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## **EXAMINATION OF ATTITUDES OF COMPULSORY EDUCATION TEACHERS IN THE REPUBLIC OF CROATIA TOWARD THE INTEGRATION OF ICT TECHNOLOGY IN DAILY WORK**

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**ABSTRACT:** There are a number of measurement instruments in the field of education the aims of which are to measure various aspects of educational technology. The instrument that we used in this study is a survey of social and technical factors affecting teachers' use of technology designed by E. Papanastasiou and C. Angeli in 2008. The sample of this study included 413 teachers teaching in public elementary schools in Zagreb. The aim of this study is to show social and technical factors that play an important role in the successful integration of ICT in schools and to answer the question to what extent and how each of these factors affects the successful integration of ICT in schools.

**Key words:** Teachers' use of ICT, social factors affecting teachers' use of technology, technical factors affecting teachers' use of technology, public elementary schools in Zagreb

### **INTRODUCTION**

ICT has changed the processes of teaching and learning and has had a significant impact on education. The use of ICT in education in a productive way can be influenced by many factors. One of these factors is teachers' attitudes toward the use of technology in the teaching and learning processes. Rogers' Innovation Decision Process Theory [21] states that an innovation's diffusion is a process which occurs over a time period through five stages: Knowledge, Persuasion, Decision, Implementation and Confirmation. Accordingly, "the innovation-decision process is the process through which an individual (or other decision-making unit) moves (1) from initial knowledge about an innovation, (2) toward forming an attitude toward the innovation, (3) the decision of either adoption or rejection, (4) implementation and (5) confirmation of this decision" [21]. This theory explains how teachers' attitudes have either a direct or an indirect influence on the teachers' use of technology in classrooms [20].

Zhao and Cziko are of the opinion that aspects of individual attitudes are the main factors influencing a teacher's use of ICT [27]. The teachers must be convinced that the use of technology can help achieve learning objectives but also lift the learning process to a higher level. Many studies confirmed that the important predictor of future ICT use were teachers' attitudes toward it ([25], [16], [1], [15], [3], [14], [26]). Researchers ([23],[4]) found that certain teachers' attitudes are obstructions to the successful integration of ICT in schools. According to Kersaint et al. [12] teachers who have positive attitudes toward technology feel more comfortable using it and usually incorporate it into their teaching. It was also found that personal characteristics such as age and teaching experience had a negative correlation with attitudes whereas gender and teaching methods were found to be insignificant as predictors of teachers' attitudes toward ICT [24].

Teachers' attitude toward technology can predict teacher and student technology use, but also the use of various instructional methods ( $p < 0.05$ ). Sang et al. [25] focused on the impact of Chinese student teachers' gender, constructivist teaching beliefs, teaching self-efficacy, computer self-efficacy, and computer attitudes on their prospective ICT use. The findings confirmed the results of the study by Palak and Walls [16], that the strongest predictor of future ICT use were teachers' attitudes toward it.

One other aspect which has an influence on the adoption and use of ICT among teachers is computer self-efficacy [20], which refers to the ability of applying one's skills when using technology for broader tasks. A

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greater sense of computer self-efficacy has been shown to influence individuals' choice regarding computer usage and adoption in general. In the case of teachers, research suggests that a strong sense of computer self-efficacy among teachers affects how often and the way ICT is used in everyday instructional practice ([5],[6],[18]).

Research on teachers' use of ICT in education suggests that attitudes have either a direct or indirect influence on a teachers' use of technology in classrooms. The direct influence of attitudes can be categorised into two groups: attitudes toward technology ([8],[22]) and attitudes to ICT use in education ([2],[1],[9],[11],[19]). One example where attitudes have an indirect influence on ICT use in education is given in the research conducted by Cox, Preston and Cox [7] in which attitudes seemed to influence teachers' motivation to use ICT. According to the authors, motivation is a factor which exerts a direct influence. Teachers' attitude toward ICT will also promote innovative use of ICT [10]. Positive attitudes to ICT and its use in education are often considered as enabling factors and negative attitudes as disabling factors ([10],[13],[19]). There seems to be some lack in data however on the link between the attitude toward use of ICT in school and ICT in daily work. According to some researches there seems to be a link between the self-efficacy theory and attitudes to ICT use as positively related to experience. It can be concluded that familiarity with technology use makes people regard ICT use more positively, which also results in a greater feeling of self-efficacy [18].

## **METHODS**

### **Research aim**

The aim of this research was to examine attitudes of compulsory education teachers in the Republic of Croatia toward the daily use of ICT in teaching.

### **Research problem**

- To determine descriptive values for teachers' attitudes toward the use of ICT in schools
- To determine if there's a correlation between teachers' working life and age, and their attitudes toward the use of ICT in schools
- To determine if there is any statistically significant difference between attitudes toward the use of ICT between teachers of compulsory education working in both lower and higher grades
- To determine correlation between weekly frequency of the ICT use in specific subjects and their attitude toward the ICT

### **Methodology and Sample**

Research instrument for this study was a questionnaire by Papanastasiou and Angeli[17]. The questionnaire was a part of a large research project and authors constructed it in 2008 for the needs of their studies. It consisted of seven sections: 1) demographic information related to teachers, 2) knowledge of computer software, 3) frequency of software use for personal purpose, 4) frequency of software use for specific subjects in classroom practise, 5) teachers' attitudes toward ICT integration, 6) teachers' perceived self-confidence in the ICT use, 7) school climate and technical support. For the purpose of this research we only used section 1, section 3 and section 5. All other sections except for section one consisted of a Likert-type scale, with possible answers: 1- completely disagree, 2-disagree, 3-neutral, 4-agree, 5-completely agree.

This research was conducted in the Republic of Croatia in 2013. The survey was done in 18 compulsory education schools in Zagreb, the capital of Croatia, where  $\frac{1}{4}$  of the global population of the Republic of Croatia lives. The sample consisted on the whole of 413 compulsory education teachers. Compulsory education in the Republic of Croatia lasts 8 years and it is divided into two stages- lower grades (from first to fourth) and higher grades (from fifth to eighth). The sample consists of 91,3 % of female teachers and 8,7 % of male teachers. 47 % teachers in lower grades 43,1 % in higher grades and 9,9 % in both lower and higher grades. The average teachers' age in the sample was 40,65, ranging from 24 to 65. Teachers who were tested have an average of 14,9 years experience in teaching, ranging from less than one year (only 2,7 %) to 45 years.

## **RESULTS and DISCUSSION**

**Table 1. Descriptive analysis of teachers' attitudes toward the use of ICT in schools (sample consisted of 410 teachers)**

Attitudes	Mean	Std. Deviation	Std. Error Mean
AT1	4,338	0,889	0,046
AT2	1,813	1,073	0,055
AT3	2,521	1,269	0,066
AT4	1,741	1,067	0,055
AT5	3,923	1,053	0,054
AT6	1,573	0,961	0,049
AT7	4,488	0,814	0,042
AT8	3,739	1,161	0,060
AT9	3,667	1,142	0,059
AT10	3,334	1,231	0,064
AT11	2,192	1,243	0,064
AT12	4,083	0,900	0,046
AT13	3,109	1,168	0,060
AT14	3,912	1,027	0,053
AT15	2,083	1,089	0,056

*LEGEND:* AT 1- I feel comfortable with the idea of the computer as a tool in teaching and learning, AT 2 - the use of computers in teaching and learning stresses me out, AT 3 - if something goes wrong I will not know how to fix it, AT 4 - the idea of using a computer in teaching and learning makes me skeptical, AT5- the use of the computer as a learning tool excites me, AT6- the use of computers in teaching and learning scares me, AT7 - the computer is a valuable tool for teachers, AT8- the computer will change the way I teach, AT9- the computer will change the way students learn in my classes, AT10- I can do what the computer can do equally as well, AT11- The computer is not conducive to student learning because it is not easy to use, AT12- The computer helps students understand concepts in more effective ways, AT13- The computer helps students learn because it allows them to express their thinking in better and different ways, AT14- The computer helps teachers to teach in more effective ways, AT15- The computer is not conducive to good teaching because it creates technical problems.

Following statements reflect positive teachers' attitudes: teachers feel comfortable while using computers as tools in teaching and learning, the computer is a valuable tool in teaching, the computer helps students learn because it allows them to express their thinking in better and different ways and it helps students understand concepts in more effective ways ( $M > 4$ ). Statements that reflect negative teachers' attitudes had a very low score, which in other words means that they are rarely present. Those statements that indicate moderately strong teachers' attitude toward the use of ICT are possibly showing that teachers are sceptical about computers helping students to understand concepts in a more effective way. This can point to moderately expressed belief that the computer will change the way students learn.

**Table 2. Correlation between teachers' attitudes toward the ICT use and age and work life (N=410)**

Attitudes	Teachers' age in years	Teachers' work life
AT1	<b>-,347**</b>	<b>-,350**</b>
AT2	<b>,356**</b>	<b>,327**</b>
AT3	<b>,301**</b>	<b>,252**</b>
AT4	<b>,212**</b>	<b>,175**</b>
AT5	<b>-,230**</b>	<b>-,242**</b>
AT6	<b>,295**</b>	<b>,258**</b>
AT7	<b>-,225**</b>	<b>-,244**</b>
AT8	-0,76	-0,70
AT9	-,058	-,033
AT10	,012	,016
AT11	<b>,334**</b>	<b>,311**</b>
AT12	-,066	-,050
AT13	-,017	-,014
AT14	<b>-,128**</b>	<b>-,130**</b>
AT15	<b>,230**</b>	<b>,210**</b>

\*Correlation is significant at the 0.05 level (2-tailed). \*\*Correlation is significant at the 0.01 level (2-tailed).

*LEGEND:* AT 1- I feel comfortable with the idea of the computer as a tool in teaching and learning, AT 2 - the use of computers in teaching and learning stresses me out, AT 3 - if something goes wrong I will not know how to fix it, AT 4 - the idea of using a computer in teaching and learning makes me skeptical, AT5- the use of the computer as a learning tool excites me, AT6- the use of computers in teaching and

learning scares me, AT7 - the computer is a valuable tool for teachers, AT8- the computer will change the way I teach, AT9- the computer will change the way students learn in my classes, AT10- I can do what the computer can do equally as well, AT11- The computer is not conducive to student learning because it is not easy to use, AT12- The computer helps students understand concepts in more effective ways, AT13- The computer helps students learn because it allows them to express their thinking in better and different ways, AT14- The computer helps teachers to teach in more effective ways, AT15- The computer is not conducive to good teaching because it creates technical problems. Out of 15 possible correlations between attitude toward the use of ICT and age, 10 are statistically significant. All statistically significant correlations are low and it can be generally said that age shows low correlation with attitudes toward the use of ICT in education. Principally older teachers show more negative attitudes toward the use of ICT in schools. Younger teachers seem to consider ICT as a valuable tool and that it can positively influence both teachers and pupils.

Similar correlations have been found in connection with work life. Out of 15 possible correlations between attitude and age, 10 are statistically significant. All statistically significant correlations have been found in the same attitude items, seem to be going in the same direction and show similar values, as it has been shown in the correlation analysis between the age and use of ICT in schools.

No statistically significant differences have been found in attitudes toward the use of ICT between higher and lower grades teachers, which leads us to the conclusion that all compulsory education teachers in Croatia have equally positive attitudes toward the use of ICT in schools (the results of the differences analysis have not been shown in tables because of the huge amount of data).

**Table 3. Correlation between teachers' attitudes toward the ICT use and weekly frequency of ICT use for specific subjects (N=410)**

	Math	Science	Art	Music	Physical Education	Croatian
AT1	<b>,142**</b>	<b>,153**</b>	,039	,015	,092	,141
AT2	<b>-,141**</b>	<b>-,133**</b>	-,039	-,017	,092	-,137
AT3	-,083	<b>-,125*</b>	-,067	-,071	<b>-,112*</b>	-,047
AT4	-,055	-,067	-,043	,017	-,071	-,047
AT5	,042	,089	<b>,100*</b>	-,032	-,063	,064
AT6	<b>-,132*</b>	<b>-,122*</b>	,042	-,032	-,063	-,142
AT7	,059	,041	,042	-,039	,041	,032
AT8	,025	,041	,062	-,011	-,014	,051
AT9	,024	,045	,079	-,003	-,025	,041
AT10	-,044	-,015	-,032	,004	-,008	,048
AT11	<b>-,111*</b>	-,062	-,023	-,068	,015	-,051
AT12	,010	,021	,047	-,054	-,017	-,047
AT13	-,032	-,081	-,025	<b>-,116*</b>	,032	-,073
AT14	,089	<b>,128*</b>	,095	-,002	,072	,076
AT15	<b>-,098*</b>	<b>-,103*</b>	-,074	,010	-,053	-,065

\*Correlation is significant at the 0.05 level (2-tailed). \*\*Correlation is significant at the 0.01 level (2-tailed).

LEGEND: AT 1- I feel comfortable with the idea of the computer as a tool in teaching and learning, AT 2 - the use of computers in teaching and learning stresses me out, AT 3 - if something goes wrong I will not know how to fix it, AT 4 - the idea of using a computer in teaching and learning makes me skeptical, AT5- the use of the computer as a learning tool excites me, AT6- the use of computers in teaching and learning scares me, AT7 - the computer is a valuable tool for teachers, AT8- the computer will change the way I teach, AT9- the computer will change the way students learn in my classes, AT10- I can do what the computer can do equally as well, AT11- The computer is not conducive to student learning because it is not easy to use, AT12- The computer helps students understand concepts in more effective ways, AT13- The computer helps students learn because it allows them to express their thinking in better and different ways, AT14- The computer helps teachers to teach in more effective ways, AT15- The computer is not conducive to good teaching because it creates technical problems.

Out of 15 possible correlations between attitudes toward the use of ICT in schools and the weekly frequency of ICT use for specific subjects, the largest number of statistically significant correlations have been found for Science (6), Maths (5), Art, Music and Physical Education (1), whereas no statistically significant correlations between attitudes and the weekly frequency of ICT use for Croatian. All statistically significant correlations are very low and it can be generally said that the weekly frequency of ICT for different school subjects shows low correlation between attitudes and the use of ICT in school in the desirable direction (positive attitudes toward the use of ICT, Table 3).

**Table 4. Correlation between teachers' attitudes toward the use of ICT and weekly frequency of common ICT software regardless of specific subjects (N=410)**

	MS Word	MS Excel	MS Power Point	MS Outlook	Internet Explorer	MS Access
AT1	,443**	,230**	,368**	,294**	,342**	,053
AT2	,368**	,206**	-,317**	-,218**	-,320**	-,066
AT3	-,300**	-,209**	-,270**	-,163**	-,239**	-,118*
AT4	-,243**	,051	-,193**	-,212**	-,284**	,031
AT5	,339**	,090	,279**	,212**	,269**	-,028
AT6	-,370**	-,214**	-,346**	-,226**	-,306**	-,092
AT7	,259**	,120*	,230**	,163**	,258**	-,099*
AT8	,206**	,132**	,201**	,075	,178**	,012
AT9	,170**	,100*	,185**	,096	,126*	,032
AT10	-,102*	-,064	-,105*	-,082	-,099*	-,038
AT11	-,388**	-,241**	-,373**	-,254**	-,338**	-,127*
AT12	,127*	,057	,139**	,072	,160**	,013
AT13	,070	,057	,184**	-,032	-,028	,156**
AT14	,277**	,160**	,281**	,170**	,247**	,078
AT15	-,268**	-,163**	-,240**	-,212**	-,261**	-,052

LEGEND: AT 1- I feel comfortable with the idea of the computer as a tool in teaching and learning, AT 2 - the use of computers in teaching and learning stresses me out, AT 3 - if something goes wrong I will not know how to fix it, AT 4 - the idea of using a computer in teaching and learning makes me skeptical, AT5- the use of the computer as a learning tool excites me, AT6- the use of computers in teaching and learning scares me, AT7 - the computer is a valuable tool for teachers, AT8- the computer will change the way I teach, AT9- the computer will change the way students learn in my classes, AT10- I can do what the computer can do equally as well, AT11- The computer is not conducive to student learning because it is not easy to use, AT12- The computer helps students understand concepts in more effective ways, AT13- The computer helps students learn because it allows them to express their thinking in better and different ways, AT14- The computer helps teachers to teach in more effective ways, AT15- The computer is not conducive to good teaching because it creates technical problems.

The correlation between teachers' attitudes toward the application of ICT in school and the weekly use of common ICT programs is mostly statistically significant and positive, but low. In other words the more teachers use a certain type of ICT programs the more positive attitudes toward the ICT use in school they show and vice versa. The lowest correlation has been found between attitudes toward the use of computers in schools and the use of MS Access.

**Table 5. Correlation between the teachers' attitudes toward the use of ICT in school and weekly frequency of specialised ICT programs use regardless of the school subject (N=410)**

	FIFA, Solitaire	MS Front Page	MS Publisher	Adobe Photo shop	(Logo, C)	Hyper Studio	Educational CDs	Kidspiration, Visio	Modelit, Stella, Electric Work bench	Stagnecast Creator, Interactive Physics
AT1	,149**	,095	,123*	,262**	,046	,040	,188**	,054	,061	,042
AT2	-,109*	-,059	-,029	-,163**	-,013	,009	-,152**	-,021	-,004	,003
AT3	-,201**	-,099*	-,122*	-,239**	-,110*	-,032	-,202**	-,091	-,041	-,052
AT4	-,110*	,018	-,018	-,086	,035	,129**	-,128**	,085	,120*	,127**
AT5	,083	-,025	,012	,138**	-,012	-,034	,160**	-,069	-,069	-,007
AT6	-,126*	-,081	-,086	-,224**	-,030	-,026	-,180**	-,068	-,013	,003
AT7	,043	,029	,009	,098*	-,009	-,067	,074	-,127*	-,054	-,052
AT8	,052	,080	,056	,181**	,088	,021	,096	,033	,078	,060
AT9	,053	,084	,068	,175**	,100*	,050	,076	,048	,094	,072
AT10	-,018	-,107*	-,042	-,135**	-,093	-,002	-,070	,022	-,011	,006
AT11	-,188**	-,100*	-,145**	-,204**	-,043	-,038	-,127*	-,109*	-,085	-,050
AT12	,074	,071	,037	,060	,109*	,004	,010	-,003	,019	,016
AT13	,018	,168**	,094	,121*	,197**	,161**	,02511	,140**	,197**	,177**
AT14	,010	,108*	,033	,117*	,137**	,076	,066	,025	,074	,042
AT15	-,156**	-,060	-,055	-,162**	-,063	,048	-,203**	-,002	,096	,062

LEGEND: AT 1- I feel comfortable with the idea of the computer as a tool in teaching and learning, AT 2 - the use of computers in teaching and learning stresses me out, AT 3 - if something goes wrong I will not know how to fix it, AT 4 - the idea of using a computer in teaching and learning makes me skeptical, AT5- the use of the computer as a learning tool excites me, AT6- the use of computers in teaching and learning scares me, AT7 - the computer is a valuable tool for teachers, AT8- the computer will change the way I teach, AT9- the computer will change the way students learn in my classes, AT10- I can do what the computer can do equally as well, AT11- The computer is not conducive to student learning because it is not easy to use, AT12- The computer helps students understand concepts in more effective ways,

AT13- The computer helps students learn because it allows them to express their thinking in better and different ways, AT14- The computer helps teachers to teach in more effective ways, AT15- The computer is not conducive to good teaching because it creates technical problems.

The correlation between teachers' general attitudes toward the use of ICT and the weekly frequency of specialised software use has been shown to be statistically less significant than between general attitudes and common software use. Statistically significant correlations are low to very low and moving in the expected direction: the more often teachers use a certain kind of specialised programs the more positive attitudes toward the ICT use he seems to show and vice versa. Correlation has been found most often between teachers' attitude toward the use of ICT and Photoshop, whereas it has been found less often between attitudes and the use of educational CDs and educational games. The largest number of statistically significant correlations has been found for the following attitude item: *the computer helps students learn because it allows them to express their thinking in better and different ways*.

## CONCLUSION

Croatian teachers have mostly positive attitudes toward the use of ICT in schools. Younger teachers and those with shorter work life seem to consider ICT as a valuable tool and that it can positively influence both teachers and pupils. No statistically significant correlation between the attitudes of lower and higher grades teachers, which leads us to the conclusion that all compulsory education teachers in Croatia have similar positive attitudes toward the use of ICT in compulsory education. Weekly frequency of ICT programs use for different school subjects show low correlation with attitudes toward ICT use in a desirable direction (positive attitudes toward the use of ICT). The more often teachers use a certain kind of ICT programs the more positive attitudes toward the use of ICT in school and vice versa. Finally it has been shown that more frequent use of certain kind of specialised ICT programs is connected with more positive attitudes toward the use of ICT in schools, although this tendency is less pronounced with regard to specialised software than with regard to common software.

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