TEACHERS FROM PRIMARY EDUCATION ABOUT THE IMPLEMENTATION OF ICT IN THE TEACHING PROCESS

Vera Stojanovska
University "Ss. Cyril and Methodius", Faculty of Philosophy – Skopje,
Institute of Pedagogy, Republic of Macedonia
veras@fzf.ukim.edu.mk

UDK: 373.3.011–3 –051:37.091.3-028.27

Abstract

Since the beginning of the XXI century our country, as one of the countries in transition, has been facing many requirements for whose realization restructuring of some segments of the society is necessary. One of these segments is education. That's why many project activities have been realized in this period, in the function of the strategically defined reform interventions in the sphere of education. In general, their goal has been modernization of the education through fitting-out the schools with modern teaching tools and training the teachers so that to be capable of implementing modern teaching technologies. Within this framework, various trainings for the teachers have been conducted, for the purpose of providing a more quality teaching process with the implementation of information-communication technologies (ICT).

Taking into account the many activities realized so far in the function of implementing ICT in the teaching, we considered important to get empiric findings regarding the relevant issues which, directly or indirectly, elucidate different aspects of ICT's implementation in the process of education.

Therefore, the object of this research is the implementation of ICT in the teaching process of primary education. The research objective is getting insights about and showing the current state of ICT's implementation in the teaching, based on the attitudes and opinions of the teachers directly involved in the educational process. For collecting the empiric data needed, we used the technical of questionnaires. The research covered 160 teachers from a several primary schools in R. Macedonia.

The results obtained give certain answers regarding some aspects of ICT's implementation in the teaching process and the problems the teachers face in the process.

Key words: *ICT, teaching process, teachers, primary education.*

1. Introduction

The awareness about the need of introducing ICT in the educational process in R. Macedonia, and consequently the beginning of this idea's materialization, date from the end of the XX and the beginning of XXI century, when more and more scientific papers were written in which ICT's worth and advantages were stressed from the aspect of modernizing the processes of studying and instructing during the curriculum, and when the preparations for monitoring the realization of the e-Schools project started.[101] Before starting the realization of this project, an experts' team was established whose task was to get insights about the actual situation in the schools in R. Macedonia regarding their outfitting with ICT and its utilization, the teachers'

[101] The project e-School was realized in the period 2003–2008, with the goal of enabling the use of ICT by teachers and students and creating an educational portal which would connect the schools, as communities, in one common, virtual working environment.

qualifications for using ICT in the teaching process, ICT's presence in the educational programmes and informatics school subjects' presence in the educational plans, and so on. The analysis of the data obtained showed that a very small number of schools were equipped with ICT, moreover – some of the computers were of little use, having obsolete operative systems and programmes, and were used exclusively for the purposes of the teaching in informatics school subjects. Also, there was found a very poor level of teachers' skills in using ICT, ICT's absence in the particular school subjects' programmes, a lack of educational software's and of teaching e-materials in Macedonian language and the languages of other ethnic communities which would be in the function of realization of the educational goals in particular school subjects, as well as obsolete themes in the teaching programmes in informatics school subjects.

After such an unsatisfactory situation in our schools had been found regarding our schools' fitting out with ICT and the implementation of ICT in the teaching process, a number of activities started which stressed more than ever the need of implementing ICTs in all the spheres of education and ways were looked for on how to integrate ICT in the educational process. Namely, in this context a few strategic documents were brought where the strategic goals of the process of ICT's implementation in the primary education were defined and was provided for a number of reform interventions with defined dynamics of realization. These documents are: "*National Programme of the Development of Education in the Republic of Macedonia (2005–2015*)", *"National Strategy for Information Society Development and the Action Plan of the Republic of Macedonia"* and *"A Strategy for Developing e-teaching materials 2010–2015".*

For achieving the goals defined in these strategic documents, a number of measures were incorporated in the documents, most of them being realized through various kinds of project activities directed towards providing the schools with the necessary infrastructure, computers and Internet connections, training the teachers for using ICT for the purposes of the teaching, and providing educational computer software's. Of those project activities, as the more important ones we shall mention the USAID projects "e-Schools" (2002–2008) and "Primary Education Project (PEP)" (2006–2011) – especially its component "*Improving the Use of ICT in Schools*", and the Macedonian government's project "*Computer for Every Pupil*" (2006–2012).

By these project activities as well as the other measures realized by various government and non-government organizations, the following results were achieved: at the end of 2005 the first educational software in Macedonia was adopted and adapted, called ToolKid, implemented in all the schools subjects taught in I, II, III, IV and V grades of the nine-year primary education; in 2007, the first educational web-portal in Macedonia (www.schools.edu.mk) of the then Ministry of Science was created and put in use;[102] a sufficient number of personal and portable (Classmate) computers were provided for the students in both primary and secondary schools as well as Internet connections for each school; a series of trainings for the teachers from primary and secondary schools were conducted for achieving basic or advanced ICT skills, trainings in integrating specific software solutions into the educational process (Windows tools, Edubuntu tools, ToolKid, etc.), trainings in creating web-sites (Mambo) and performing Internet search, trainings in innovative use of ICT such as computer control, robotics, electronic music and recording video and audio materials; digitalized teaching materials were provided for realization of the teaching programmes in geography, maths, physics, chemistry, biology and other school

[102] Stojanovska, V. (2013). A national strategy and project activities for implementation of ICT in primary education. International Scientific Symposium: Education between tradition and modernity, Faculty of Philosophy, University "St. Cyril and Methodius", Skopje.

subjects taught in both primary and secondary education, and the teachers were trained how to successfully integrate them in the educational process.

2. Research objectives ans methods

Taking into account the many activities done so far in the function of ICT's implementation in the teaching process, we considered important to obtain empiric data about various issues that, directly or indirectly, elucidate different aspects of ICT's implementation in the educational process. In this case we considered it was the best the implementation of ICT in the teaching process to be perceived through the prism of the teachers, who in fact are the most important factors directly involved and in some way the most responsible for successful implementation of ICT in the educational process, and are the most competent to speak about some problems they meet in its implementation in the teaching practice.

For that purpose we polled 160 teachers (both class teachers and subject teachers) from 12 primary schools, of which 6 from the area of the city of Skopje and 6 from the interior of the country.[103] The questionnaire, specially created for the poll, had a total of 15 questions, most of them being of closed type offering a number of options for answer, the others being of open type where the teachers were let to freely express their opinions.

3. Results ans discussion

In the following part of the paper are tabularly presented, analyzed and interpreted the answers obtained to some of the questions given in the questionnaire, which we thought are the most closely related to the problem studied.

From a few years ago, the teachers are obliged to carry out 30% of their lessons using ICT. That's why of particular interest for the investigation was to find out how often they perform the teaching by using ICT. The results obtained on this issue are shown in Table 1.

Table 1. *Teachers' answers to the question how often they do the teaching with the use of ICT*

Options for answer	**Class teachers**		**Subject teachers**		**Total**	
	f	%	f	%	f	%
Once a week	27	33.75	40	50.00	67	41.88
More than once a week	41	51.25	21	26.25	62	38.75
Once a month	12	15.00	19	23.75	31	19.37
Total	80	100.00	80	100.00	160	100.00

$\chi^2 = 10.554$ df=2 $p<0.01$

From the answers obtained, we can see that most of them (41.88%) conduct the teaching by the implementation of ICT once a week, 37.75% do this more than once a week, and only

[103] In our educational system, a class teacher is the one who teaches all the school subjects only to one class, at the same time being its teacher-in-charge. Class teachers are engaged only in the grades I to V of primary education. A subject teacher is a specialized teacher and teaches one school subject (sometimes two, or a few similar), to many classes in different grades. Subject teachers are engaged in the grades VI to IX of primary education.

19.37% once a month. But, if we view the answers from the aspect of who gives the answer, it's obvious that most of the class teachers (51.25%) use ICT in the teaching more than once a week, while most of the subject teachers (50.00%) use ICT once a week. So, we can conclude that class teachers are those who more often use ICT in the teaching process. According to the obtained value of the χ-square test, which is statistically significant, there is a big difference in the practice of using ICT in the teaching process between class teachers and subject teachers.

In the research we also tried to find out in what type of lessons the teachers most often use ICT. Their answers to this question are shown in Table 2.

Table 2. *Teachers' answers to the question in what type of lessons they most often use ICT*

Options for answer	Class teachers		Subject teachers		Total	
	f	%	f	%	f	%
Introductory lessons	0	/	0	/	0	/
Lessons for presentation of a new teaching material	39	48.75	43	53.75	82	51.25
Lessons for exercising	5	6.25	11	13.75	16	10.00
Lessons for reviewing the already taught teaching material	8	10.00	13	16.25	21	13.12
Lessons for checking up the students' knowledge	2	2.50	2	2.50	4	2.50
Lessons of combined type	26	32.50	11	13.75	37	23.13
Total	80	100.00	80	100.00	160	100.00

$\chi^2 = 9.716$ df=4 $p<0.05$

From the data shown we can see that the teachers most frequently (51.25%) use ICT in the lessons where some new teaching material is presented to the students, 23.13% use ICT in the combined lessons, 13.12% in the lessons for reviewing old teaching materials, 10.00% in the lessons for exercising, and only 2.50% in the lessons for checking students' knowledge. It is worth mentioning the fact that none of the teachers in the poll answered that he/she most often uses ICT in the introductory lessons. According to the obtained value of the χ-square test, which is statistically significant, there are substantial differences between the answers given by class teachers and the answers given by subject teachers.

Also, of interest for the investigation was to find out what form of organizing the teaching with the use of ICT the teachers most often implement in their practice.

Table 3. *Teachers' answers to the question what form of organizing the teaching with the use of computers they most often use*

Options for answer	Class teachers		Subject teachers		Total	
	f	%	f	%	f	%
Each student works on one computer	20	25.00	26	32.50	46	28.75
Two students work on one computer	30	37.50	32	40.00	62	38.75
A number of students work on one computer	28	35.00	16	20.00	44	27.50
Only I work on a computer	2	2.50	6	7.50	8	5.00
Total	80	100.00	80	100.00	160	100.00

$\chi^2 = 6.118$ df=3 $p>0.05$

From the results obtained we can conclude that the teachers implement different forms of organizing the teaching with the use of computers. Namely, the largest part of the polled teachers (38.75%) most often use the method of work in pairs i.e. when the students work in pairs on the same computer, 28.75% of the teachers practice the method of individual work i.e. when each student works on one computer, 27.50% of the teachers practice the group work i.e. when a group of students work on the same computer, whereas only 5.00% of the teachers are the only ones who work on computer during the lessons. Also, we can see that there is no difference in this case between class teachers and subject teachers, since the obtained value of the χ-square test is not statistically significant.

The questionnaire also contained a question about that for what purpose they use ICT in the curriculum. The answers are given in Table 4.

Table 4. *Teachers' answers to the question for what purpose they most often use ICT in the teaching*

Options for answer	Class teachers			Subject teachers			Total		
	f	%	R	f	%	R	f	%	R
Creation of teaching materials	51	63.75	4	42	52.50	5	93	58.12	5
Presentation of a new teaching material	47	58.75	7	39	48.75	6	86	53.75	7
Creation of tests and control works	53	66.25	2	54	67.50	2	107	66.88	2
Keeping pedagogical records	51	63.75	4	36	45.00	7,5	87	54.38	6
Preparations for the lessons	49	61.25	6	46	57.50	4	95	59.38	4
Electronic portfolio on the students	20	25.00	9	15	18.75	9	35	21.88	9
Search for and use of Internet materials for the purposes of the teaching	61	76.25	1	58	72.50	1	119	74.38	1
Electronic communication with the colleagues, parents and students	36	45.00	8	36	45.00	7,5	72	45.00	8
Creation of presentations	51	63.75	4	53	66.25	3	104	65.00	3

$\rho = 0.838$ $df=7$ $p<0.05$

From the data given in the table, it is obvious that the teachers most often use ICT when searching for and using Internet materials for the purposes of the teaching, also for preparing tests and control works for the students, while most seldom for keeping electronic portfolios about their students and for electronic communication with the colleagues, parents and students. It is also interesting the fact that less than half of the teachers use the means of e-communication with the colleagues, students and parents. According to the obtained value of the ρ-coefficient of correlation, which is 0.838 and statistically significant, there is no difference between class teachers and subject teachers regarding this issue.

In our research we wanted also to find out teachers' opinion on whether ICT is of help for more successful realization of the set goals of the teaching. Here are the answers:

From the data given in the table, we can conclude that a very high percentage of the teachers (86.25%) think ICT helps for achieving the goals set, while a very low percentage think ICT is of no help. There is no difference between the opinions of class teachers and subject teachers on this issue – they have surprisingly identical opinions. This indicates that the teachers think ICT is supportive for the more successful realization of the defined teaching objectives.

Table 5. *Teachers' opinions on whether ICT is of help for more successful realization of the set goals of the teaching*

Options for answer	Class teachers		Subject teachers		Total	
	f	%	f	%	f	%
Yes	69	86.25	69	86.25	138	86.25
No	11	13.75	11	13.75	22	13.75
Total	80	100.00	80	100.00	160	100.00

To us it was also interesting to find out what approaches they most often use in the lessons where ICT is used. The answers are given in Table 6.

Table 6. *Teachers' answers to the question what approaches they most often use in the lessons where ICT is used*

Options for answer	Class teachers		Subject teachers		Total	
	f	%	f	%	f	%
The students *watch* electronic material provided by the teacher	47	58.75	24	30.00	71	44,38
The students *work* on a model (electronic material) provided by the teacher	24	30.00	36	45.00	60	37,50
The students *create single-handed* their own electronic products	9	11.25	20	25.00	29	18.12
Total	80	100.00	80	100.00	160	100.00

χ^2= 14.022 df=2 p<0.01

From the data given in the table, we can see that 44.38% of the teachers said that in their lessons with the implementation of ICT their students most often *watch* e-material provided by the teacher, 37.50% said that their students most often *work* on a model (e-material) provided by the teacher, while 18.12% of the teachers usually let the students *create single-handed* (i.e. without teacher's interference) their own e-products. But, from the aspect of who gives the answer, we can see that most of the class teachers use to let the students *watch* e-material provided by the teacher, whereas most of the subject teachers let the students *work* on a model (e-material) provided by the teacher. According to the obtained value of the χ-square test, there is a substantial difference between class teachers and subject teachers regarding this issue.

In our research we were especially interested in finding out whether ICT's implementation in the teaching is a burden to the teachers. Here are the answers:

Table 7. *Teachers' answers to the question whether ICT's implementation in the teaching is a burden to them*

Options for answer	Class teachers		Subject teachers		Total	
	f	%	f	%	f	%
Yes	48	60.00	27	33.75	75	46.88
No	32	40.00	53	66.25	85	53.12
Total	80	100.00	80	100.00	160	100.00

χ^2= 11.068 df=1 p<0.01

From the data given in Table 7, we can see that the answers of the class teachers differ from those of the subject teachers. Namely, more than a half of the class teachers (60.00%) said that the implementation of ICT in the teaching is a burden, whereas more than a half of the subject teachers (66.25%) said it isn't. To this attests the obtained value of the χ-square test, which is statistically significant.

Plus, the teachers who answered that the implementation of ICT was a burden, were asked to specify in which of their activities they were burdened more. Most of the examinees (57.33%) answered they were equally burdened during both the preparations for and the realization of the lessons.

For successful realization of the teaching process with the implementation of ICT, also important are the conditions in which the teaching is performed. That's why one of the questions was intended to find out the teachers' opinions on whether the classrooms are suitable for teaching with the use of ICT. The answers are given in Table 8.

Table 8. *Teachers' answers to the question whether their classrooms have appropriate conditions for teaching with the use of ICT*

Options for answer	**Class teachers**		**Subject teachers**		**Total**	
	f	%	f	%	f	%
Yes, there are appropriate conditions	19	23.75	30	37.50	49	30.62
There are no appropriate conditions	54	67.50	42	52.50	96	60.00
I cannot decide	7	8.75	8	10.00	15	9.38
Total	80	100,00	80	100.00	160	100.00

χ^2= 4.066 df=2 p>0.05

As we can see from the table, 60% of the teachers think that their classrooms don't have the appropriate conditions for teaching with the use of ICT. A much lower percentage (30.62%) think the classrooms have the appropriate conditions, while 9.38% cannot decide on that. The value of the χ-square test, which is 4.066 and therefore isn't statistically significant, indicates no major difference between the answers given by class teachers and those given by subject teachers.

Regarding the conditions for performing the teaching process teaching process with the implementation of ICT, we were interested to find out whether the teachers had any problems while performing teaching activities. The answers are given in Table 9.

Table 9. *Teachers' answers to the question whether they have any problems in performing teaching activities where ICT is involved*

Options for answer	**Class teachers**		**Subject teachers**		**Total**	
	f	%	f	%	f	%
Yes, always	23	28.75	14	17.50	37	23.13
Yes, sometimes	56	70.00	61	76.25	117	73.12
No, never	1	1.25	5	6.25	6	3.75
Total	80	100.00	80	100.00	160	100.00

χ^2= 5.068 df=2 p>0.05

As we can see from the table, the highest percentage of both class teachers and subject teachers said they sometimes had certain problems. There is no significant difference between the answers given by class teachers and those given by subject teachers, for the obtained value of the χ-square test (4.897) is not statistically significant.

In the questionnaire there were also two questions where the examinees were asked to state the reasons which make impossible or difficult ICT's implementation in the teaching process and to state what they thought it was necessary to do so they could more frequently use ICT in the teaching. These questions were of open type, i.e. the teachers were free to express what they thought, without any suggestions or limitations about the formulation of their answers. In their answers to the question what makes impossible of difficult ICT's implementation in the teaching process, the teachers gave a number of reasons, and here we shall quote only those stated by most teachers: there aren't enough computers; Internet connection is not available in every classroom or at any time; weak, poor-quality Internet connection; obsolete versions of the operative and applicative programmes installed in the computers; not having enough time for quality presentation of the school subject materials by using ICT; a part of the time for the lesson is wasted for placing and plugging the computers; time is lost when the teacher must download the material in each computer in the classroom; attrition of the batteries of Classmate portable computers; there are not enough sockets in the classrooms for plugging in the computers; the educational software ToolKid doesn't function; the use of a computer operative programme not customary in our country (Linux), instead of Windows.

In their answers to the question asking to state what they thought was necessary to do so they could more frequently use ICT in the teaching process, the teachers gave many suggestions, of which we shall mention only these: available computers and space for work, lesser number of students in one class; equipping only a few classrooms, but with modern ICT; the schools to be provided also with other kinds of additional IC equipment (LCD projectors, smart boards, portable computers for each student from the upper grades, tablets, robotlets, printers, auxiliary equipment for the students with special needs, etc.); providing a stable Internet connection in each classroom, for having access to the Internet at any time; to improve the network system; the teacher's computer to be directly connected with the computers of the students, for quicker and easier sharing the materials; regular maintenance, servicing and upgrading of the computers, and providing complete technical support; engaging a qualified technician, if possible in each school, for servicing the computers; installation of the operative system Microsoft in the computers; preparing reading books with digitalized material, especially in the school subjects from the field of social sciences; to provide maintenance and enrichment of the current educational portals with new and quality e-materials for each school subject; to provide appropriate education of the teachers for advancing and upgrading their ICT skills.

4. Conclusion

The results obtained with the research depict the situation regarding ICT's implementation in the teaching process, seen from the aspect of the teachers in primary education. Based on that, we can draw the following conclusions:

- In general, the teachers do think ICT is helpful for more successful realization of the teaching process;
- Class teachers use ICT in the teaching process more often than their subject colleagues;

- Most of the teachers use ICT mainly in the lessons where new educational materials are presented;
- The teachers use many forms for organization of the teaching implementing ICT;
- The teachers use ICT most often in searching for and using Internet materials needed to perform the teaching process (for finding new teaching materials, for creating tests and control works for the students), and least often for keeping electronic portfolios about the students, for e-communication with the colleagues, students and parents, as well as for presentation of the teaching material;
- Most of the class teachers (60.00%) think the implementation of ICT in the teaching process is a burden, while the subject teachers think the opposite (66.25%);
- Most of the teachers (more than a half) think that in the classrooms there are no conditions appropriate for the realization of the teaching using ICT.

Further, based on these results we can make the conclusion that for the goal of improving the quality of ICT's implementation in the teaching process, it is necessary: to provide the schools with all the necessary ICT equipment; to provide ceaseless Internet connection; to continuously follow up the teachers' needs for improving their ICT skills and to accordingly organize adequate trainings; to enrich the current educational portals with new and quality e-materials in all the school subjects, thus providing a wider choice; to develop digitalized materials of various types for the purposes of the teaching process, for each school subject; to create mechanisms for stimulating the teachers to use ICT more frequently.

References

1. Ala-Mutka, K., Redecker, C., Punie, Y., Ferrari, A., Cachia, R., Centeno, C. (2010). The future of learning: European teachers' visions report. Report on a foresight consultation at the 2010 eTwinning conference, Sevilla, 5–7 February 2010. http://ipts.jrc.ec.europa.eu/publications/pub. cfm?id=3679. Accessed June 2014
2. Dede, C. (2010). Comparing frameworks for 21st century skills. In: Bellanca J, Brandt R (eds) 21st century skills: rethinking how students learn. Solution Tree Press, Bloomington, pp 51–76
3. European Schoolnet (2013). Survey of schools: ICT in education [online]. http://essie.eun.org. Accessed June 2014
4. Information and communications tehnology (ICT) Briefer (2009). U.S. Agency for International Development, www.usaid.gov
5. Извештај за реализирани обуки со наставниците во основното и средното образование. (2010). Скопје: Биро за развој на образованието.
6. Information and communications tehnology (ICT) Briefer, (2009) U.S. Agency for International Development, www.usaid.gov
7. Kozma, R. B. (ed) (2003). Technology, innovation and educational change: a global perspective. International Association for Technology in Education, Eugene.
8. Наставен план и програми за деветгодишното основно образование, Skopje: Биро за развој на образованието.
9. Националната програма за развој на образованието во Република Македонија 2005-2015. (2006) Скопје: Министерство за образование и наука на Република Македонија.
10. Национална стратегија за развој на информатичко општество и акционен план на Република Македонија. (2005) Скопје: Влада на Република Македонија.
11. Национална стратегија - Стратегија за развој на е-содржини 2010-2015 (2010). Скопје: Министерство за информатичко општество.
12. Програма за развој на ИКТ во образованието. (2009). Скопје: Биро за развој на образованието.
13. Состојбата со е-учењето во Македонија. (2011). Скопје: Фондација Метаморфозис.
14. Stojanovska, V. (2010). Implementation of ICT in the Education of the Republic of Macedonia. 13th International Conference: ICT in the Education of the Balkan Countres. Varna: Balkan Society for Pedagogy and Education, BASOPED – BG.
15. Stojanovska, V. (2013). A national strategy and project activities for implementation of ICT in primary education. International Scientific Sympoosium: Education between tradition and modernity, Faculty of Philosophy, University „SS. Cyril and Methodius" Skopje.
16. UNESCO (2008). ICT competency standards for teachers. United Kingdom.
17. Употребата на компјутери и интернет во образовниот ситем на РМ. (2010) Скопје: Донација Институт отворено општество - Македонија; Фондација Метаморфозис.
18. USAID Primary Education Project, Fourteenth Quarterly report, January-March 2010, Under Cooperative Agreement No.165-A-00-06-00101-00, Submitted by: Academy for Educational Development (AED) with: Macedonia Civic Education Centre (MCEC) and Indiana University.
19. Sharples, M., et al. (2012). Innovating Pedagogy makers. Milton Keyne: Open University.
20. Veletsianos, G. (2010). A definition of emerging technologies for education. In G. Veletsianos (Ed.), Emerging technologies in distance education. (pp. 3–22). Athabasca, CA: Athabasca University Pres.
21. Weaver, B. E., & Nilson, L. B. (2005). Laptops in class: What are they good for? What can you do with them? New Directions in Teaching and Learning, 101, 3–13.