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INTERESTS OF CROATIAN PRIMARY SCHOOL PUPILS ABOUT ELECTIVE TECHNOLOGY TEACHING AND SCHOOL ACTIVITIES

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Allowing pupils to choose the content of their learning is an important step towards individualized development. Despite the need proclaimed by society for the development of competences in STEM area, educational cycles in this field are the least represented in the Croatian general education curriculum. This research was conducted in order to gain insight into pupils' interests in the contents of technical culture and for school activities. The research was conducted on a stratified sample of primary school pupils in Croatia (N = 2155) aged 11 to 15 years. The analysis of the research results showed that the activities from ICT, robotics, programming and woodworking are the most attractive. When it comes to school activities, pupils most prefer sports activities, computer activities, experiments in science subjects and then technical activities. This result suggests that the school curricula needs to be redesigned so that pupils can develop according to their interests.

Keywords: *election teaching, extracurricular activities, curriculum, primary education, technology education*

1. Introduction

During the educational process, in addition to the time spent in formal classes, practical experience outside the traditional classroom

also plays an important role. Pupils who attending activities outside the formal classroom enhance their intellectual and cognitive abilities (Simmons *et al*., 2017). In order for primary school pupils to properly develop their personality and build themselves as a person and future experts, a synergy was needed between regular formal teaching and extracurricular activities. Learning during extracurricular activities includes education related to the expansion of knowledge within the regular educational system and prescribed content. Compared with regular formal learning in an extracurricular environment, students have autonomy when choosing activities and research of various opportunities in accordance with personal interests and independently acquiring knowledge and skills with the dynamics that best suits for them (Rennie *et al*., 2018). According to such observations, it can be concluded that the participation of students in extracurricular activities increases and improves educational competitiveness. Although the research of the positive impact on academic achievements and student assessments are contradictory (Seow and Pan, 2014; Schuepbach, 2015), it is undoubtedly that such activities have a positive impact on the socialization processes of students (Ivaniushina, 2013) and on the quality of school and education (Durlak and Weissberg, 2007; Schuepbach, 2015). Therefore, such activities also improve the quality of the teacher, as an important factor in this process. As far as technology education is concerned, it has been shown that the involvement of students in extracurricular activities increases their interest in technology and development in science, technology, engineering and mathematics (STEM) education (Dabney *et al*., 2012).

In everyday life, the world and our environment are constantly exposed to change. These changes describe education in science, engineering, technology, and mathematics as a tool to interpret these changes. The interest in this field of education, which integrates interdependent disciplines, is based on the care of professionals to fill jobs and maintain economic competitiveness. Therefore, it is necessary to implement engineering and technological approaches in schools, in order for students to achieve the most successful results and be ready for further education and future work in sectoral areas. The concept of education in unified natural and technical areas is not properly understood and there is no clear vision of the development of this concept even among

those who consider it important, and equally, due to lack of cooperation of all stakeholders in the education system, very little evidence schools (Changtong *et al*., 2020). Research in the United States points out that there is a declining number of students in education who are interested in science, engineering, technology, and mathematics (Roberts *et al*., 2018) while demanding that education in prominent disciplines become and remain a priority (US Bureau of Labor Statistics, 2018). A similar view is shared by China, which has decided to evaluate its success in the transition from a production-based economy to an innovation-based and knowledge-based economy, based on the level of development of the STEM field of education with the aim of becoming a world-class innovator by 2050 (Han and Appelbaum, 2018). Therefore, in order to make education in primary and secondary schools more interesting and attractive to students, it is necessary to reform the education curriculum. Reforms need to be implemented through effective planning of the implementation of elective classes in the curriculum of compulsory education. The complexity of this task in their research is described by Kristiansen *et al*. (2011) and state that no model has been developed in Denmark to meet the problems of planning electives. Tumasheva *et al*. (2020) explained the reasons for the lower representation of elective subjects in regular classes. They highlight two main reasons that directly affect reduced electives: the lack of professional individuals who are competent enough to conduct elective classes and the lack of willingness of teachers to conduct elective classes.

Today's modern age requires the transformation of the education curriculum to be innovative and to contain real-life problem situations, thus preparing students for the challenges posed by today's reality and the near future. Gerwin and Visone (2006) compared the results of teaching in two forms and detected the importance of the need to introduce elective curricula: one according to the state model and the corresponding curriculum, and the other as an elective subject without the state curriculum. They obtained results that surprised them when they discovered a significant division in the quality of realization of learning outcomes. Respondents who attended elective classes carried out ambitious activities and showed exceptional success in tests conducted at the state level, in contrast to those who were participants in public classes who noticed only memorization of facts and unwillingness to new chal-

lenges. Today, therefore, it is more than clear that the need for the introduction of elective classes and the development of additional elective activities proves to be explicitly significant with the development of technology and society. Previous mentioned researches also show that elective courses improve students' self-confidence, which reflected in the more successful realization of learning outcomes. In addition, the electiveness of teaching puts students in an opportunity to develop their initial skills as well as to follow their desires and persevere in creating their successful career (Hammond *et al*., 2020).

1.1. The problem of elective classes and extracurricular activities in Croatia

The framework for the organization and implementation of teaching in Croatia prescribed by the current Act (OG 87/08) with its numerous amendments, while the State Pedagogical Standard (OG 63/2008) determines the weekly workload of students. The weekly workload of students in subject teaching is limited to a maximum of 30 hours, which is often cite as the reason for the impossibility of introducing new and different elective programs. However, the main problem lies in curricula in which the structure of learning and teaching is fragmented into numerous subjects. In doing so, more attention is paid to which subjects and contents will be represented and which interest groups are satisfied than to the needs, possibilities and interests of students and the needs of the community. In such a context, the elective teaching of technical culture has had its only incarnation in the past 30 years as the teaching of Informatics, which in the meantime has separated from the auspices of technical culture and become a separate subject. However, technology is not just ICT (Information and Communication Technology), because ICT is only a small segment of the whole technology about which students today need deeper knowledge. Therefore, teachers and experts, primarily due to insufficient time for the implementation of meaningful activities in regular classes of Technical Culture (Purković *et al*., 2020), on two occasions, in 2014 and 2017, developed the curriculum and proposed the introduction of elective classes in Technical Culture. Both attempts failed without explanation from the education authorities and without completing the procedure or holding a public hearing on it.

Namely, elective courses give more importance to learning of technology than extracurricular activities. This allows students a more serious focus on the content that interests them and brings a formal recognition of the learning outcomes achieved. It also gives the teacher more freedom to operationalize the curriculum, but also more responsibility for achieving learning outcomes.

In terms of extracurricular activities, technological teaching in primary school, but also the entire STEM field of education was hardest hit by the reform of the second half of the 1990s. In that period, practically all activities with technology, activities in science, but also numerous workshops and laboratories disappeared from schools (Purković, 2015). Many extracurricular activities (not just from technology) were then shut down, either because they were not supported by school administrations or because it did not enter the workload of teachers. The school reform of the mid-2000s gradually removed the stigma from technology education and introduced various extracurricular activities, depending on the school curriculum of each school. Facilitating the establishment of school KMTs (Club of Young Technicians), which may additionally burden the teacher with a maximum of 2 hours per week, has somewhat intensified extracurricular activities in the field of engineering and technology. However, this did not meet the needs and expectations of students, which is usually not considered in the Croatian education system, and it also did not meet the needs of the community for more intensive development of students in the STEM area of education.

Considering the previously described context of Croatian primary education, the primary goal of this research was to examine the interests of primary school students for the contents of elective technical culture classes, as the backbone of learning technology and engineering in primary education in Croatia, and their interests for content-specific school activities. Therefore, the main research question can be formulated in the following way: How many students do they want and what elective classes of technical culture do they want, what activities would they like to do during primary education and how do these interests differ according to students' age and gender? In this way, we want to shed light on the student perspective of what they would like to learn and what they would like to do, in technology and abroad, as an important

contribution and argument for the development of future, preferential curriculum of technology education, and primary education in Croatia.

2. Methods

This research was conducted as an anonymous survey of the interest of primary school students in the elective classes of Technical Culture, when they would be conducted, and on the activities they prefer or would like to choose in school when they could choose them. The study was carried out as part of a wider investigation into students' preferences in relation to technology and sustainable development,[1] which are relevant from the point of view of elective teaching and the argument for the introduction of the preferential curriculum in primary schools. Descriptive statistics methods were used for data analysis, and the results obtained were then interpreted qualitatively. In order to determine the statistical significance of differences related to the age and gender of the pupils, the Hi-square test was used. In this way, statistically significant differences in the distributions of students' interests were determined, with a first type error $\alpha = 0.05$.

2.1. Sample

The study was conducted on a proportional stratified random sample of 5th to 8th grade (age 11 to 15) primary school pupils (N = 2155) from the entire territory of Croatia. The sample included all Croatian areas (regions) and different environments from the point of view of urbanity and cultural characteristics of Croatia. The survey thus included 54 main schools out of a total of 876, as many as there were at the end of 2019 (Croatian Bureau of Statistics, 2020). When selecting schools and respondents, care was taken to ensure that an equal number of boys and girls participated in the survey and that each class was represented by an equal number of pupils. At the same time, care was taken to en-

[1] Part of the preliminary results of the research project: *Curriculum based on preferences: Student Preferences as a Framework for the Modular Curriculum of General Technology Education*, ID: uniri-drustv-18-207, University of Rijeka, Rijeka, Croatia.

sure that the proportion of respondents from specific areas (regions) and categories of urbanicity was proportional to the proportion of the total pupil population. In the selection of schools, special care was taken to select competent teachers who were directly in the schools to motivate students to answer honestly and to conduct the data collection. Because of the careful selection of schools and respondents, and the manner in which the data were collected, the research findings provide a suitable basis for generalizing the conclusions that emerge from the study.

2.2. Instrument

The *PUTTOR* (*Preferencije učenika o tehnici, tehnologiji i održivom razvoju*) instrument was used for data collection, which consisted of five parts: a) general data on pupil and school, b) pupils' attitudes about technology and engineering, c) attitudes about Technical Culture and teachers, d) attitudes about ecology and sustainable development issues, and e) interests in elective classes and school activities. It is basically an extended PATT-SQ (*Pupils' Attitudes Towards Technology − Short Questionnaire*) test that examines students' preferences for technology (Ardies *et al*., 2013). For the purpose of this research, two items were singled out as multiple choices questions with the possibility of adding pupils' own choices (Table 1).

While in the first item, the pupils were directly asked to express interests in attending elective classes of technological content, in the second part the activities were not intentionally titled as "extracurricular", but only as "desired" activities. The classification of the elective contents of technical culture has been selected mainly on the basis of the contents resulting from the description of the domains in the subject curriculum of Technical Culture (OG 7/2019). The expressions are adapted to the spirit of the Croatian language so that students can understand them better. During the data collection, the pupils were told that they could list any other activities or subjects that they would like to attend at school. In this way, an attempt was made to get the most honest answer to this question from the pupils, that is, the most real interest in certain activities.

Table 1. Items and sub-items of the fifth part of the questionnaire

Item No.	Item and sub-items	
1.	If the elective classes of technical culture were organized in the school, I would choose:	
	1.1.	Automatics,
	1.2.	Robotics,
	1.3.	Programming,
	1.4.	Wood processing (modeling),
	1.5.	Metal processing (mechanical engineering and constructions),
	1.6.	Informatics (computer sciences),
	1.7.	Technical drawing (design),
	1.8.	Electrical engineering and electronics,
	1.9.	Traffic culture
	1.10.	Construction and housing
	1.11.	Ecology
	1.9.	Something else – what?
	1.10	Nothing – I don't want elective classes
2.	If I could choose what I would study and do in school, I would choose:	
	2.1.	Product development and manufacturing,
	2.2.	Assembling of devices and robots,
	2.3.	Ecological activities,
	2.4.	Computer activities,
	2.5.	Music and arts activities,
	2.6.	Sport activities,
	2.7.	Experiments in physics, chemistry, biology (science),
	2.8.	Writing, reading, reciting… (language activities),
	2.9.	Something else, what?

2.3. Data collection

Data collection was conducted in selected primary schools with the written consent of school administrations and parents. The researchers in the field were teachers (mainly on Technical Culture and Informatics), who instructed the pupils on how to fill in the questionnaire. In doing so, the teachers paid special attention to motivating pupils, being honest in their answers, and guaranteeing anonymity. Most of the questionnaires were completed online, while a smaller proportion of teachers insisted on a paper form. The data collection process lasted from February to December 2020. After collecting and arranging the data, statistical processing and analysis of the results were carried out at the School of Polytechnics, University of Rijeka.

3. Results

A total of 2,155 primary school pupils from all over Croatia took part in the research, of which 1,130 girls and 1,025 boys. Among them were 497 5th grade pupils, 530 6th grade pupils, 559 7th grade pupils, and 569 8th grade, pupils.

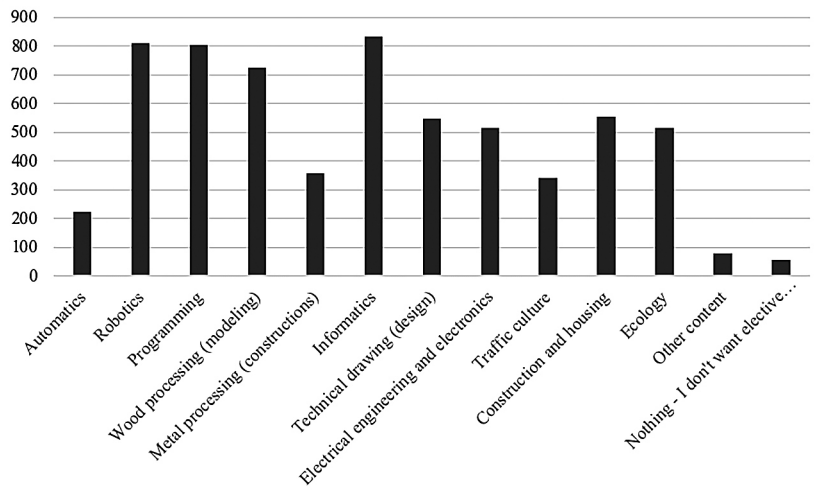

Figure 1. Expressed interests of pupils for electives in technical culture

Regarding the interest in elective classes in technical culture (Figure 1), as many as 97.3% of students chose one or more elective activities, only 58 (2.7%) do not want any elective classes in this area, while 80 of them (3.7%) mentioned some other contents of elective classes. Since pupils were able to choose from several electives, a total of 6,237 contents were selected, which means that on average, each pupil selected three offered electives of technical culture. Among the selected contents, informatics is in the lead, which was chosen by 835 (38.9%) pupils, followed by robotics (37.7%), programming (37.4%), and wood processing/modeling (33.8%). These four electives were selected by more than a third of all pupils surveyed. The next elective contents of technical culture, which were chosen by a significant number of pupils, are construction and architecture (25.8%), technical drawing and design (25.6%), electrical engineering and electronics (24.1%), ecology and energy 24.0%), as contents that would be chosen by a quarter of all pupils. Pupils for metal processing and constructions (16.8%), traffic culture (16.0%), and automatics (10.4%) showed slightly smaller, but not insignificant interest. Among the elective programs (content) that the pupils enrolled were photography and film (0.7%), mechanical engineering (0.5%), food and textile/household technology (0.3%), and radio amateurs and defense technology (0.1%).

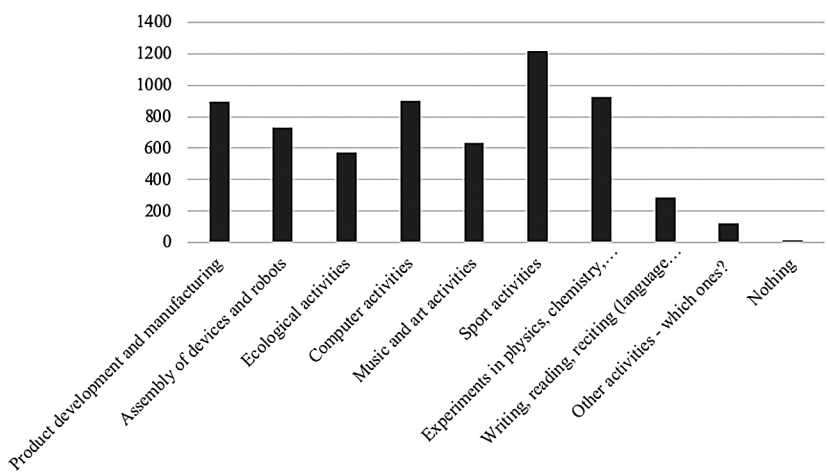

Figure 2. Expressed interests of pupils for school activities

When it comes to the activities that they would like to practice during school, the pupils chose 6290 activities from the offered or activities that they themselves suggested. This means that, on average, each pupil chose three activities during schooling. Among the activities that pupils would like to practice, sports activities dominated, which were chosen by 56.7% of pupils. The second group of activities in which students are highly interested includes experiments in physics, chemistry, and biology/science (43.1%), computer work (42.2%), and the product developing and manufacturing (41.8%). The next group of activities for which students are somewhat less, but still highly interested are assembling devices and robots (34.2%), music and art activities (29.7%), and environmental activities (26.6%). They are somewhat less interested in reading, writing, and reciting activities (13.4%), while some other activities were recorded by 5.61% of pupils. None, that is, no activities in the school were chosen by a negligible 12 students (0.6%). Among the activities that students wrote themselves are household/cooking, dressing, etc. (0.6%), architecture and design (0.5%), mathematical activities (0.4%), foreign languages (0.4%), activities in psychology and health (0.4%), activities in history and geography (0.3%), acting, dance and film (0.2%), and activities in economics and finance (0.1%).

When it comes to gender differences in the choice of elective teaching of technical culture (Table 2), a statistically significant difference ($X^2 = 626{,}870$) was observed at the level of statistical significance $p = 0.000$. The differences are noticeable for the content of automation, robotics, programming, and electrical engineering, and electronics, which were chosen largely by the boys. In addition, differences were expressed for the content of wood processing/modeling, technical drawing, and ecology, which were largely chosen by the girls.

Table 2. Differences between girls and boys in choosing the content of elective technical culture classes

Elective classes content	Gender		Sum
	Boys	Girls	
Automatics	168	56	224
Robotics	475	335	810
Programming	507	297	804

Wood processing	289	436	725
Metal processing	204	156	360
Informatics	462	373	835
Technical drawing (design)	202	347	549
Electrical engineering and electronics	366	151	517
Traffic culture	162	181	343
Construction and housing	281	273	554
Ecology	144	372	516
Nothing	29	29	58
Other content	34	46	80
Sum	3323	3052	6375

$X^2 = 626{,}870$, $df = 13$, $p = 0{,}000$

Regarding age differences in the selected content of elective teaching of technical culture (Table 3), statistically significant differences were also observed ($X^2 = 158{,}829$) at the level of statistical significance $p = 0.000$. However, the differences here are not as pronounced as for the gender of the pupils. It is worth noting that the interest in robotics is significantly higher in the 6th grade, that the interest in programming decreases with the age of students and those 6th-grade students are most interested in woodworking. At the same time, the differences in the interests for the metal processing content are significant between 7th-grade pupils, who want it the most, and other grades. 5th-grade pupils expressed a significantly higher interest in technical drawing, while 6th-grade pupils were most interested in electrical engineering and electronics. In addition, 5th graders are significantly less interested in the contents of the construction and ecology compared to others. It should be noted that the interest in informatics is significantly different between 6th and 8th-grade pupils, in which it is the smallest. In contrast, interest in ecology is significantly higher in 8th grade, especially compared to 5th grade. There is a uniform interest of pupils in the contents of traffic culture and automatics.

Because more than 20% of the selection of activities under "other" and "nothing" was below 5, the statistical significance of gender and

age differences of desired activities in school was determined only for activities whose values were appropriate for statistical processing.

Table 3. Age differences in the selection of the content of elective teaching of technical culture

Elective classes content	Class				Sum
	5th	6th	7th	8th	
Automatics	60	63	49	52	224
Robotics	222	228	189	171	810
Programming	218	211	195	180	804
Wood processing	160	209	188	168	725
Metal processing	67	94	106	93	360
Informatics	213	236	207	179	835
Technical drawing	155	144	124	126	549
Electrical engineering and electronics	108	162	119	128	517
Traffic culture	85	87	92	79	343
Construction and housing	120	163	136	135	554
Ecology	99	129	132	156	516
Nothing	12	20	11	15	58
Other content	21	17	24	18	80
Sum	1540	1763	1572	1500	6375

$X^2 = 158,829$, $df = 39$, $p = 0,000$

Gender differences among chooses desired school activities (Table 4) also proved to be statistically significant ($X^2 = 665,666$) at the level of statistical significance $p = 0.000$. The differences between girls and boys are most pronounced for music and art activities, language activities, environmental activities, and science experiments, with convincingly more girls wanting such activities at school. Differences were also expressed for activities on assembling devices and robots and computers activities, with significantly more boys wanting such activities at school. The smallest differences are present for sports activities and for activities of products developing and manufacturing.

Table 4. Gender differences in chooses of desired school activities

School activities	Gender		Sum
	Boys	Girls	
Product development and manufacturing	417	478	895
Assembly of devices and robots	473	258	731
Ecological activities	194	375	569
Computer activities	572	331	903
Music and art activities	152	483	635
Sport activities	636	578	1214
Experiments in physics, chemistry, biology/nature	389	534	923
Writing, reading, reciting (language activities)	69	218	287
Sum	2902	3255	6157

X^2 = 665,666, df = 8, p = 0,000

When it comes to age differences in the choices of desired activities in school (Table 5) and here this difference is statistically significant (X^2 = 74,264) at the level of statistical significance p = 0,000. However, the differences are significantly less than gender differences. Differences are noticeable between 5th grade pupils and other grades in terms of ecological activities and experiments in sciences, with 5th grade students being significantly less interested in such activities. 7th graders are significantly more interested in products development and manufacturing, especially compared to 5th graders. 6th graders are more interested in assembling devices and robots than pupils in other grades. There is also a difference in pupils' interest in computer activities, with 8th grade pupils being the least interested in such activities, and the difference is significant between 8th and 6th grade pupils. The differences are the smallest for sports activities, and there is even interest in language activities, although significantly lower compared to other selected activities.

Table 5. Age differences in the selection of the desired activity of pupils in school

School activities	Class				Sum
	5th	6th	7th	8th	
Product development and manufacturing	190	224	247	234	895
Assembly of devices and robots	177	202	184	168	731
Ecological activities	117	159	149	144	569
Computer activities	228	248	223	204	903
Music and art activities	168	151	157	159	635
Sport activities	309	309	304	292	1214
Experiments in physics, chemistry, biology/nature	190	255	246	232	923
Writing, reading, reciting (language activities)	67	74	65	81	287
Sum	1446	1622	1575	1514	6157

$X^2 = 74{,}264,\ df = 24,\ p = 0{,}000$

4. Discussion

Although currently in the Croatian education system pupils do not have the opportunity to enroll in elective classes of technical culture, it is clear from the results of the research that the vast majority of students (97%) would do so if there was such an opportunity. Nevertheless, most pupils chose content related to informatics (39%), which over time has been separated into a separate subject and is currently taught as a regular and elective subject in primary school. In the subject Informatics, the domain Computer Thinking and Programming (OG 22/2018) includes activities that are correlated with the technical culture content related to robotics and automatics. However, this content is not suitable for all students, but only for those who express the development of logical-mathematical intelligence, which Gardner (1999) refers to as a special type of intelligence. This justifies including such content in electives or extracurricular activities for students. If IT contents are

singled out from this share, the share of pupils who would choose an elective content of technical culture is still extremely high, and only about 3% of pupils do not want any elective classes in this subject/area. This finding clearly indicates that these contents and activities should be provided to primary school pupils, especially because 1 hour of teaching per week in the subject of Technical Culture certainly cannot provide an opportunity for further development of competencies in engineering and technology (Purković *et al*., 2020). The research findings also show that pupils' perceptions of the importance of technical culture have changed significantly during the previous two curricular reforms, i.e. since 2006, when the last comprehensive survey of students' perceptions of such importance was conducted. At that time, the perception of the importance of the subject Technical Culture was relatively low assessed by pupils (Marušić, 2006), which was to be expected given that the teaching that preceded the research was realized as a history of technology. It is also important to point out that this research focuses on what students want to do in school, not on their preferred subject. This is important for organizing school instruction and changing methods, approaches, and learning strategies because students' expressed desire for activities is more than evident. We believe that attitudes toward subjects are different from attitudes toward activities related to those subjects. Of the other elective contents of technical culture, as expected, robotics, programming and wood processing-modeling dominate, which to some extent confirms the interest of pupils from the previous research of pupil preferences (Suman and Purković, 2018). Although a significant proportion of pupils (about a quarter) chose technical drawing — design, construction, ecology, and electrical engineering and electronics — we expected more pupils to choose some of these contents. As expected, differences in content selection are present concerning the age and gender of the pupils. While the contents of automatics, robotics, programming, metal processing and electrical engineering and electronics are mostly interesting for boys, the contents from wood processing-modeling, technical drawing-design and ecology are more interesting for girls. Only traffic culture, construction and housing, and informatics can be considered equally interesting for both genders. When it comes to age differences, individual contents, despite small differences, can be considered universally applicable. These are

automatics, programming, traffic culture, technical drawing and only conditionally robotics and informatics. Nevertheless, it is noticed that pupils' interests in most content decreases with maturation, which may indicate that the content is no longer interesting to them, but also that the way in which existing activities are implemented is not challenging and significant enough for pupils. Although woodworking/modeling is a highly selected content in each grade, it is significant that 6th grade pupils most often choose it. 6th grade pupils also most often choose construction contents and, which is unexpected, contents from electrical engineering and electronics. 7th grade pupils most often choose metal processing and construction, while 8th grade pupils convincingly most often choose ecological contents. These last two findings indicate that students still need a certain level of physical and mental maturity to master such content or to make sense to them. Age and gender differences indicate certain regularities that appear in previous research (Suman and Purković, 2018; Purković *et al*., 2020), which may be significant from the point of view of operationalization of some future elective teaching of technical culture.

While the results related to the selection of elective contents of technical culture are closely related to the technical and IT area of the curriculum, the results of research on the selection of school activities are significant from the point of view of overall general and compulsory education in Croatia. From these results it is clear that students would most often choose sports activities, which was expected, but also speaks in favor of their awareness of the importance of such activities for their own development. What is very surprising is that after these activities, students most often chose experiments in science, which is very important from the point of view of the development of competencies in the so-called STEM area. Namely, after the education reform of 1997, most of these activities were partially or completely removed from general education in Croatia and, despite efforts through the last two reforms, it was never returned to the level of 30 years ago. This speaks in favor of the thesis that it is very easy to demolish something that has been built over the years, and it is very difficult and time-consuming to build it later. This finding definitely indicates the awareness and interest, but also the need of pupils for such activities. In addition, the high share of choice of activities such as working on computers,

making objects and products, assembling robots and devices, but also art and music and environmental activities indicate the need to transform learning and teaching in primary education to active, situational and contextual (Purković *et al*., 2020). It is noticeable that a respectable share of students perceived language activities as important for their own development, which is significant and completes the structure of some future primary education in Croatia. What does not go in favor of the existing structure of primary education in Croatia is that only a small number of pupils perceived some existing activities as something they would like to do in school. These activities include math activities, history and geography activities, but also activities from all other subjects in the school that pupils would never choose if they could choose what to study and do at school. This finding indicates the need for a radical transformation of primary education in Croatia, which should abandon the current traditional and fragmented curriculum. In doing so, it should focus on meaningful activities of pupils that should take up most of the time spent in school, while the traditional teaching (lessons) should be reduced to a minimum time (Purković *et al*., 2016). This means that pupils should be given significantly more time for their own activities, in which the teacher should interest and motivate them. At the same time, there should be significantly less time for typical lessons, as they prevail today in primary school. Gender differences in the choice of activities in school are mostly significant and only to some extent expected. Thus, boys would most often assemble robots and circuits at school and practice computer activities, while girls would be more involved in environmental activities, art and music activities, science experiments and language activities. This supports the need for a modular approach to teaching when it comes to these activities. Girls and boys would be equally involved in sports, as well as in the making of objects and products, although, surprisingly, more girls would be involved in these latter activities. This means that sports activities and activities on product design and development are something that should be mandatory for everyone in the primary education curriculum. Although the subject of physical education and health is compulsory in primary school, pupils' statements show that this is not enough for most pupils. As for product design and development, such activities are not a focus at all in Croatian primary schools, which directly shows how much time is allocated

for such activities in the curricula. When it comes to age differences, they are the least statistically significant for the choice of school activities. It is worth noting that sports and language activities are equally selected in all grades and that the 6th-grade pupils would deal with the largest number of activities. 7th grade pupils in a slightly larger share choose product development and manufacturing activities, and 8th grade students choose language activities. Such findings probably indicate that the age of 6th grade pupils is the "breakthrough" limit in which pupils should be provided with the most different experiences, and thus prepare a variety types of activities. At the same time, from 7th grade onwards, pupils can approach more serious product development, while language activities begin to be perceived as a challenge probably from 8th grade. Although these latter explanations are grounded in this research, they require a whole range of additional research in order for the stated claims to be unequivocally and confirmed.

5. Conclusion

Elective classes and activities implemented by pupils in primary school can significantly improve their competencies, positively affect the discovery of their own preferences and abilities, enable self-realization of pupils, but also make teachers more successful and the school recognizable. The interests of pupils are an indicator that every society should consider when planning such classes. These starting points are an important reference point by which the entire education system can be dynamically improved.

When it comes to pupils' technological and engineering competencies, pupils in Croatia currently do not have the opportunity to attend elective classes, and the choice and quality of school activities is very limited (Purković, 2015; Purković *et al*., 2020). An exception could be the teaching of Informatics in the 7th and 8th grade, which cannot be considered a relevant elective in the context of this study. In order to avoid speculation about what primary school pupils in Croatia want to learn and do in school, this research was launched to provide answers to these questions. The research showed that more than 95% of pupils would choose some of the contents of elective classes in technical culture, if such elective classes were held in Croatia. The research also

gave a clearer picture of the structure of activities that pupils would be happy to engage in school, if such activities were provided to them. The dominant activities for which Croatian pupils expressed the greatest interest relate to sports, science, IT and technical (engineering) activities. If significant proportions of art, music and language activities are added to this, a clear structure of school activities is obtained that is relatively independent of age and gender differences. Such a structure of pupils' interests, both in the elective teaching of technical culture and in school activities, in many segments is a critique of the current traditionalist and subject-limited system of primary education in Croatia. Primarily because many existing subjects and contents were not perceived by pupils at all as something that was meaningful and interesting to them. The findings therefore point to the need to transform primary education by drastically shortening the time for traditional lectures, while most of the time should be devoted to pupil activities in areas of their interests. At the same time, many contents of existing subjects could be integrated into such activities. Above all, this means reducing a large number of compulsory subjects, introducing elective modules, and intensifying strategies such as project-based learning, problem-based learning, and other modern approaches and strategies of active learning. Such strategies are partially present in the Croatian education system, but very often they are not the case because they only provide ready-made solutions in a somewhat more complex form.

Despite such findings, the fact that the interests of pupils are a dynamic category that depends on many factors of the current social and civilizational moment should be considered, so it should be scientifically questioned from time to time. Also, the transformation of education as it results from this and similar findings is not something that can be carried out simply and in a short time. For such a transformation, it is first requiring changing teachers' awareness of the need to critically reflect on the importance of their own teaching (Svendsen, 2016) and the need to collaborate to organize, perform, and solve problems (Mora-Ruano *et al*., 2019). Such cooperation cannot be forced or prescribed, because then it becomes highly formalized and thus counterproductive. In doing so, education authorities urgently need to work on a meaningful framework that will enable such a transformation.

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INTERESI UČENIKA OSNOVNE ŠKOLE ZA IZBORNU NASTAVU TEHNIČKE KULTURE I ŠKOLSKE AKTIVNOSTI U HRVATSKOJ

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Učenikova mogućnost izbora sadržaja učenja tijekom općeg obveznog obrazovanja važan je korak ka individualiziranom razvoju. Unatoč proklamiranim potrebama društva za razvojem kompetencija u tzv. STEM području, u hrvatskom su obrazovnom sustavu aktivnosti iz ovog područja najmanje zastupljene u kurikulumu općeg obrazovanja. Stoga je provedeno istraživanje interesa učenika za izbornu nastavu tehničke kulture te za aktivnosti koje bi odabrali kad bi mogli birati što će u školi učiti i raditi. Istraživanje je provedeno na stratificiranom uzorku učenika osnovnih škola u Hrvatskoj (N = 2155) u dobi od 11. do 15. godine života. Analizom rezultata istraživanja ustanovljeno je da su aktivnosti iz IKT-a, robotike, programiranja i modelarstva najatraktivnija područja za izbornu nastave tehničke kulture. Kad je riječ o aktivnostima u školi, učenici bi najradije odabrali sportske aktivnosti, a potom slijede informatičke, prirodoznanstvene i tehničke aktivnosti. Ovakav nalaz ukazuje na nužnu preobrazbu školskog kurikuluma koji će učenicima omogućiti razvoj u skladu s njihovim interesima.

Ključne riječi: *izborna nastava, izvannastavne aktivnosti, kurikulum, opće obvezno obrazovanje, tehnička kultura*