

THE INFLUENCE OF TEACHERS' ICT CULTURE ON TEACHING

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Abstract: This paper deals with the concept of ICT culture in the school context in order to regard the problem of ICT integration in the educational system more completely. Analysing opinions and experiences of different authors, as well as through conducted research, the aim is to assess if teachers' ICT culture influences the change of the standard pedagogical practice. Research results point to a connection between teachers' ICT culture and frequency of use of ICT in teaching and the way in which they conduct classes when applying ICT.

I. INTRODUCTION

ICT culture research offer a more integral view of a man's relationship towards ICT in different forms of its application, towards digital sources of information and modern communication media, which is reflected in different ways in his personal, social and professional life.

Information society in which we live demands that educational institutions and their employees understand the life imbued with ICT, that is, to accept and develop the ICT culture [4] in order to become more familiar with the world of their pupils, the so called "digital natives" [6] and customize teaching and learning in accordance with necessities of the present time. It is a matter of building culture which promotes lifelong learning and dedication to innovative teaching by means and through the ICT.

Some authors express their disagreement with the widely accepted opinion that the application of ICT in schools depends solely on infrastructure and attending courses and point out that it is extremely important how an organisation/school supports the use of ICT as well as the viewpoints, convictions and values that individuals and organisations have in relation to it [3]. The point up to which teachers develop their ideas, accept innovations, that is, change their attitudes on the use of ICT in teaching and learning is determined to a great extent by their own ICT culture. According to [11], by encouraging the development of teachers' ICT culture, new methods of teaching and learning spread, the curriculum is enriched and the whole pedagogical context changed.

Research results presented in this paper will reveal if there is a connection between the level of teachers' ICT culture and changes in teaching as a consequence of the use of ICT.

II. ICT TEACHERS' CULTURE AS A MEANS TO CHANGE THE PEDAGOGICAL PRACTICE

"While the technology of the 20th century provoked a revolution in communications and brought to the information society, our educational institutions are still freezed in the industrial revolution. A university professor from the 19th century would probably feel at home in many our classrooms, although he maybe wouldn't know how to react when a student's mobile phone rings in the middle of his lecture".[1]

In order to become "learning organisations" schools, in which process the integration of the ICT into education is indispensable, require changes in the organisation and school management, alterations of organisational culture, curriculum, teaching and learning methods as well as the quality of teachers. The development of teachers' ICT competences is the first but not the only step in their professional development. Many have already recognised the need for teachers to understand the life permeated with ICT and know how to use ICT from the proper methodological point of view within the framework of curriculum improving in this way teaching and communication with pupils. Therefore, it is necessary to improve the level of teachers' ICT culture through gradual alteration of their habits and attitudes towards ICT in general and information and communication mediated through ICT, develop their knowledge and skills regarding the use of ICT and make available required resources.

According to [2], significant investments in teaching supported by ICT may be justified only if they result with important changes in the way of teaching. Teachers should be explained why it is important to use ICT, for which purposes and how it affects the way of teaching. It is very disappointing that teachers apply ICT retaining their old teaching materials based on outdated teaching strategies [10].

III. RESEARCH METHODOLOGY

The aim of the research is to determine the relationship between the teachers' ICT culture and their application of ICT in teaching, that is, the influence of teachers' ICT culture on the implementation and organisation of teaching.

The following hypotheses have been determined:

- There is a statistically significant difference between the level of teachers' ICT culture and the frequency of their application of ICT in teaching.
- There is a statistically significant difference between the level of teachers' ICT culture and the way of organisation and implementation of teaching featuring the use of ICT.

The research was conducted on a simple random sample of primary and secondary school teachers of the Istrian County in Croatia. The principal method of data gathering was polling and the questionnaire was completed by 320 teachers included in the sample.

The level of teachers' ICT culture was first determined by the questionnaire and then it surveyed the frequency of their use of ICT in the process of preparation and teaching implementation. It also surveyed the frequency of changes in the organisation and implementation of the teaching process in which the teacher uses ICT. A Likert scale was applied for the examination of frequency.

Data collected by polling were statistically analysed and the hypotheses were tested by means of the chi-square (χ^2) test.

IV. RESULTS AND ANALYSIS

The purpose of the ten polling questions was to assess to which extent teachers use ICT when planning and teaching. The participants had to choose among five levels of frequency (*1-never... 5-very often*) and the results were interpreted on the basis of descriptive statistics.

The arithmetic mean (3,65) of responses obtained from respondents suggests that teachers very often use computer for different activities when preparing for teaching. These answers also have the smallest standard deviation. The average frequency *sometimes*, with the tendency towards *rarely* was indicated by teachers for downloading educational material from the web (arithmetic mean is 2,67).

Teachers *rarely* use computer to participate in educational projects (2,26) to present teaching contents (2,2) and for demonstration (2). *Hardly ever* with the tendency towards never is the computer used in teaching to repeat and review teaching matter (1,64) and to check pupils' knowledge (1,55). Responses to these last questions have the biggest standard deviation.

Most surprisingly the computer (laptop and LCD projector) is scarcely ever used as an aid while presenting teaching contents or demonstration, which may be explained by the fact that the teachers rated their presentation knowledge and working skills (Power Point) good with the arithmetic mean amounting to 2,61.

The use of ICT in teaching implies a more flexible organisation of teaching, the release from spatial (school, classroom) and time (school calendar, timetable) restraints for teaching and learning, new strategies of teaching and learning, better cooperation and communication between teachers and pupils and bigger availability of educational contents. The intention of the following series of questions in the questionnaire was to determine if there are any changes in our schools.

Teachers of non-informatics subjects *rarely* (2,23) use the computer classroom for their teaching and when they use ICT in their teaching they often apply the same methods and forms of work as in classical teaching.

The average frequency *sometimes* (2,96) was indicated by teachers for the organisation of teaching activities demanding from pupils the use of the computer and digital information sources in school or at home whatsoever. Teachers *rarely* (2,11) present teaching contents using the computer multimedia, although it is well known that multimedia and hypermedia make teaching more interesting and dynamic. Teachers indicated the smallest average frequency when it comes to readiness and availability for the communication with pupils via e-mail (1,54) as well as the inclusion into the creation and publication of digital educational contents (1,43).

V. TESTING THE HYPOTHESES

One of the reasons to study teachers' ICT culture is to determine if there is a connection between it and the frequency of use of ICT in the preparation and teaching implementation. The number of points which arise from respondents' answers to that part of the questionnaire is arranged into four classes as shown in the heading of table 1. The table below shows frequencies in regard to mentioned characteristics in order to enable the calculation of the chi-square empirical value and in this way test the first hypothesis.

Table 1 Frequencies of ICT culture and the use of ICT in teaching

Level of ICT culture	Frequency of use of ICT in teaching				Total
	0 – 20 points	21 – 30	31 – 40	41 – 50	
Low	55 (17)	1 (26)	0 (8)	0 (4)	56
Medium	44 (59)	131 (90)	16 (28)	1 (15)	192
High	0 (22)	18 (34)	30 (10)	24 (6)	72
Total	99	150	46	25	320

Table 2 Frequencies of teachers' ICT culture and changes of the organisation and implementation of teaching

Level of ICT culture	Frequency of changes in teaching				Total
	0 – 20 points	21 – 30	31 – 40	41 – 50	
Low	55 (23)	1 (20)	0 (10)	0 (2)	56
Medium	76 (79)	91 (70)	25 (35)	0 (8)	192
High	1 (30)	24 (26)	33 (13)	14 (3)	72
Total	132	116	58	14	320

Statistical hypothesis reads as follows:

$$H_0 \dots p_{ij} = p_{i.} \cdot p_{.j}, \quad \forall i, j, \quad i = 1, 2, 3, \dots, r; \quad j = 1, 2, 3, \dots, s;$$

$$H_1 \dots \exists p_{ij} \neq p_{i.} \cdot p_{.j}, \quad i, j, \quad i = 1, 2, 3, \dots, r; \quad j = 1, 2, 3, \dots, s;$$

Chi-square empirical value for the frequency of the use of ICT in teaching in relation to the level of teachers' culture equals $\chi^2 = 285,08$ while the number of degrees of freedom is $df = 6$. Chi-square border value amounts to $\chi^2_{0.05;6} = 12,6$. Chi-square measured value is considerably bigger from its border value and the level of significance by 5% which leads to the acceptance of the alternative hypothesis stating that there is a statistically significant difference in the frequency of the use of ICT in teaching in view of teachers' ICT culture level.

As it was already emphasized, methodological application of ICT in teaching, which provides teaching with a new dimension and quality, should result in certain alterations in the organisation and implementation of teaching. Chi-square test will establish if there is a connection between teachers' ICT culture and the frequency of these alterations. Table 2 shows rates of frequency of alterations in the organisation and implementation of teaching featuring the use of ICT according to the point classes and the level of teachers' ICT culture.

The measured value of the chi-square amounts to $\chi^2 = 188,07$ and the number of degrees of freedom is $df = 6$. According to chi-square test results the alternative hypothesis about the acceptance of statistically significant differences, at the level of significance of 5%, in ways of organisation and teaching implementation and the level of teachers' ICT culture is verified.

VI. CONCLUSION

Many authors emphasize the need for schools to adapt to the time in which they operate and do something about the greater use of ICT in teaching. Nowadays it is even more apparent because today's pupils live with ICT, that is, in a digital world since their birth. Schools as places where young people prepare and make themselves ready for life and world of work require teachers with developed ICT culture because it is reflected in the frequency and quality of implementation of ICT in teaching.

The research has verified that there is a statistically significant dependence between the level of teachers' ICT culture and the frequency of their application of ICT in the preparation and implementation of teaching. It has also been confirmed that there is a relation between the level of ICT culture of teachers and the way in which they organise and conduct classes when applying ICT.

Therefore, the schools which would like to encourage a meaningful use and the use of ICT in teaching adapted to pupils should, along with the creation of adequate infrastructural conditions, encourage spreading of ICT culture through personal and professional development of teachers. It means that besides developing teachers' knowledge and skills of the use of ICT it is necessary to gradually change their habits, perception and attitudes about the role and importance of ICT in today's society and work they do. It will give rise to an educational environment in which teaching and learning will be improved by means of a methodological use of ICT, which will become a role model and a part of everyday practice.

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