	2	438	0.464	1.370	0.255
	middle a.	316	1.94	1.082						
	older	25	1.72	0.891						
	total	441	1.89	1.056						

Note same as with Table 1

This was confirmed by some of the statements in our survey, as for example: *"Similar to other teachers, I was not too enthusiastic about the use of ICT in school. At least not at the beginning. But the reason was myself. I believe that people have difficulties accepting change, which is especially true if one is ignorant in the area. When I became skilled in the use of ICT and when I learned more about it, I started implementing it in the educational*

process. It is mainly the older teachers who are "afraid" of it. They think it is very complicated and therefore tend to reject it..."

Or: "Younger teachers feel close to this kind of work and so they use it regularly. Only few of the teachers (older ones) are still not using modern technology – problem of adjustment."

And: "Older teachers are afraid of using ICT - especially the computer and the Internet. The younger teachers use them more frequently."

Certain international studies (European Report on Quality Indicators of Lifelong Learning, 2002, p. 57-58) claim that older persons (55 years or older) exhibit more limitations in the use of ICT than other generations and the access to the Internet differs with regard to the degree of education. However, the Scottish research on the use of ICT for teaching purposes at the primary school level found out that the use of ICT was not connected with the teacher's age (Williams et al., 1998). Similarly, the SITES study from 2006 showed that with the natural sciences and mathematics teachers the use of ICT was not related with their age.

Conclusion

When looking at the questionnaire data, we have to admit both advantages and limits of this research method. Questionnaire is a perfect instrument for gathering data with large samples of respondents. However, investigators are unable to check the validity of the respondents' answers. The questionnaire answers were declarations of respondents of their use of ICT, and we had no proof of what teachers really use in their classrooms. This is a limitation of our data.

It is said that computers are the most patient of teachers (Jasim, 2002). We do not advocate the opinion that because of this characteristic we should use them instead of teachers, but rather that teachers should, where appropriate, implement them into their classroom practice. Of course, there remain certain tasks where the use of "paper and pencil" method will continue to be preferred. We can also agree with the opinion of Dawson (2004, p. 408) that ICT is only a tool and that effective teaching still depends heavily on the teachers teaching with heart. The author stresses that we need good teachers and not only good tools.

This is the reason why teachers must be competent for work with ICT and why they must use it not only as a means of motivation or for revision and consolidation, which is the practice in Slovene schools according to their opinions, but for the development or construction of knowledge, which, as the results have shown, is not as yet sufficiently present. The results from the survey have shown that the development of competence for using ICT in classroom practice is a process. The Bologna reform process in Europe places

great emphasis on the subjects of educational technology as well as on the general and specific ICT competencies within individual subjects. At the postgraduate teacher education study level the opportunities for research work in the area of ICT have also been provided.

The role of the teacher in class is changing. The new role or new roles are far more demanding because the teacher constantly has to upgrade his/her knowledge and has to follow the changes and prepare for work differently. It is here that ICT can be of great assistance; it can facilitate organisational tasks, help in the preparation of stimulating learning environments by using the multimedia, through liaisons and cooperation at the work place and also externally through the exchange of know-how and experiences.

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