

COVID-19 IMPACT ON THE USE OF ICT TOOLS IN THE CROATIAN EDUCATION SYSTEM

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Abstract

Since mid-March 2020, the COVID-19 pandemic has changed the learning processes and teaching methods for half a million students in the Republic of Croatia. Primary and secondary schools as well as higher education institutions had to fully adapt their learning processes to work in an online environment in a very short period. Conventional methods of education have not emphasized the great use of ICT (Information and Communications Technology) tools within the education system itself, while modern forms of learning and teaching represent indispensable use of ICT tools. Planning online teaching and learning is very demanding and complex. The mutual relations between teachers and students and their use and knowledge of ICT tools are a key factor in the success of its implementation. The education system in the Republic of Croatia has used existing tools and introduced new ones to ensure successful and quality online teaching. For the purpose of this research, following ICT tools have been selected as the research sample: Microsoft Teams and Yammer from Office 365 package, Google Classroom from G Suite for education and CARNET's (Croatian Academic and Research Network) Loomen. The research was conducted by the data analysis method of selected data also containing data from the CARNET system. Based on this analysis, with descriptive statistic method it can be determined the intensity of ICT tools use in the education system during COVID-19 compared to the same time last year. Therefore, this paper represents a contribution to the field of ICT science and opens the possibility for further research related to the use and effectiveness of ICT tools in the education system.

Keywords: E-learning, experience, ICT tools, times of crisis, COVID-19.

1 INTRODUCTION

The pandemic spread of the new COVID-19 virus had the far-reaching consequences on the social, cultural and professional areas of life. The risk to health and risk of an infection emphasized the concept of social distance and created a distinct need for an online interaction and learning. Conventional methods of teaching and learning such as going to schools and universities where the professor stands with chalk or marker in front of the students have been untouched for hundred years. Therefore, for the first-time educational systems worldwide have faced great challenge how to adapt to the new situation in a long term due to pandemic. Cybernetic space – the term which has been described by William Gibson as a “voluntary hallucination” is a seventh continent according to him. We no longer have a workplace. Now we have a workplace and living space. New immigrants will be virtual, and they will take over someone's work without showing their face. Instead of moving people, we started moving their thoughts and ideas – it is a whole new game with completely new rules.[1]

The education system of the Republic of Croatia was on the very beginning of its digital transformation when pandemic occurred in March. Primary and secondary schools barely used information and communication technology (ICT) tools in its everyday education. The proof of how situation was undeveloped lays in fact that only 10 percent of total school in Croatia were targeted to be covered with pilot project e-school which goal was to introduce ICT tools to schools in Croatia. [2]

Changes affected not only today's students but also their teachers who need to adapt their learning and teaching skills. In 2006, the European Union (EU) has already recognised digital competence as one of the eight basic competences for lifelong learning [3] in order to successfully respond to the challenges of society knowledge and global markets development. In 2010, digital competences were recognised as one of the key competences in the Europe 2020 strategy [4]. EU publication *Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources* [5], points out that educational institutions should assess how ready and capable they are to use information and communication technology and how to adapt their educational models in accordance with that.

The concept of schools' digital maturity becomes even more important because of the very rapid development and greater importance of information and communication technologies in education. Digital mature schools in Croatia are defined as schools with high level of ICT integration and systematized approach of using ICT tools in educational processes. Usage of ICT tools in schools should not depend on the enthusiasm of an individual but of a systematic approach which must be planned and implemented by school, school founder and all other competent institutions. For this reason, fundamental areas and elements were identified which contribute to school's digital maturity, so that integration progress of ICT usage can be planned. [6]

With appearance of pandemic, education system is found in front of serious challenge because of a small share of digital mature schools. With the aim of building a digital mature society, from March 2015 year, CARNET implemented the program "E- Schools: The complete computerization of school business and teaching process in order to create a digital mature school for the 21st century". The first phase of the pilot project ended in August 2018. The main result of the pilot project is an increase in the level of digital maturity in 10 percent of primary and secondary schools. In cooperation with the Ministry of Science and Education, CARNET initiated the second phase of the program, which is, to cover all primary and secondary schools in Croatia until 2022. [2]

Therefore, this paper examines how the occurrence of the pandemic affected the use of ICT tools in the education system in the Republic of Croatia. Most of the educational system, because of pandemic, familiarized, except Loomen, with new ICT tools covered in this paper. For the purposes of this paper, the use of two tools [4] of Microsoft Office 365 package was analysed, MS Teams and Yammer as well as Google Classroom from G Suite. The survey is conducted on the basis of the use of ICT tools from mid- March 2020, when educational institution physically closed until the end of June when classes were finished compared to the same time in 2019 when circumstances were normal and there was no pandemic.

2 METHODOLOGY

The research was conducted by the method of data analysis on a 14-day user activity (hereinafter: user activity) of selected tools. The result analysis was performed by the method of descriptive statistics and the intensity of ICT tools usage in the education system during COVID – 19 was determined compared to the same time last year.

As a research sample, tools were used which, in accordance with their functionalities, can support learning and teaching in a digital environment. CARNET provides instructions on how to choose the most appropriate tools for conducting distance learning on its website in the Distance Learning category. In order to select the most suitable system, the authors bring the main features of each of them. [7] The research is limited to the education system of the Republic of Croatia, and the tools supplied by CARNET and recommended by the Ministry of Science and Education of the Republic of Croatia, the method of data analysis was a logical choice considering the availability of data.

MS Excel, Google Analytics and Power BI tools were used to process the obtained data. For the purpose of this paper, first research step was to collect data by querying the CARNET data lake. The second step was to collect data from external Google analytics and Power BI tools. The collected data were combined and analyzed using advanced MS Excel tools, which resulted in graphical representations.

User activity analysis is the number of user activities in an open session in Loomen, Google Classroom, Yammer, and Teams tools. It is a period of 14 days from the last observed activity for each of the users, in order to include all significant users. Each observed user has an electronic identity @skole.hr from the AAI@EduHr system, which he received from its school. The analysis included a comparison of user activity of the same period in 2019 and 2020 in relation to different types of devices, and the ratio of tools from the same manufacturer. Google Classroom service started in March 2020, so its impact has been monitored since the beginning of the pandemic.

The focus of the research was on amount (number) of user activities in covered tools individually, mutual relationships, and in the relationships with other variables during same period. Next, we draw the main conclusions.

3 RESULTS

3.1 User activity of ICT tools in Croatian education system

The results - present user activities of ICT tools in the education system of the Republic of Croatia in the period from January to June 2020 compared to the same period of the previous 2019.

3.1.1 Analysed tools

Loomen, a learning management system based on the open code platform - Moodle. The system includes solutions for organization and implementation of tools for distance learning.

MS Teams of Microsoft Office 365 cloud-based services allows to create an individual or group channels for digital communication as well as enabling connection to tools for data sharing and storage.

Google Classroom, a learning management system of G Suite for Education service, offers organization and implementation of tools for distance learning and virtual environment.

Yammer, social networking platform of Microsoft Office 365 cloud-based services for communication, enables communication through own or group publications, private correspondence and data share.

3.1.2 User activities (January - June 2020)

The rapid growth of digital transformation in education system at the beginning of the pandemic led to an increased number of user activities in all researched tools.

The user activities in majority of observed ICT tools in 2019 are less than 10% in relation to the 2020. Therefore, the analysis in 2020 is more useful for the research itself because we can more accurately monitor user activities. Furthermore, analysis of user activity states that the introduction of the new Google classroom tool reduces user activity on other tools by 10-22%.



Figure 1. User activities (Jan-Jun 2020).

3.1.3 Teachers and students User activities in relation with created Google classrooms

In March 2020, CARNET started providing G Suite for Education service for skole.hr users, which leads to an increased transfer of Loomen users.

Number of teachers and students' activities has decreased after April 2020, while the number of created classrooms kept in absolute amount of 25,000. Slight increase in created classrooms represent that users do not leave the platform, but they use possibilities of other tools.

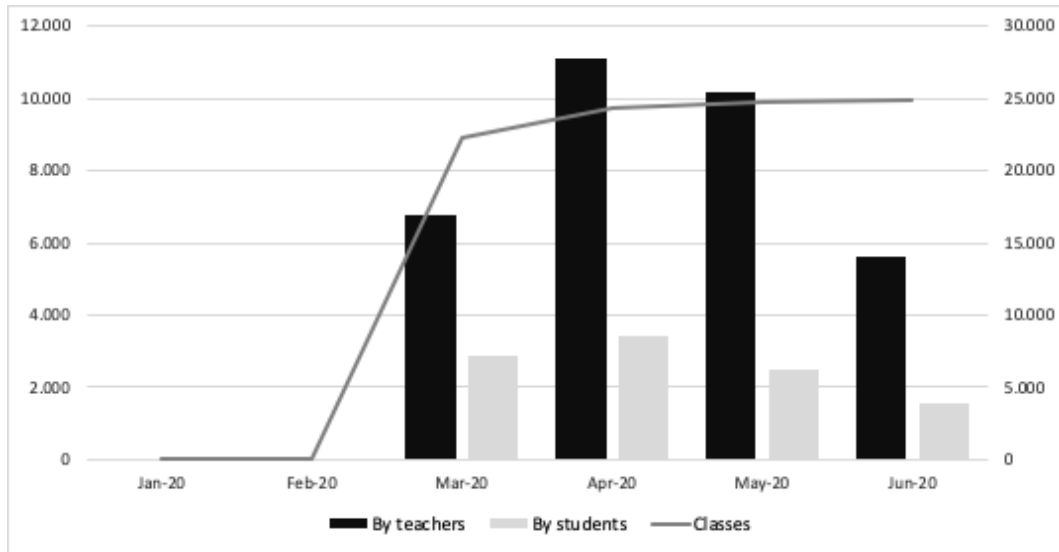


Figure 2. Teachers and students User activity vs. created Google classrooms.

3.1.4 User activities in MS Teams and Yammer

Yammer users' activities are 2.8 times higher in relation to Teams in 2019, in absolute amount up to 12,000 users. In mid-March 2020 classes have been suspended which marked the growth of Teams users 36 times and Yammer users 10 times higher, due to need for a greater video communication.

Teams User activity increased 3.5 times compared to the growth of Yammer Users in March 2020, at the beginning of a pandemic. Which represents higher number Teams user's activity by 1.7 times compared to Yammer in an absolute amount of up to 180,000 users.

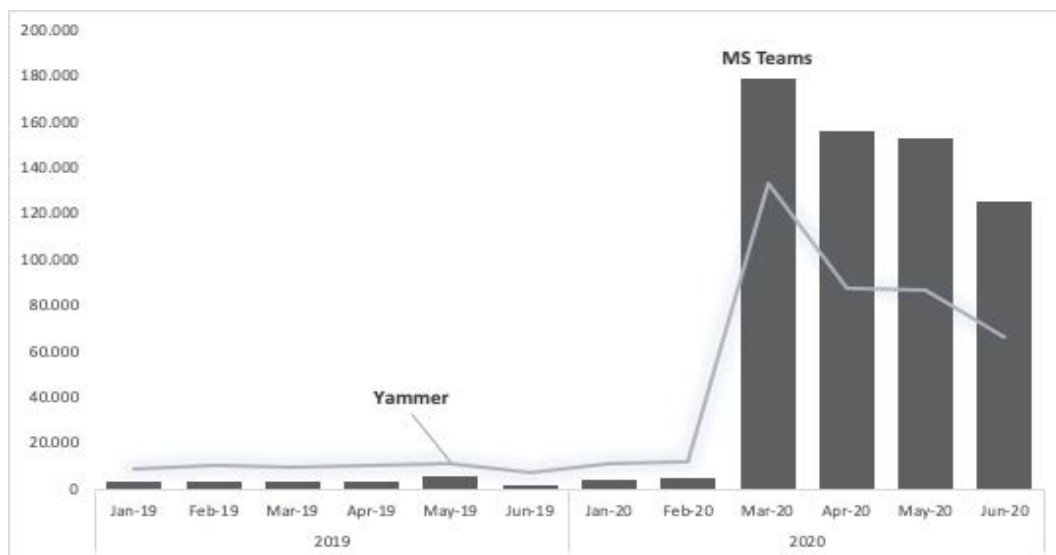


Figure 3. User activity in MS Teams and Yammer.

3.1.5 Loomen User activities in relation with mobile and tablet devices traffic

Share of school mobile and tablet devices in Loomen was 35.12% in observed period of 2019 while remaining share belongs desktop and laptop computers.

Activity of private mobile and tablet devices have not been measured until the beginning of pandemic. The global pandemic has contributed to use and acceptance of private mobile and tablet devices for the needs of the Croatian education system. The share of use private mobile and tablet devices grew to 12% of the total share in the Loomen, which led to an increase in the share of using private and

school mobile and tablet devices to 50% in the Loomen, thus equalling the share of desktops and laptops.

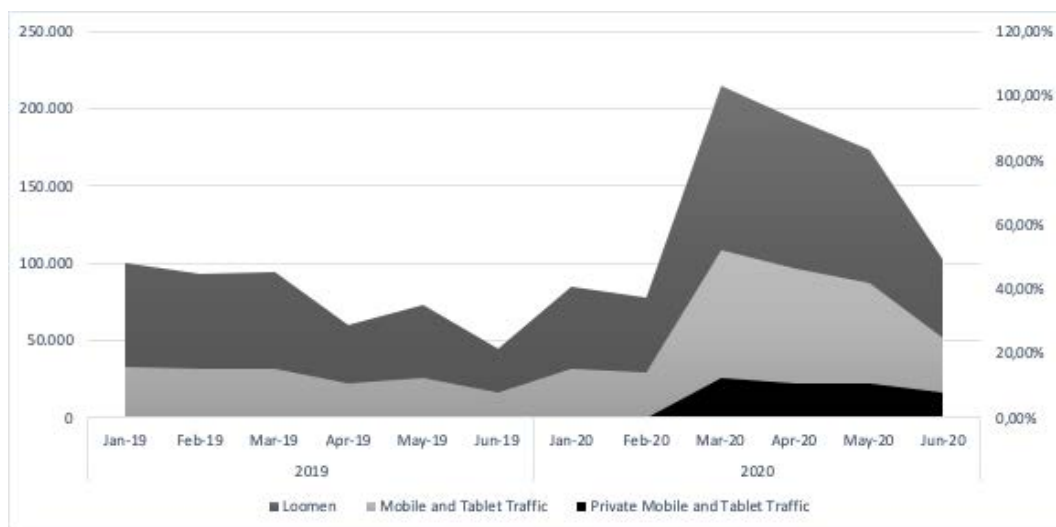


Figure 4. Loomen User activity in relation with mobile and tablet devices traffic.

4 CONCLUSIONS

Pandemic COVID – 19 surprised the whole world at all level and in all industries. This paper examined how the pandemic affected the use of ICT tools in the education system of the Republic of Croatia compared to the same time in 2019 based on 14 – day users' activity when the circumstances were normal. Croatian education system quickly reacted and in a short period of time digitally transformed and quickly met with new ICT tools. The growth of users in specific tools growth up to 36 times. Furthermore, in order to improve user experience, in March 2020, CARNET introduced a new learning management system, Google Classroom. By the result analysis, it is evident how the total number of ICT tools users covered in this research grows from March 2020 and then stagnates at the beginning of May until the end of June, which is in accordance with lockdown since the pandemic weakened in Croatia by the beginning of May.

Furthermore, research shows absolute number of users in March 2020 compared to March 2019 of MS Teams and Yammer as well as mutual comparison. Interestingly, with the introduction of Google Classroom, user activity of other observed tools is decreasing, the activities of Loomen user are largely taken over by Google Classroom. Also, the research shows how pandemic affected on mobile and tablet devices user activity in Loomen in March 2020. The growth of private devices user activity is significant in the total share of traffic in Loomen system. Based on this research, it can be concluded that the pandemic significantly affected the use of ICT tools in all measurement parameters.

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REFERENCES

- [1] J. Špacir, A. Jurčić, R Veršić, L. Luić, "The influence of computer and mobile ergonomics on working efficiency", 6th International Professional and Scientific Conference, Occupational safety and health, Karlovac, University of applied sciences, pp. 479-484, 2016.
- [2] CARNET, "About CARNET," 2020. Retrieved from URL:<https://www.carnet.hr/en/about-carnet/>.
- [3] Official Journal of the European Union, "Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning", 2006/962/EC. pp. 10-18, 2006. URL:<https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF>.

- [4] European Commission, Communication from the Commission Europe 2020 A strategy for smart, sustainable and inclusive growth. Brussels/Belgium: European Commission, 2010. Retrieved from URL: <https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf>. 2010.
- [5] European Commission, Communication from the Commission to the European Parliament, the Council, the European economic and social Committee and the Committee of the regions, Opening up Education: Innovative teaching and learning for all through new Technologies and Open Educational Resources: European Commission, 2013. Retrieved from URL: <https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF>
- [6] N. Begičević Ređep, I. Balaban, M. Klačmer Čalopa, B. Žugec, "The framework for the digital maturity of primary and secondary schools in Croatia". Zagreb/Croatia: CARNET, 2017.
- [7] CARNET, "Distance learning," 2020. Retrieved from URL: <https://www.carnet.hr/en/usluga/distancelearning/>.