USE OF DIGITAL MEDIA IN LEARNING IN ORDER TO DEVELOPMENT OF INFORMATION LITERACY

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Summary

In the introductory part of the paper discusses the development of information literacy (IP) in general, then give examples of the development of IP in a poorly developed country (Colombia) and one highly developed country (USA), to be then made cross-section of the development of IP in the educational Croatian system with recommendations for its further development. The empirical part shows that pupils in higher grades of elementary school digital media most used for reading, to help in the learning of mathematics and favored environment rich with modern technologies. A student homework are more acceptable, easier and more effective when it can be performed with the help of modern media, and higher academic achievement are achieved when they did not care how the classes designed (modern or classic). Students which digital media facilitate learning prefer to use digital media in the classroom and in independent study at home. Students who spend more time on the computer digital media make it easier to learn and more likely to use digital media for learning at home. Pupils at the beginning of higher grades and higher academic achievement digital media more facilitate learning. Students of higher academic achievement and boys and young men more used digital media for learning at home.

Keywords: development of information literacy, digital media in learning, questionnaire use of digital media for learning.

UPORABA DIGITALNIH MEDIJA U UČENJU S CILJEM RAZVOJA INFORMACIJSKE PISMENOSTI

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Sažetak
U uvodnom dijelu rada raspravlja se o razvoju informacijske pismenosti općenito, potom se daju primjeri razgovaranja u jednoj slabo razvijenoj državi (Kolumbiji) i jednoj visoko razvijenoj državi (USA), da bi se zatim napravio presjek razvoja IP u odgojno-obrazovnom sustavu Hrvatske s preporukama za njen daljnji razvoj. Empirijski dio rada pokazuje da učenici predmetne nastave u osnovnoj školi digitalne medije najviše koriste za čitanje, kao pomoć u učenju matematike te da preferiraju okoline bogate suvremenim tehnologijama. Učenicima je domaća zadaća prihvatljivija, lakša i učinkovitija kada ju mogu obavljati uz pomoć suvremenih medija, a viši školski uspjeh postižu kada im je svejedno kako je nastava oblikovana (suvremeno ili klasično). Učenici kojima digitalni mediji olakšavaju učenje preferiraju korištenje digitalnih medija u nastavi i pri samostalnom učenju kod kuće. Učenicima koji više vremena provode na računalu digitalni mediji olakšavaju učenje te češće digitalne medije koriste za učenje kod kuće. Učenicima nižih razreda predmetne nastave i višeg školskog uspjeha digitalni mediji više olakšavaju učenje. Učenici višeg školskog uspjeha te dječaci i mladići više koriste digitalne medije za samostalno učenje kod kuće.

Ključne riječi: razvoj informacijske pismenosti, digitalni mediji u učenju, Upitnik uporabe digitalnih medija za učenje.

INTRODUCTION
Development of ICT in the education system
The weak economic situation in developing and transitional countries such as Croatia can be improved, at least to some extent, by accessing and integrating information and communication technologies (ICT) in many areas of everyday life. Thus, the education system, as a typical representative of society, ICT should be implemented and developed as much as possible in the entire vertical aspect of education. In other words, ICT should be part of the natural ecological environment of pupils and students. Apart from ICT, developing skills in using it, a scientific approach to thinking about and resolving problems, and the development of information literacy are part of generic competencies at all levels and in all types of education. The realisation of global concepts largely depends on the individual's ability to cope in the infinite information network, to find and select appropriate kinds of information, and to valorise and evaluate them – in other words, on information-communication skills (Anđić, 2007). The need to develop Information literacy in schools arises from Behavioural learning theories, then Social-constructivist learning theories (which emphasise the importance of the learning context), and Social-cognitive learning theories (individual learning in interaction with the environment, which should be as wide as possible in educational terms, and in particular with competent individuals such as teachers and other pupils, so that the pupil gradually adopts responsibility for his own learning) and, most of all, from the Constructivist approach to learning (based on developing knowledge through personal experience, and focusing on pupil independence and activity, encouraging critical thought and experimentation). According to Rončević Zubković et al. (2016), implementing different technologies leads to educational changes which aim to motivate students towards
active learning. The active inclusion of Croatia in the process of economic globalisation therefore requires the integration of new technology which restructures the concept of literacy. Thus, today, we can speak of different types of literacy which the individual needs to master in order to participate on an equal footing in social life. The emphasis lies on education in the area of information literacy, which should equip children and young people to use technology more effectively and make them aware of the usefulness of developing their skills (Milički & Sudarević, 2016, 17). Faced with the challenges of the new, visual age in the 21st century, the concept of multiliteracy has developed, which includes not only reading, but computer and media skills, information literacy, visual literacy, and many others (Kordigel, 2008, 8). In fact, learning has acquired a new significance, which means creating a new educational environment (networking in social networks), in which students manage the learning process (developing self-regulated learning), work on problem-solving, cooperate, share knowledge, are activated critically, and become independent and on an equal footing. Reading in itself is no longer as important, but the use of materials read, while during the reading process, texts and images acquire equal importance, and it is essential to have a highly developed metacognitive awareness, a critical approach, developed strategies for problem-solving, developed tools and skills, and networking applications, etc. Digital, or media literacy is defined as the ability to access, analyse, valorise and communicate messages in different forms (Aufderheide & Firestone, 1993, 7). In order for children today to be literate, i.e. in order for them to know how to read and communicate, they must learn by using different media, rather than depending entirely on the printed word (Kordigel, 2008, 10). These media include films, videos, DVDs, computers, photographs, works of art, magazines, music, television, adverts and many others, which communicate through images, words, and sounds. They extend to wide areas of the net, using computer systems which enable people to communicate through them. The Internet has introduced a new form of literacy (for example, through the use of emoticons and changes in the conventional use of language). Multimedia learning, based on multimedia technology, through this kind of approach, is becoming more and more popular, in line with the galloping pace of informatisation in society and life in general, in this information or scientific era (Andić, 2007). Digital, or media literacy changes the climate or environment around us, and leads to social change. It includes individuals in a community in the process(es) of creating content (knowledge, innovation), and represents an extremely important potential for disseminating information. So the question of how to extend digital technology by integrating it in media, communication and development practice is important. ICT is a relatively new discipline, characterised by extremely short innovation cycles. Therefore, in this area, we cannot speak of completed levels of development which can then be applied to working in schools. It is an ongoing process of innovation, which must have a reciprocal relationship with educational processes. Countries with high technological development are aware that it cannot be separated from educational processes. Outside the school arena, there is already a close link. For example, in the area of communications, mobile phones have become part of cultural experience and are used in the context of informal and lifelong learning. Also, certain institutions, particularly schools, no longer have the monopoly over the learning process, since it occurs in different places and in ways which correspond to individual needs. The use of digital media is not a goal in itself, but demands attention in the context of education, since it has a considerable effect not only on private, but also professional life. This means launching and maintaining educational processes through the net, using digital media for different target groups (Nadrıljanski et al., 2007). However, the integration of digital media in educational processes has been hindered by the gap between the slowness of innovation processes in educational institutions and the speed of technological innovation processes. This discrepancy may result in far-reaching, negative consequences in
We are dealing with a new, interdisciplinary area of research, which includes psychology, pedagogy, linguistics, ICT, and communicology (Hobbs, 2004).

**An example of the development of digital literacy in a poorly developed country (Columbia)**

As an example of the development of digital literacy at the national level, the programme developed in Columbia, as a country with a weak economy, serves at least partially to show how modern technology has been implemented in the education system. The programmes used were *Free Internet* and *Computers for Education* (McKenna et al., 2006). The first was a national programme of collecting computers no longer used by companies and organisations, in Colombia and other countries, updating them and delivering them free of charge to all public schools to use for educational purposes. Teachers were trained and received support to enable them to develop this curriculum. The programme delivered 23,000 computers to 2,951 schools in 700 municipalities in the country, particularly in rural areas, and covered 868,000 pupils and 32,000 teachers. The second programme involved providing new computer technology for teachers and the wider community, networking them with the aim of developing a better quality of education and creating the active participation of citizens in the progress of their places of residence. Some components of this programme included computer hardware, a communication infrastructure and educational software, training for education in the community, an information system which supported operational academic processes, and an educational website. Thus, 662 education centre, 16 small libraries and three large libraries were equipped and connected. In addition, 4,776 teachers and 2,498 administrative personnel began computer courses, while 316 education institutions used a virtual learning environment (www.redp.edu.co). The third programme was implemented from 2002 onwards, and ensured that all public education institutions in the town of Medellin had computer laboratories, each with 21 computers and Internet connections using modems. Thus, 492 laboratories and about 10,000 computers were set up, to benefit 400,000 pupils and the entire community which could access them. With the support of a research group from the University working in the area of reading and writing in these new technologies, the process of awareness-raising and training began for teachers and pupils in using these resources. The project turned Medellin into the town with the best-equipped ICT school system (www.funfacionepm.org.co). Apart from these programmes, with the aim of improving the quality of the education system, from a basic level to a higher one, capable of better resolving demands in future in various areas, the Ministry of Education initiated a programme to introduce ICT in education. Their efforts had three goals: 1) to set up the necessary equipment and infrastructure, 2) to develop curricula, and 3) to define the processes and standards for using ICT in primary and secondary education. One of the strategies available for this programme was an agreement between the Ministry and Microsoft, with the aims of 1) training teachers further in the use of ICT as a didactic aid, 2) developing ICT based projects to help improve education, and 3) developing computer-based learning material for public distribution. The process of training teachers focused on 1) including ICT in the classroom, 2) developing ICT with academic content for various purposes, and 3) setting up academic centres to train teachers to use ICT in education. In this way, and in spite of being a relatively poor country, Columbia clearly recognised the importance of developing a new digital literacy. The state and the education system thus took steps to launch a programme to aid the
promotion of developing a new digital literacy. Although the scope of these efforts was not wide, and the hardware and software used were not as modern as in economically developed countries, the focus was specific, and a certain amount of progress was evident. This, and similar examples, may serve in other poorly developed educational systems in relation to developing digital literacy.

Use of digital media by children and young people in the United States of America

In contrast to a country with a weak economy like Columbia, the USA represents a country with a strong economy, so in this theoretical part of the paper, the situation regarding the use of digital media is presented. Research by Rideout et al. (2003) shows that at the beginning of the 21st century, almost half the child population aged 6 was using computers for learning and games. Older children used computers even more, while about 86% of children and young people between the ages of 8 and 18 had computers at home (Roberts et al., 2005). Adolescents in the USA used media more than six hours per day (after sleeping, this is the activity which occupies most of their time). Along with various technologies used by children and young people, there was increasing interest in developing a technologically rich learning environment. This included virtual reality, computer simulations which aided problem-based learning, intelligent teaching systems, educational games and software, audio recordings, wireless devices, multimedia environments, etc. A growing phenomenon was the use of several media at the same time. Constructive approaches to learning assume the need to shape an environment which supports learning and includes learners, giving them more control over their learning. Students become active in their own learning processes. Most young people get involved in actively creating on-line content. The web has changed the way in which people read, process information and think. Internet technology has enabled a diffuse, plastic way of thinking. This shift has changed the way people read and has led to behavioural changes. Technologically rich learning environments, placed in authentic contexts, support the social structuring of knowledge, providing models and guiding students, while enhancing cooperation. Students are able not only to cooperate in the classroom or school, but also with their peers worldwide (Lajoie & Azevedo, 2006; Pea & Maldonado, 2006). However, the question arises as to whether digital media, however attractive, are really appropriate in early education? The Alliance for Children thinks that computers should no longer be used in education in early childhood, until we have learned more about their long-term effects, since computers hinder physical activity and social interaction, which are necessary to child development. Children sitting in front of computers do not communicate with their parents or cooperate with their peers. They represent the digital or net generation, which some authors call the ‘thumb generation’. There is a huge chasm between them and their parents in terms of access and use of modern media. In addition, their teachers are often insufficiently trained to be guides in the process of using such media. However, digital media are spreading more and more in everyday life and it is only to be expected that they will be used more and more intensively by all age groups. We do not yet understand how they will change the world in the future. Technological programmes, of course, must be suited to children's development, and should not just include simple spoken instructions. Computer activities should be open, encouraging discovery, exploration, problem-solving and an understanding of cause-and-effect relations, rather than being simply used for solo exercises and repetitive activities. The contents must be appropriate, respecting cultural and age differences, along with different skills (Woolfolk, 2016). According to Carpenter (2000), some research has shown that coping with the all the stimulation provided by contemporary
media may help children multitask, but it may also hinder them from thinking more deeply, for example by understanding the perspectives of other people, or grasping the plot, theme and development of a story. In other words, while students learn to multitask, they only understand what they are doing superficially. On the basis of an overview of many research projects, associates conclude that the issue is whether using computers makes school learning very complex and controversial, and that there are no clear conclusions (Roschelle et al., 2000). It seems that using computer programmes in teaching improves the test results of primary and secondary pupils, while simulations and enrichment programmes have little effect. Computers are perhaps more useful for improving mathematical and scientific skills, rather than for other subjects. Like many teaching tools, computers are useful if they are properly employed. According to Roschelle et al. (2000), they improve achievements if used as auxiliary tools for basic processes which lead to learning: active involvement, frequent interaction with feedback, authenticity, and connections with the real world, along with productive group work. Access to all these tools (computers, calculators, text processing) at school and in the home can be of benefit to pupils. For example, Jackson et al. (2006) has been found that computers and access to contemporary learning and teaching resources are strong indicators of school achievement (in mathematics and science, as well as reading), but that they are also linked to a high socioeconomic status. Reading skills are enhanced by using the Internet, while the most frequent types of Internet use are searches for information for school projects and communication with friends. However, there are differences between children in terms of possessing computers and contemporary technology, and in Internet access, according to differences in their family circumstances, though such differences are being reduced. For example, children from single-parent families of lower social status who received computers from the researchers as gifts, and who were using the Internet more at the end of this project, had better average grades and results in standardised reading tests. Some research conducted in the USA shows that parents and teachers believe that it is important to use ITC well in schools in both teaching and learning (Hart Research Associates Poll, 2012). It was found that parental attitudes towards ITC influenced children when they were young, while adolescents were more susceptible to peer influence (Duncan et al., 1994).

Development of information literacy in the Croatian education system

Like many other developing countries, Croatia cannot develop a model for including ICT in the education system based only on experience and research results, as conducted in other areas or contexts, which present clearly differing social, economic and cultural conditions. In Croatia, we must first start by defining the percentage of pupils who have computers at home, and the number of computers available to them in schools. Questions like How can ICT be used to improve reading and writing skills? and How can ICT be used to improve scientific modes of thinking, and learning and memorising in general? are particularly important in a country like Croatia, where only a certain proportion of the population has limited access to such resources. For example, in Singapore, every pupil has a computer, while in Croatia, three pupils share one computer in schools (Jutarnji list, 2016). This shows there has been an improvement since 2007, when according to Nadrljanski et al. (2007, 546) the ration was 21:1, and when in spite of efforts to improve information literacy, the standard of computer equipment was still poor. It is still in need of improvement. In addition, significant factors include accessibility at all times and in all places, integrating computers in the classroom, support and regular updating and replacement. In terms of home access, Croatia is also below the OECD average, so that young people from lower social status families rarely have computer access at home. However, the authors emphasise that, regardless of the unfavourable situation at the moment regarding the use of digital media, pupils have a
A distinctly positive attitude towards them. According to European Commission (2013), foreign research has also confirmed positive attitudes towards ICT implementation in the education system, along with high expectations regarding such implementation (Courtois et al., 2014). According to European Commission (2013), it has been shown that many pupils evaluate the positive effects of using ICT technology on the school and classroom climate, and on various means of processing information thoroughly while learning. As a prerequisite for the development of multimedia learning in Croatian schools, the need for training teachers in non-traditional forms and methods of work is emphasised, through on-line courses, developing international ICT networks for teacher education, training in the form of action projects which assume problem-solving and cooperative forms of work, projects for teacher training which are conceptually focused on developing modules for learning and teaching, and specially created thematic workshops designed to train teachers (Andić, 2007). Nadrljanski et al. (2007) add these elements: providing courses and workshops, applying multimedia elements, engaging mentors in schools, individual counselling, co-teaching, improving the infrastructure, and attempts at integration in seminars. These activities need to be systematic at different levels of education. Internal school training oriented towards the needs of participants and their framework conditions is particularly important. As an example of particularly high quality in experiences of learning through multimedia technology is a UNESCO Learning and Teaching for Sustainable Future Programme programme is highlighted for the professional training of teachers and educators developed in line with existing demands for a new educational vision for sustainable development. The programme places a special emphasis on the need to train educators in the area of ICT and computer literacy, and focuses on considering the new roles of these educators in the learning process or ICT teaching. One significant issue is bringing the place of education closer to the home or workplace. It also enables the creation and development of educational networks, databases, various models and forms of learning and teaching, searching for alternative solutions, the exchange of ideas and experience, general cooperation in terms of education, and promotion of the concept of sustainability (Andić, 2007). The education systems in European countries have adopted various organisational approaches to including ICT in education. In some countries, schools create their own ICT plans and define strategies in relation to infrastructure, services, contents, and training teachers and instructors. There are different projects throughout Europe for the education and further training of teachers, from those oriented primarily to the needs of teachers, to those which are partially aimed at educating the public. However, the author stresses that although teachers have had opportunities over the last fifteen years to take courses in using computers, tablets and programming, this has resulted in few changes in the classroom, since teachers have not acquired pedagogical knowledge or examples specific to the curriculum. As an example of good educational practice and further training of teachers, she cites projects carried out in Denmark and Sweden, Pedagogical IT Licence and IT Schools, which stand out as integrated approaches to training teachers. Through them, Andić (2007) emphasises that there has been a positive shift towards developing basic technical skills, adopting new roles in the education process, combining new educational environments, accessing and using educational materials, creating networks, understanding how ICT may replace teaching and learning processes, and collaborative learning and cooperation between teachers. Although evident progress has been made in Croatia in terms of professional further training, there is a lack of momentum in developing ICT as a methodology of work in information gathering, developing new learning processes in the areas of sustainable development and promoting the element of sustainability as a way of life in modern society (Andić, 2007, 129). This author carried out research among primary class teachers in Primorje-Gorski Kotar, Istria and Lika-Senj Counties. Among other things,
she investigated how teachers used modern technology to improve information flows and communication. Unfortunately, particularly low results in terms of using modern technology were recorded in Lika-Senj County, and the situation in the other counties was far from satisfactory. The author concluded that the use of multimedia technology and ICT approaches to learning and teaching was still at an unsatisfactory level in Croatian educational practice, and in the personal educational and further training practice of teachers. The difference is not great in regard to qualification levels among teachers: those with university degrees showed only slightly higher results in terms of using modern technology compared to those with college diplomas. Surprisingly, the lowest values were seen for teachers with up to 15, and the highest for those with 26 years of service. Related to their age, those aged 51 and over assessed the use of modern technology higher than other age groups. In line with these results, the author concluded that the development of future models and programmes for thorough teacher education and further professional training (for example e-learning, distance-learning) must include content, skills and abilities linked to applying e-media and using ICT in practice in work in schools, and educating and training teachers for sustainable development. In the European framework, at different national levels, strategies and political measures have been adopted to advance the information society. This primarily relates to liberalising telecommunications, setting up clear legislative frameworks for e-business, and for research and development in key areas of human activity. The e-Europe initiative aims to enable online access for every citizen, home, school, company and administration, in order to create a digitally literate, enterprising Europe and ensure an information society which includes all its parts. According to Nadrljanski et al. (2007, 541), the following factors are important for the development of education with the aid of digital media: a) extending the field of education, particularly as informal education and lifelong learning are becoming more important (lifelong learning focuses on adults and young people, and aims to ensure that no social group is excluded from its activities), 2) cooperating with media professionals and their participation in education through digital media, along with contacts with the media industry, c) developing new means of communicating and carrying out educational tasks with the help of virtual pedagogy, distance learning, open learning, or TeleMonitoring, and d) connecting up at the international, European, national, regional and local levels. Distance learning is becoming more and more popular throughout the world, thanks to the rapid development of information technology. Another important new addition to education is e-learning. Education using digital media can be carried out in several ways, with greater or lesser scope. Broad education using digital media is highly desirable. Even minor activities carried out by teachers, schools and IT professionals can be effective. Any democratic society needs alert, qualified teachers and well-informed citizens who demonstrate media competencies. In Croatia, they are already at the European level in terms of using new technology. Blackboard, Moodle and similar e-learning means and digital media use are used at certain Croatian universities with as much success as at famous British, European or American universities (e-learning originated in the last). In Zagreb, the Information Sciences Department of the Faculty of Humanities and Social Sciences has developed the Omega programme, based on Moodle (omega.ffzg.hr), and students and professors have been using it for years. In Varaždin, an e-learning project is under way as part of the international FP7 project. The concepts and contents of education using digital media must be adapted to specific situations and needs in Croatia. Rodek (2011) emphasises that society is becoming intensely mediated, learners increasingly use databases, digital tools, games and experiments, participate in virtual seminars, tele-tutorials, tele-lectures, virtual exercises, virtual laboratories, etc. So a new learning culture is developing which requires self-regulated learning, networking, cooperative learning, etc. The author, however, also mentions some limitations to the use of digital media in learning: a) the
simplistic, mechanical linking of several methods of presenting content does not necessarily lead to increased efficiency in learning (the learners must first master the presentations) and b) multiple reception and processing of information may lead to learners being overwhelmed with information. Regardless of this, Hugger & Walber (2010) claimed that the contours of new digital worlds of learning are already on the horizon, as the providers of informal education accessible to all, whatever the boundaries, time and place in which learning takes place. In addition, technology is an outcome or function of other social processes and should be seen in the context of other social, economic and political development.

The goals of this research were: 1) to ascertain when pupils in class most use digital media in learning teaching (as they reach puberty, the use of digital media increases), 2) to examine the link between the use of digital media by pupils in class teaching and a) school achievement, b) age and class level, c) daily time spent on computers, d) mothers' level of education, and e) access to media in the pupils' homes, 3) to establish the structure of factors which define the use of digital media in learning, and 4) to examine how groups of predictors (the use of digital media, characteristics of pupils, socioeconomic characteristics of the family) contribute to criteria (factors which define the use of digital media in learning).

METHODS

Study participants

The study included 243 students of the 6th and 8th grades (equally from both grades; 54 % girls) from the three primary schools: Primary School Dr Jure Turić from Gospić, Primary School Petar Berislavić from Trogir, Primary School Dr Franjo Tuđman from Lički Osik.

Instruments

A Survey was drawn up for the research. The Survey of Use Digital Media in Learning (SUDML) for pupils was first aimed at one primary school level (Class 6) in order to check the pupils' understanding of the statements. Then, some statements were reformulated in a more specific way. The final version had 23 statements linked to the use of contemporary media in learning in general, in learning individual school subjects, in mastering generic (basic) knowledge, and in doing homework assignments. All the statements were phrased positively, apart from numbers 5 and 17, which were assessed in opposition. The factorial analysis of the survey and the reliability test are shown in the results section and the discussion.

The Sociodemographic Survey contained information on: overall achievement at the end of the previous school year, b) the age and class level of the pupils (middle school; according to Piaget, the concrete operational phase – Class 6, and upper middle school; according to Piaget, the formal operational phase – Class 8.) We were interested in the different between these two qualitatively different intellectual phases of human development), c) the daily time spent on computers, d) the mothers' level of education (primary school, secondary school, graduate, master's or doctoral level), and e) access to media at home (mostly whether they had/did not have contemporary media).

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1 According to Piaget (1965), pupils in Class 6 are in the concrete operational phase, when their mental operations allow them to resolve problems with specific outcomes logically, while pupils in Class 8 are in a more advanced intellectual phase, the formal operational phase, when they reason logically to resolved abstract and hypothetical problems. Accordingly, we were interested in the use of digital media in the transition period between these two qualitatively different intellectual phases.
Research procedure

Before sending out the survey, we requested permission from primary school head-teachers and written passive parent's permission for their children to participate in the research. Survey were applied in groups in regular classes. Before applying the survey, all respondents read the instructions on filling out the questionnaire. The Survey were done by expert associates in the schools. After reading the instructions, the pupils indicated the extent to which they agreed with each statement using a numerical scale (1 – 5: 1 – no, never, 2 – generally no, 3 – neither yes nor no, 4 – generally yes, and 5 – yes, always). The results obtained were entered and processed in the statistical package Statistica 13.2. in which statistical analyzes were calculated: descriptive statistics, correlations, factor analysis, reliability and hierarchical regression analysis. Pilot application of the questionnaire indicates that the application takes about 30 minutes in six grades and about 20 minutes in eight grades.

RESULTS AND DISCUSSION

- Table 1 here -

Table 1 gives the basic descriptive results of the Survey (SUDML) for pupils. For each cell, the maximum range was achieved, which implies that the cells covered the entire spectrum of potential answers, from the most negative to the most positive pupil assessments of the use of digital media in learning. The highest assessed cells indicate that pupils use digital media most for reading and for help in learning mathematics, and that their environment is rich in contemporary technology. Somewhat less frequent, but nonetheless above average results indicated that pupils would like to learn using digital media all the time, and that the learning material was brought closer to reality in this way. Contemporary media make learning easier and pupils often use various mobile applications. Their classrooms are equipped with contemporary media and they like to be surrounded by them. Schools are progressing in the use of contemporary media, and they are used increasingly in lessons by both pupils and teachers. With the help of contemporary media, pupils read set books and write reports, and it is easier for them to read digital versions rather than printed books and to search for texts they need for learning with the aid of contemporary media. Pupils mostly study at home with the help of digital media. Earlier research has confirmed the results obtained in terms of digital media making learning easier for pupils, more interactive and closer to reality, and shown that pupils enjoy being surrounded by digital media (Nadrljanski, Nadrljanski, Tomašević, 2007; Lisek & Brkljačić, 2013; Topolovčan, Matijević, Dumančić, 2017).

- Table 2 -

Given the results expressed on the nominal and ordinal scales, i.e. the questionability of meeting the prerequisites of normal distribution to confirm the link between variables, a non-parametric coefficient (Sperman's coefficient of correlation) was used. The coefficients of correlation between the cells and pupils’ school achievements show a low level of connectivity. There were significant negative correlations for pupils’ school achievements for
cells 1, 6, 8, 11, 21 and 22, which means that pupils had lower success if they liked learning with the help of digital media all the time, if they used various mobile applications, if they preferred reading digital texts over printed ones, and if it was easier for them to search for texts using digital media. The findings of earlier research authors Nikčević-Miljković, Jerković, Brala-Mudrović (2017, in the publication) show that pupils who use digital media less for reading and writing, or rather, prefer classic reading from printed texts and writing using pen and paper, had overall higher academic success. Higher success was demonstrated for pupils who were more independent in reading and writing, and for pupils who preferred reading and writing using classic printed media. The findings also showed that for pupils with a richer experience of reading and writing, and therefore more positive attitudes towards these skills, the sources they used were immaterial (classic or digital; they simply focused on achieving excellent school results regardless of the means), that is, within which media or (type and form of text) they wrote. This explanation also held for the findings of this research, as it is obvious that pupils do not mind which sources they use to learn and read from in presenting their knowledge, when they focus as a priority on achieving excellent academic success. In addition, the level of use of digital media in the education system should be at the level of information literacy, which implies the integrated use of media from various, multiple sources, in various forms, and a cooperative, critical attitude towards information, mostly with the aim of creating new knowledge. The most advanced level of using digital media, in relation to a lower communication level or lowest behavioural level has been present in more developed educational systems since the late 1990s (Warschauer & Healey, 1998), and is something the Croatian education system should strive towards. The only positive low, which has significant correlation, was obtained between success and cell 23, I master homework with the help of digital media, which means that pupils find homework more acceptable, easier and efficient when they can do it with the help of contemporary media. In the research on primary school pupils authors Topolovčan, Matijević & Dumančić (2017), this resulted in better success for those who showed a higher degree of computer self-efficiency and had more positive attitudes towards perceived usefulness and perceived control, but reduced behavioural intentions, while pupils who used multimedia software more frequently were prone to constructivist learning which included the use of contemporary media.

Negative rows, but significant coefficients, were obtained between class levels and cells 1 and 15, which means that the younger the pupils, the more they enjoyed learning with the use of contemporary technology all the time, and assessed schools as becoming more advanced in the use of such media. Older pupils had more experience in using various media in their private and academic lives, and so were more demanding and critical towards their advantages and drawbacks, requiring increasingly sophisticated variants, etc. Younger pupils with little experience wanted to intensify their experiences in using media, and due to being less demanding, saw any positive shift at school as progress. Positive rows, but significant coefficients, were obtained between classes and cells 16 and 17, which means that the higher the class, the more pupils read set books and wrote reports using contemporary media, and learned using them exclusively at home. The problem of reading set books and writing reports among older pupils, and the overuse of the Internet in this regard, is familiar from the literature and public media. While younger pupils are eager to read set books and write reports, older ones often find them boring and overrated, and frequently resort to copying material from the Internet. Jerkin (2012) found that pupils did not like reading set books, were bored and uninterested by them, and thought they were a nuisance, mostly because of the lack
of correlation between their themes and pupils' interests and needs, and of course because of
the compulsory factor involved. Book reports are also a problem for teachers, who try hard to
find ways of bringing literature closer to their pupils and enable the development of creative,
critical readers who will be able to distinguish between the aesthetic and the non-aesthetic
(Rosandić, 2003). Teachers are often blind to pupils' interests, there are not enough interesting
titles, and too few copies in libraries. Writing book reports is also a big problem. Pupils often
copy them from the Internet, manuals or other guides, so teachers resort to asking questions
(sometimes too detailed, excessive, or unnecessary) to discover which pupils have actually
read the book. However, this approach does not achieve the basic purpose of literary
education, and may undermine it entirely.

Positive rows, but significant correlations, were obtained between daily time spent on
computers and cells 2, 10, 11, 12, 15 and 21, which means that pupils who spent more time
daily on computers thought learning content was somehow closer to reality if processed using
contemporary media, particularly in learning languages (mother tongue and foreign
languages), that it was easier to read digital texts rather than printed ones, that they used
computers intensively at home, and that schools were progressing in the use of digital media.
Pupils who used them intensively did not perceive such media as anything special, but quite
normal (Topolovčan et al., 2017). This confirms that primary school pupils in Croatia belong
to the net generation (the generation born into a digital, multimedia environment, who have
access to it and use it best). This generation is more inquisitive and self-directed in their
learning. Using the Internet has produced a completely new learning style. These pupils are
more analytically directed, more focussed, and think more critically, which means they
question established authorities which were accepted in the past. Learning based on the
Internet is interactive, rather than based on knowledge transfer (Buckingham & Willett,
2006). New media facilitate situational, cooperative learning, oriented towards creativity,
individualisation and problem-solving (Kanselaar et al., 2002; Schulz-Zander & Tulodziecki,
2011). Lisek & Brkljačić (2013) research carried out among Croatian students shows that
those who started using computers when young tend towards a more holistic learning
approach, a wider range of attention, non-linear learning, and multitasking, and experience
learning as a game. In contrast to the 'old' approach to education, focusing on the teacher as
the representative of authority in knowledge transfer, education based on digital media is non-
linear, focused on learners, and based on discovering, rather than transferring information.
The teacher in contemporary education becomes a facilitator and mediator. Learning using the
Internet becomes fun – children can be children. The pupils' working environment is their
personal ability to network, innovate and be open. The new orientation towards information is
natural and spontaneous, and so is not experienced as learning. Using technology in learning
has certain psychological effects; it influences the formation of identity and shapes
personality, improving the self-image among the net generation, increasing self-efficiency and
personal welfare. Thanks to the distribution and democracy of the Internet, it is available
collectively and non-hierarchically, which has consequences for behaviour, which must itself
be democratised. The net generation is therefore more tolerant, more globally oriented, and
more prone to practise social and civil responsibility and respect the environment (Tapscott,
1998). Thus, technology liberalises and strengthens learners.

The level of education of pupils' mother is relevant to their upbringing (as mothers generally
spend more time with their children), and this row was positive, but statistically significantly
linked to cell 15, schools are progressing in the use of digital media. It is probably true that
children whose mothers are more highly educated, and who are encouraged by them more in
terms of education, notice positive changes in their environment better.
The possession of various contemporary media in pupils' homes was negatively low, but significantly linked to cells 18 and 19, which means that pupils who have fewer contemporary media at home rate their use in lessons higher, along with their more frequent use by teachers. Children who are more surrounded by contemporary media adapt to this environment, so it becomes the normal, ecological environment (they often cannot image an environment without such media). According to Topolovčan et al. (2017), most pupils and teachers have computers and Internet access, while 90% of pupils have their own profile on a social media network. According to Brebrić (2015), about 23.46% of pupils spend more than two hours a day on the computer, while every third pupil spends between one and two hours, and the same proportion less than one hour per day. However, they use these media more for entertainment than for school-related tasks. Two-thirds of pupils are members of social networks. On average, only one pupil per class has no computer, or never uses one. Smartphones are used by three out of four pupils. Almost half of them watch television for one to two hours per day. Although technology and social media are significantly present in the lives of pupils, even at primary school, there is also an evident lack of education among pupils and parents about their use. The fact that every sixth pupil uses a computer for school-related tasks may indicate a lack of use of new educational technology in teaching on the part of teachers, and also a lack of education among pupils about the use of new technology for educational purposes. This author mentions the absence of national guidelines for pupils on using social media. She also mentions that although the curriculum for using the Internet and educational technology does not require great material resources, it is not implemented in many schools. It is necessary to create training courses for teachers, where they would be prepared to teach by focusing on pupils using contemporary media, so that their teaching would include media and constructive didactics (Topolovčan et al., 2017). When they do use them, teachers apply them within the framework of traditional teaching, mostly ‘from the front’. These authors obtained results showing that pupils statistically significantly assessed the use of contemporary media higher than teachers.

**Survey on the Use of Contemporary Media in Learning (SUCML): Results of The Exploratory Factor Analysis, Reliability and Correlation Results**

- *Table 3 here*

- *Figure 1 here*

An Exploratory Factor Analysis (Analysis of the main components with Varimax rotation, Scree test), revealed three different factors which explained 40.25% variance. All the statements had a weighting of over 0.30. The reliability of the Scale expressed using Cronbach’s alpha test was 0.78, and of the individual subscales, the first was 0.72, the second 0.71 and the third 0.70, indicators of high reliability. The name of the factors:

1. **factor: Facilitated learning with the help of digital media** (items 1, 2, 3, 5, 6, 13, 21, 22); 24.11% of explained variance; Eigen value 6.03;
2. **factor: Use of digital media in teaching** (items 7, 14, 15, 18, 19, 20, 23); 8.84% of the explained variance; Eigen value 2.21;
3. **factor: Using digital media for learning at home** (items 4, 8, 9, 10, 11, 12, 16, 17); 7.30% of the explained variance; Eigen value 1.82.

Items 5 and 17 are negatively formulated so that the result is reversed.

Pearson's coefficients of correlation between factors in Survey are shown in Table 4.

- *Table 4 here*
A positive, but low correlation \((r = 0.17; p < 0.05)\) was established between factor 1 _Facilitated learning with the help of digital media_ and factor 2 _Use of digital media in teaching_. A positive, moderate correlation was established between factors 1 and 3 \((r = 0.50; p < 0.05)\). This means that pupils who find digital media makes learning easier prefer the use of these media in the classroom, and use them considerably more frequently when learning at home. The correlation between the factors is significant, which confirms the suitability of the instruments used.

**The results of hierarchical regression analysis**

A hierarchical regression analysis was carried out for the purpose of measuring the contribution of individual variables to explain individual factors. Due to the specific nature of the survey used, variables relating to the use and possession of digital media were entered first, after which the characteristics of pupils were entered in the second step, and in the final step, the socioeconomic characteristics of their families. In each of the three steps of the analysis, partial regressive coefficients for each variable were calculated \((\beta)\), along with the coefficient of multiple correlation \((R)\) and changes in the quantity of the variants explained due to the successive entry of new variables into the calculation \((\Delta R^2)\).

- _Table 5_. here –

In the first step, in which a group of predictors were entered, a significant predictor for criteria _Facilitated learning with the help of digital media_ was _Time spent on the computer_ \((\beta = .24, p < 0.01)\), and this group of predictors explained 4 % of the criteria, while a significant predictor was also _Time spent on the computer_ \((\beta = .15, p < 0.05)\) for criteria _Using digital media for learning at home_, and this group of predictors explained 2 % of the criteria. Pupils who spend more time on the computer found digital media facilitated learning in general, and used them more often for independent learning at home. In the second step, a group of variables labelled _Characteristics of pupils_ was entered, along with the control of the contribution of _Using digital media_, which explained a further 5 % of variants and a significant predictor was _Grade_ \((\beta = -.15, p < 0.05)\) and _School achievement_ \((\beta = .23, p < 0.01)\). Digital media facilitate learning more for pupils in lower classes and have a greater influence on their school achievement. In the second step, for the criterion _Using digital media in the classroom_, the predictor which proved significant was _School achievement_ \((\beta = .15, p < 0.05)\), and this group of predictors explained 3 % of the criteria. For the criterion _Using digital media for learning at home_ predictors which proved significant were _School achievement_ \((\beta = .25, p < 0.01)\) and _Gender_ \((\beta = .16, p < 0.05)\), and this group of predictors explained additional 5 % of the criteria. Pupils with higher school achievement and boys and young men used digital media more. All the predictors in the group _Socioeconomic characteristics of pupils_ which were entered in the third step explained a further 3 % of criteria _Facilitated learning with the help of digital media_ and additional 2 % of criteria _Using digital media for learning at home_. However, some predictors from this set of variables have not been statistically significant.

The authors Nadrljanski et al. (2007) claim that, in spite of the current unsatisfactory use of digital media in the classroom, children and young people use them often at home. In 2005, 38 % of children between the ages of 6 and 13 used computers at school less than once a week, while 86% used them regularly at home. About 17 % used computers every day or several times a week at school, while 76 % used them as frequently at home. The home use of computers for entertainment and accessing information include active learning in the
classroom. The data that more boys use digital media for learning at home arise from the fact that boys use digital media more in any case.

This research has certain limitations: in order to generalise the findings, the sample should be larger and more representative (a cross-section of pupils from the lower classes of primary school to the end of secondary school should be taken), and this is our recommendation for further research. It would also be useful to widen the methodological approaches to include the application of qualitative, combined research approaches. It would be good to focus on teacher self-assessment and compare this with the answers obtained from pupil self-assessment. This information could be gathered over an extended period of time, so that pupils would note their actual use of contemporary media every day (types, forms, time, etc.), and this would provide a more objective picture of the state of actual use. The number of schools in different sociodemographic milieus should be greater, in order to achieve better representation of schools and samples. The methods used in this research, as value measures in which the participants assessed themselves in comparison to others, remembering their own behaviour in certain actual or hypothetical situations, have certain limitations, particular in regard to younger pupils. In fact, these are simultaneously subjective perceptions of self in relation and according to different aspects of objective reality, and may therefore be unrealistic and contribute to limitations in reaching conclusions. However, despite all these shortcomings, this research gives at least a partial picture of ICT use among elementary school students when the use of ICT is intensified.

CONCLUSION:

ICT should form a natural ecological environment for pupils. The development of information literacy is part of generic competencies at all levels, in all types of education. The achievement of global competencies by individuals depends on their ability to cope with, select and evaluate data from the infinite information network. Although Croatian pupils have markedly positive attitudes towards the implementation of ICT in the education system, its development has not yet reached an enviable level. One of the prerequisites for its development is training teachers to use ICT in the classroom, as pupils often use it more efficiently than their teachers. The research conducted at the elementary school pupils (at the transition from the intellectual phase of concrete operations to the most advanced intellectual phase of formal operations) shows that pupils in higher grades of elementary school digital media most used for reading, to help in the learning of mathematics and favored environment rich with modern technologies. A student homework are more acceptable, easier and more effective when it can be performed with the help of modern media, and higher academic achievement are achieved when they did not care how the classes designed (modern or classic). Students which digital media facilitate learning prefer to use digital media in the classroom and in independent study at home. Students who spend more time on the computer digital media make it easier to learn and more likely to use digital media for learning at home. Pupils at the beginning of higher grades and higher academic achievement digital media more facilitate learning. Students of higher academic achievement and boys and young men more used digital media for learning at home.

LITERATURE:


Nadrljanski , D., Nadrljanski , M., Tomašević , M. (2007). Digitalni mediji u obrazovanju – pregled međunarodnih iskustava, INFuture2007: “Digital Information and Heritage”/on line/. From the network downloaded on December 29th, 2016 with: nfoz.ffzg.hr/...7-09%20Nadrljanski%20&%20Nadrljanski%20&%20To...


omega.ffzg.hr/on line/. From the network downloaded January 5th, 2017.


### Table 1 Basic statistics for The Survey of Use Digital Media in Learning (SUDML)

<table>
<thead>
<tr>
<th>Number of item</th>
<th>Content of item</th>
<th>Min</th>
<th>Max</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I would like to learn constantly with the help of digital media.</td>
<td>1</td>
<td>5</td>
<td>3.31</td>
<td>1.115</td>
</tr>
<tr>
<td>2.</td>
<td>Using digital media in learning is somewhat closer to reality.</td>
<td>1</td>
<td>5</td>
<td>3.04</td>
<td>1.167</td>
</tr>
<tr>
<td>3.</td>
<td>Digital media makes learning and memory easier.</td>
<td>1</td>
<td>5</td>
<td>3.21</td>
<td>1.204</td>
</tr>
<tr>
<td>4.</td>
<td>I use digital media to read.</td>
<td>1</td>
<td>5</td>
<td>4.51</td>
<td>0.998</td>
</tr>
<tr>
<td>5.</td>
<td>Digital media learning makes us too virtual, unrealistic.</td>
<td>1</td>
<td>5</td>
<td>2.99</td>
<td>1.232</td>
</tr>
<tr>
<td>6.</td>
<td>I use my mobile phone, a smartphone for learning.</td>
<td>1</td>
<td>5</td>
<td>3.22</td>
<td>1.179</td>
</tr>
<tr>
<td>7.</td>
<td>In classrooms at school we have computers and projectors.</td>
<td>1</td>
<td>5</td>
<td>3.41</td>
<td>1.345</td>
</tr>
<tr>
<td>8.</td>
<td>Digital media help me in learning math.</td>
<td>1</td>
<td>5</td>
<td>4.05</td>
<td>1.162</td>
</tr>
<tr>
<td>9.</td>
<td>Digital media help me in learning natural sciences (nature and society, biology, chemistry, physics).</td>
<td>1</td>
<td>5</td>
<td>2.54</td>
<td>1.272</td>
</tr>
<tr>
<td>10.</td>
<td>Digital media help me in learning the language (maternal and foreign).</td>
<td>1</td>
<td>5</td>
<td>2.54</td>
<td>1.272</td>
</tr>
<tr>
<td>11.</td>
<td>At home learning, I use a computer.</td>
<td>1</td>
<td>5</td>
<td>2.85</td>
<td>1.382</td>
</tr>
<tr>
<td>12.</td>
<td>I use digital media to write.</td>
<td>1</td>
<td>5</td>
<td>2.80</td>
<td>1.260</td>
</tr>
<tr>
<td>13.</td>
<td>I like to be surrounded by new technologies.</td>
<td>1</td>
<td>5</td>
<td>3.04</td>
<td>1.359</td>
</tr>
<tr>
<td>14.</td>
<td>My learning environment is rich with contemporary technology.</td>
<td>1</td>
<td>5</td>
<td>4.15</td>
<td>0.979</td>
</tr>
<tr>
<td>15.</td>
<td>My school is increasingly advancing in the use of contemporary technology.</td>
<td>1</td>
<td>5</td>
<td>3.39</td>
<td>1.179</td>
</tr>
<tr>
<td>16.</td>
<td>With the help of contemporary media I read and write a lecture.</td>
<td>1</td>
<td>5</td>
<td>3.19</td>
<td>1.260</td>
</tr>
<tr>
<td>17.</td>
<td>I'm using digital media exclusively at home.</td>
<td>1</td>
<td>5</td>
<td>3.71</td>
<td>1.004</td>
</tr>
<tr>
<td>18.</td>
<td>At school we often use contemporary media.</td>
<td>1</td>
<td>5</td>
<td>3.17</td>
<td>1.356</td>
</tr>
<tr>
<td>19.</td>
<td>My teachers are increasingly using contemporary media in teaching.</td>
<td>1</td>
<td>5</td>
<td>3.08</td>
<td>1.203</td>
</tr>
<tr>
<td>20.</td>
<td>At school we have: computers, projectors, smart boards, photo cameras and other contemporary media.</td>
<td>1</td>
<td>5</td>
<td>3.04</td>
<td>1.214</td>
</tr>
<tr>
<td>21.</td>
<td>It's easier for me to read digital text than printed (on paper).</td>
<td>1</td>
<td>5</td>
<td>3.32</td>
<td>1.082</td>
</tr>
<tr>
<td>22.</td>
<td>With the help of digital media I can easily search the texts I need for learning.</td>
<td>1</td>
<td>5</td>
<td>3.54</td>
<td>1.130</td>
</tr>
<tr>
<td>23.</td>
<td>With the help of digital media I can easily master my homework.</td>
<td>1</td>
<td>5</td>
<td>2.89</td>
<td>1.322</td>
</tr>
</tbody>
</table>

Legend: M - minimum score; M - maximum score; M - arithmetic mean; SD - standard deviation; (N=243)
Table 2. Spearman's coefficients correlate between school success, grade, daily time spent at the computer, mother's education, and possession of media in pupil's home and individual items

<table>
<thead>
<tr>
<th>Items</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
<th>11.</th>
<th>12.</th>
<th>13.</th>
<th>14.</th>
<th>15.</th>
<th>16.</th>
<th>17.</th>
<th>18.</th>
<th>19.</th>
<th>20.</th>
<th>21.</th>
<th>22.</th>
<th>23.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation coefficient for school success</td>
<td>-0.164*</td>
<td>-0.063</td>
<td>-0.086</td>
<td>-0.075</td>
<td>-0.118</td>
<td>-0.193*</td>
<td>-0.207*</td>
<td>-0.088</td>
<td>-0.011</td>
<td>-0.133</td>
<td>-0.194*</td>
<td>-0.084</td>
<td>-0.000</td>
<td>-0.002</td>
<td>-0.038</td>
<td>-0.063</td>
<td>-0.262*</td>
<td>-0.292*</td>
<td>0.150*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient for grade</td>
<td>0.253*</td>
<td>-0.079</td>
<td>0.090</td>
<td>-0.049</td>
<td>-0.064</td>
<td>-0.015</td>
<td>-0.087</td>
<td>-0.102</td>
<td>-0.050</td>
<td>0.22</td>
<td>0.103</td>
<td>0.082</td>
<td>0.000</td>
<td>0.006</td>
<td>0.055</td>
<td>0.037</td>
<td>0.122</td>
<td>0.175</td>
<td>-0.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient for daily time spent at the computer</td>
<td>0.133</td>
<td>0.122</td>
<td>0.129</td>
<td>0.020</td>
<td>0.065</td>
<td>0.010</td>
<td>0.103</td>
<td>-0.050</td>
<td>-0.015</td>
<td>-0.013</td>
<td>0.227*</td>
<td>0.145*</td>
<td>0.309*</td>
<td>0.156*</td>
<td>-0.004</td>
<td>-0.050</td>
<td>-0.012</td>
<td>-0.262*</td>
<td>-0.207*</td>
<td>0.150*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient for mother's education</td>
<td>0.070</td>
<td>0.041</td>
<td>0.18</td>
<td>0.002</td>
<td>0.047</td>
<td>0.020</td>
<td>0.002</td>
<td>0.047</td>
<td>0.020</td>
<td>0.002</td>
<td>0.047</td>
<td>0.020</td>
<td>0.002</td>
<td>0.047</td>
<td>0.020</td>
<td>0.002</td>
<td>0.047</td>
<td>0.020</td>
<td>0.002</td>
<td>0.047</td>
<td>0.020</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient for possession of media in home</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td>-0.008</td>
<td>-0.012</td>
<td></td>
</tr>
</tbody>
</table>

* p<0.05

Table 3. Factors of The Survey of Use Digital Media in Learning (SUDML) extracted by Analysis of Major Components with Varimax Rotation (with Eigen Values greater than 1)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Eigen Values</th>
<th>Total %</th>
<th>Cumulative</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR 1</td>
<td>6.03</td>
<td>24.11</td>
<td>6.03</td>
<td>24.11</td>
</tr>
<tr>
<td>FACTOR 2</td>
<td>2.21</td>
<td>8.84</td>
<td>8.24</td>
<td>32.95</td>
</tr>
<tr>
<td>FACTOR 3</td>
<td>1.82</td>
<td>7.30</td>
<td>10.06</td>
<td>40.24</td>
</tr>
</tbody>
</table>
Figure 1. Graphical representation of factor extraction

Table 4. Correlations between the factors in the Survey of Use Digital Media in Learning

<table>
<thead>
<tr>
<th>Faktori</th>
<th>M</th>
<th>SD</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>3.17</td>
<td>0.814</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F2</td>
<td>3.50</td>
<td>0.567</td>
<td>0.17*</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>F3</td>
<td>2.85</td>
<td>0.551</td>
<td>0.50*</td>
<td>0.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Legend: M - arithmetic mean; SD - standard deviation; Factor 1: Facilitated learning with the help of digital media; Factor 2: Use of digital media in teaching; Factor 3: Using digital media for learning at home; * = p < 0.05

Table 5. Results of hierarchical regression analysis for F1, F2 and F3 as criterion variables

<table>
<thead>
<tr>
<th>PREDICTORS</th>
<th>F1: FACILITATED LEARNING WITH THE HELP OF DIGITAL MEDIA</th>
<th>CRITERIA</th>
<th>F3: USING DIGITAL MEDIA FOR LEARNING AT HOME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>β'</td>
<td>β</td>
</tr>
<tr>
<td>1. step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USE OF DIGITAL MEDIA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possession of media</td>
<td>0.02</td>
<td>0.036</td>
<td>-0.13</td>
</tr>
<tr>
<td>Time on computer</td>
<td><strong>0.19</strong></td>
<td><strong>0.24</strong></td>
<td>0.004</td>
</tr>
<tr>
<td>R=0.19</td>
<td>R²=0.04**</td>
<td>R=0.13</td>
<td>R²=0.02</td>
</tr>
<tr>
<td>2. step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHARACTERISTICS OF PUPILS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>-0.14*</td>
<td>-0.15*</td>
<td>-0.12</td>
</tr>
<tr>
<td>School achievement</td>
<td>-0.19**</td>
<td>-0.23**</td>
<td><strong>0.15</strong></td>
</tr>
<tr>
<td>Gender</td>
<td>0.11</td>
<td>0.13</td>
<td>0.09</td>
</tr>
<tr>
<td>Age</td>
<td>0.07</td>
<td>0.09</td>
<td>0.05</td>
</tr>
<tr>
<td>R=0.29</td>
<td>ΔR²=0.05**</td>
<td>R=0.22</td>
<td>ΔR²=0.03*</td>
</tr>
<tr>
<td>3. step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCIO-ECONOMIC FEATURES OF FAMILY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother's education</td>
<td>0.12</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Parent's employment</td>
<td>-0.07</td>
<td>-0.07</td>
<td>-0.02</td>
</tr>
<tr>
<td>Household size</td>
<td>0.05</td>
<td>0.05</td>
<td>0.003</td>
</tr>
<tr>
<td>R</td>
<td>ΔR²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.34</td>
<td>0.03**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.23</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.28</td>
<td>0.02*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

β = standardized partial beta coefficients; β’ = beta in the last analysis; R = coefficient of multiple correlation; R² = coefficient of multiple determination; Δ R² = change of multiplication coefficient

*p<0.05; ** P<0.01