Parents' Attitudes toward Programming in Elementary Schools in City of Osijek

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Abstract - Programming is the process which enables a production of software, applications and web sites. Programming develops skills for logic and critical thinking and problem solving necessary for living in today information society. In the theoretical part is pointed out a lot of positive aspects of Micro: bit technology, the suitable programming tools for elementary school pupils such as Scratch are described as well as numerous projects of programming in city of Osijek oriented toward this particular population. In the empirical part the parents' attitudes toward programming in elementary schools in city of Osijek are explored. The results of the research show parents' familiarity with elementary concepts in regard to programming, the possible connections between parents' workplaces and their perceptions and support of programming within school or out of school activities.

Keywords – elementary school; parents; programming;

I. INTRODUCTION

Programming can be defined as the process which enables a production of software, applications and web sites [5]. Programming is not just writing of computer programs but moreover programming is problem solving. To solve certain problem it is necessary to develop appropriate strategies which are not necessary inside the field of programming. The technology is children’s natural surrounding thus technology and programming should be incorporated into educational process in schools. Computational thinking became skill integrated within everyday reading and writing at computer [3]. Programming language is defined as group of commands and other syntax for creating of software program. Program development involves several steps: problem definition, problem solution, program testing and program documentation [9]. Programming language enables to write the language of machine in readable format. Learning the programming languages is similar to learning ordinary languages thus children should learn programming languages as earlier as possible to accept them better. Nowadays a great attention is given to Micro: bit technology and its implementation across elementary schools in Croatia. Namely, Micro: bit is a little hand device specially designed to make programming more accessible for teaching and learning. It enables beginners to learn programming through 25 LED monitor, buttons and embedded sensors. It is designed by BBC, Microsoft, Samsung and Science Scope and it gives insight into introduction of coding for pupils around the world. Micro: bit is very easy for use, efficient and cost-effective hardware. It can be programmed through every web browser without additional installation of software. There are more than 200 different activities and resources which can be try out at Micro: bit, from simple experiments to challenges of creative coding. Micro: bit programming is compatible with programming languages Python and C++. Microsoft offers two programs for easier coding – Microsoft Touch Develop, so called textual programming and Microsoft Blocks, so called graphic programming language [1]. Micro: bit can be connected to another mother boards which enables transmission of signals to robots and motors through electrodos. Micro: bit is more and more employed into elementary schools because of easier and simplest knowledge transfer regarding programming. For visual programming in elementary school a very appropriate programming tool is Scratch. Scratch is a programming tool especially for children which enables research and experiments with concepts of computer programming through graphical interface which is easy to use [8]. Programming language Scratch is born at MIT University and it is based on idea of programming language Logo. Scratch enables creating games, stories and interactive presentations. Scratch interface consists of stage with sprites and commands are grouped into pallets according to their purpose. Scratch is programming language with following main properties: (1) low floor – enables easy start, (2) high ceiling – gives opportunities to increase complexity and (3) wide walls – supports different kinds of projects to involve people with different preferences [12]. This paper aims to explore parents' attitudes toward programming in elementary schools in city of Osijek thus the research questions raised in this paper are the following:

(1) What kind of attitudes toward programming in general in elementary school parents have?

(2) What kind of attitudes toward programming with Micro: bit parents have?

(3) Do parents' attitudes toward programming and their support of programming within school or out of school activities depend upon parents' workplaces and their jobs?

After the introduction which gives theoretical insight into the theme of the paper follows the description of the method used in the research. Third section of the paper consists of the overview of gained research results and related discussion. The last concluding section of the paper brings the main findings of the research and points out its possible implications.
II. METHOD

In this paper the method used in this research is an online questionnaire distributed in September 2019 year toward random sample of parents of pupils in all elementary schools in city of Osijek. The online questionnaire was firstly distributed to teachers and than they distributed online questionnaire to parents of their pupils. Total of 102 fulfilled questionnaires were analyzed for the purpose of answering to the research questions.

III. RESULTS AND DISCUSSION

The total of 102 parents filled out the online survey regarding their attitudes toward programming of their children in elementary schools in city of Osijek. According to gender in research participated 46 (45.1 %) of male parents and 56 (54.9%) female parents. At Fig. 1. it can be seen parents’ gender.

According to the age in research participated 9 parents between 25 - 35 years old (8.8%), 50 parents between 35 - 45 years old (49.1%), 39 parents between 45 - 55 years old (38.2%) and 4 parents between 55 - 65 years old (3.9%). Almost half of parents had between 35 - 45 years old (49.1%) and for those parents and younger namely 9 parents between 25 - 35 years old (8.8%) it could be supposed that they learned about some main programming concepts during their formal or informal previous education. The parents were asked are they familiar with the main concepts of programming. 85 parents (83.3%) answered that they are in some way familiar with programming concepts but 17 parents (16.7%) answered that they did not heard for this terms at all. Fig. 2. shows the percentage of parents regarding their familiarity with main programming concepts.

Parents were asked weather their workplace and job is in some kind of relation with programming skills. The total of 96 parents answered this question. 79 parents (82.3%) claimed that there does not exist any kind of relation of their job with programming. The minority of parents, 17 (17.7%), answered that their workplace and job is in relation to programming. Fig. 3. shows that the majority of parents’ workplaces and jobs were not in any kind of relation to programming. Although, results shown at Fig. 2. and Fig. 3. seem contradictory it could be explained that parents find programming interesting and are informed about programming either during their own formal or informal previous education or they learned about programming together with their children or perhaps from their children. Although, parents claimed that they were familiar with main programming concepts for majority of them their workplaces and jobs were not in any kind of relation to programming.

Figure 1. Parents’ gender

Figure 2. Parents’ familiarity with main programming concepts

Figure 3. Parents’ workplace and job in relation to programming
Parents were asked do they think that learning with Micro: bit is very interesting and just one parent completely disagree with this. 9 parents (8.8%) disagreed with this, 24 parents (23.5%) neither agreed, neither disagreed with this. The majority of parents even 61 parents (59.8%) agreed with this and 7 parents (6.9%) parents completely agreed with this. Parents were asked do they think that Micro: bit within computer science in school should be more employed. 2 parents completely disagreed with this and 5 (4.9 %) of them disagree with this. 26 parents (25.5%) neither agree d, neither disagree d with this. The majority of parents even 58 parents (56.9%) agreed with this and 11 of them (10.8%) completely agreed with this. Parents do not completely agree with claim that programming with Micro: bit is simplier. 11 parents (10.8%) disagree d with this claim. 34 parents (33.3%) neither agreed, neither disagreed with this.

Parents were asked to grade the most important opportunities of Micro: bit technology. 35 parents (34.3%) agreed that speed of use is important characteristic. The majority of parents, 55 parents (53.9%), agreed that easiness of use of Micro: bit is the most important characteristic. 44 parents (43.1%) agreed that compatibility with other devices such as laptops, tablets, mobile devices etc. is very important characteristic.

Less than half of parents 45 parents (44.1%) agreed with this and 12 parents (11.8%) completely agreed with this. Parents were asked do they think that non-computer science teachers should also use Micro: bit and just one parent does not completely agree with this. 6 parents (5.9%) disagreed with this and 47 of them (46.1%) neither agreed, neither disagreed with this. The third of parents 35 of them (34.3%) agreed with this and 13 parents (12.7%) completely agreed with this. Parents were asked do they think that Micro: bit enables easier entrance into the digital world for their children and 3 parents (2.9%) completely disagreed with this. 7 parents (6.9%) disagreed with this and even 27 parents (26.5%) neither agreed, neither disagreed with this. Less than half of parents 44 of them (43.1%) agreed with this and 21 parents (20.6%) completely agreed with this.

The half of parents, 52 parents (51%) agreed that multidisciplinarity is the most important characteristic of Micro: bit. 26 parents (25.5%) agreed that Micro: bit enables education not just for pupils but also for teachers and that this is very important characteristic. Fig. 5. shows parents' attitudes toward different opportunities of Micro: bit.

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Parents were asked whether they are familiar with the following programming tools namely whether their children learned about them in elementary school. The majority of parents, 55 parents (53.9%), answered that they are familiar with programming tool Scratch [11]. Less than half of parents, 42 parents (41.2%) answered that they are familiar with programming tool Code.org [4]. Almost third of parents, 27 parents (26.5%) answered that they are familiar with programming tool Blockly [2]. Just 13 parents (12.7%) were familiar with programming tool Hopscotch [7]. 20 parents (19.6%) were familiar with programming tool Pocket Code [10] and 14 parents (13.7%) were familiar with programming tool Gdevelop [6]. Fig. 6. shows parents' familiarity with different programming tools.
Parents were asked if they think that programming is a necessary skill for their child for further life. 2 parents completely disagreed with this. 11 parents (10.8%) disagreed with this. 13 parents (12.7%) neither agreed, neither disagreed with this. The half of parents, 51 parents (50%) agreed with this. 25 parents (24.5%) completely agreed with this. Parents were asked if they think that programming should have priority at computer science classes. 2 parents (2%) completely disagreed with this. 8 parents (7.8%) disagreed with this. 21 parents (20.6%) neither agreed, neither disagreed with this. More than half of parents, 53 parents (52%) agreed that programming should have priority at computer science classes. 18 parents (17.6%) completely agreed with this. Parents were asked if they think that programming develops logical reasoning of children. None of the parents completely disagreed with this. 6 parents (5.9%) disagreed with this. 20 parents (19.6%) neither agreed, neither disagreed with this. More than half of parents, 56 parents (54.9%), agreed that programming develops logical reasoning. 20 parents (19.6%) completely agreed with this. Parents were asked if they think that programming should be elective subject. Just one parent completely disagreed with this. 8 parents (7.8%) disagreed with this. 21 parents (20.6%) neither agreed, neither disagreed with this. More than half of parents, 54 parents (52.9%), agreed that programming should be the elective subject. 18 parents (17.6%) completely agreed with this. Parents were asked if they think that programming should be obligatory subject. 5 parents (4.9%) completely disagreed with this. 8 parents (7.8%) disagreed with this. 26 parents (25.5%) neither agreed, neither disagreed with this. Almost half of parents, 42 parents (41.2%), agreed with that programming should be obligatory subject. 21 parents (20.6%) completely agreed with this. Fig. 7 shows parents' attitudes toward programming in general in elementary schools.

Figure 7. Parents' attitudes toward programming in general in elementary schools
IV. CONCLUSION

In this paper an online questionnaire in elementary schools in city of Osijek was conducted in purpose to explore parents' attitudes toward programming. According to the gained results it could be concluded that the more than half of parents agreed that programming is necessary skill for their child for further life. Furthermore, more than half of parents agreed that programming should have priority at computer science classes. Also, more than half of parents agreed that programming develops logical reasoning. Although, parents generally support programming more than half of them would like that programming be the elective subject and not to be obligatory. Regarding parents' attitudes toward programming with Micro:bit the majority of parents agreed that learning with Micro:bit is very interesting. Also, the majority of parents agreed that Micro:bit within computer science in school should be more employed. Parents graded the most important opportunities of Micro:bit technology in the following order: easiness of use, multidisciplinary, compatibility with other devices, speed of use and education for teachers and pupils. Among different programming tools the majority of parents are the most familiar with programming tool Scratch. Since the majority of parents' workplaces and jobs were not in relation to programming it could be concluded that their strong support toward programming within school or out of school activities does not depend upon their own professional orientation.

REFERENCES