SURVEY OF THE CURRENT SITUATION OF THE IMPLEMENTATION OF POLYTECHNIC EDUCATION IN KINDERGARTENS AND PRIMARY SCHOOLS IN THE CZECH REPUBLIC

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Abstract

From a long-term point of view the educational system of the Czech Republic faces with the current issue of integrating the field of polytechnic education into its curriculum. This long-underestimated situation is to be changed in the near future by a sophisticated STEM system (Science, Technology, Engineering and Mathematics), representing one of the key competencies within the new concept of the curriculum. Improving the quality of polytechnic education will be bulit on supporting preschool age children and, within the adherence to pedagogical principles, on developing their technical thinking at all levels (practical, visual, intuitive and conceptual thinking) with an emphasis on the practical applicability of skills. Equally important is to develop fine motor skills and technical creativity in connection with new technologies, including teacher training in the given areas, but also the involvement of practitioners in teaching. The presented article aims to present the current state of implementation of polytechnic education and current needs of schools in the Moravian-Silesian region. The preparatory and testing phase took place as a subject of activity of the project Local Action Plan for the Development of Education of the Municipality with Extended Competence Ostrava and a total of 120 respondents from primary schools, kindergrtens and art schools took part in the survey, of these 20 respondents answered two questionnaires separately (primary and kindergarten), 67 questionnaires came from primary schools, 66 questionnaires from kindergartens and 7 from elementary art schools. In total, we analyzed 140 questionnaires. The authors of this article actively participate in the solution of this project and participated in the preparation of a questionnaire for the survey.
Keywords: evaluation of teachers, pedagogy, polytechnical education, pupils.

1 INTRODUCTION

The word polytechnic comes from the Greek word poly, "many" + technikós, "art", "ability", colloquially also only technique [1]. In recent years, we have worked with the definition of "polytechnic education", exclusively in secondary and higher education, which defines polytechnic education as an education providing knowledge of scientific principles and sectors of production, technical knowledge and technical skills in general [2]. Polytechnic education in a modern sense must be incorporated into the period of preschool pedagogy, so it is closely connected with activities in kindergarten.

The main goal of polytechnic education in kindergartens and subsequently in primary schools is the systemic didactic effect of the teacher on the cognitive, affective and sensorimotor learning objectives leading to the acquisition and deepening of pupils' knowledge, work skills, habits and attitudes. Other important goals include the practice of handling activities leading to the development of fine motor skills - working with tools, utensils and materials or the student's reflection on the relationship between technology and the environment. Equally important is the affective component in the sense of supporting a positive relationship of students to technology in everyday life.

If we compare the situation in the Czech Republic with abroad, we find that in some countries a separate subject focused on technology or work has never existed in primary schools or has been canceled in recent years (3). These topics are then included in more broadly conceived subjects (4,5,6). In other countries, these separate subject exists, for example in the United Kingdom, Slovakia, Denmark and Sweden.

Primary school (K-6) technology education in The Netherlands is part of an integrative learning domain called ‘natuur en techniek’ (nature and technology), which was introduced around the year 2000, but is structurally implemented in only a small number of curricula. For the entire learning domain, seven standards are formulated, two of which are specifically concerned with technology education: (1) pupils learn to find connections between the functioning, design, and use of materials of products in their own environment, and (2) pupils learn to design, realise, and evaluate solutions for technical problems (7).

Polytechnic education in the Czech Republic pursues even higher goals than work education, as it seeks to ensure that students acquire not only selected manual skills in working with materials (which can be used interdisciplinary - for example, training in drawing materials can be combined with mathematics), but also awareness of key processes in technology (what is the essence of how things work), the ability to learn to control the necessary technical devices and equipment, the ability to apply technical knowledge in practice, etc.
The educational content of the educational field Man and the World of Work at primary school is divided into four thematic areas, all of them are compulsory for the school:

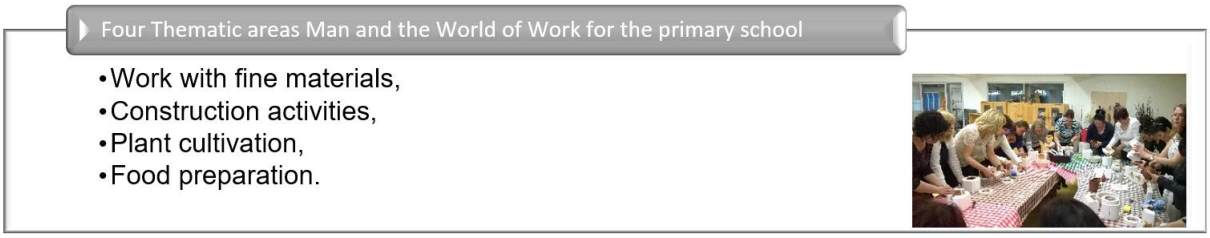

Figure 1. Thematic areas Man and the World of Work for the primary school

At lower secondary school, the educational content is divided into eight thematic areas:

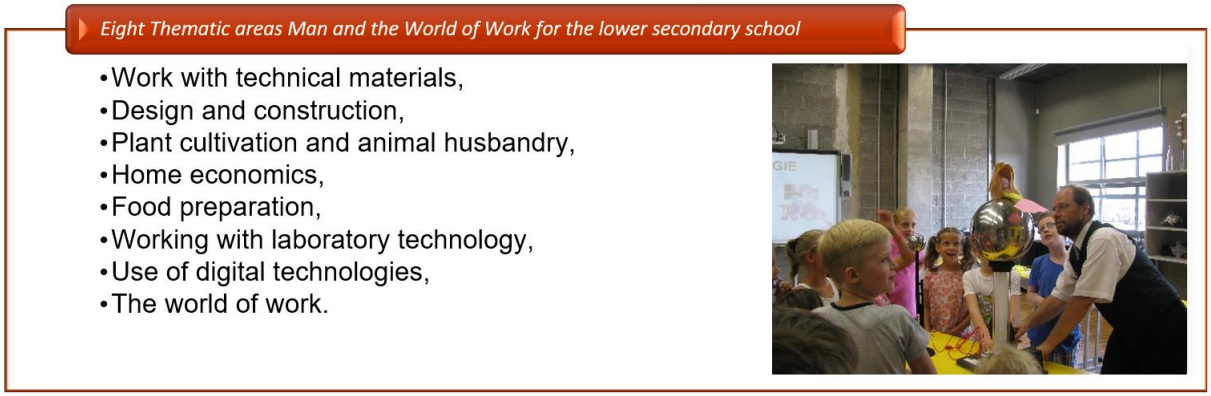

Figure 2. Thematic areas Man and the World of Work for the lower secondary school

The thematic areas at lower secondary school make an offer, from which the thematic area The World of Work is obligatory, and schools select at least one other area from other areas according to their conditions and pedagogical intentions. Selected thematic areas must be implemented in full. The thematic area World of Work is compulsory for all pupils in full and due to its focus on the choice of future job, it is appropriate to place it in the highest grades of the lower secondary school (8).
Basically, we can distinguish two levels ensuring quality polytechnic education of pupils.
1. The quality of education depends on the teacher's abilities, knowledge and his/her own desire to improve, consequently, the quality of the activity of the polytechnical education institution mainly depends on the teachers' high-quality activity, their ability to continuously improve and develop their competences, therefore, professional development processes become inevitable as a factor determining the development of the individual and the organization and the professionalism of the teacher. A very important factor is also the teacher 's approval and the connection of the pedagogical' s professional life with the practice of a modern company in the manufacturing industry.
2.
For the implementation of polytechnic education, schools need well ensured conditions of material and didactic aids, including workshops and laboratories, which comply with the correct principles of safety according to applicable European standards. The key aspect of the issue is also based on the regular interval of the supply of a sufficient amount of financial subsidies, thanks to which the school carries out regular maintenance and renewal of tools, machinery, purchase of consumables, or payments of external staff from expert teams.These high demands on the conditions for the implementation of polytechnic education must be met, because otherwise the teaching of polytechnic subjects is a formalism, demotivating for students, exhausting for teachers and as a result does not achieve the expected outcomes.

2 METHODOLOGY

The presented article aims to present the current state of implementation of polytechnic education and current needs of schools in the Moravian-Silesian region.
The preparatory and testing phase took place as a subject of the project activity Local Action Plan for the Development of Education of the Municipality with Extended Competence Ostrava, project registration number: CZ.02.3.68/0.0/0.0/17_047/0009132. The online survey was launched on March 1, 2021, and data collection was closed on March 14, 2021. A total of 120 respondents from primary schools, kindergartens and art schools participated in the survey. Of these, 20 respondents answered two questionnaires separately (primary and kindergarten), 67 questionnaires came from primary schools, 66 questionnaires from kindergartens and 7 from primary art schools. A total of 140 questionnaires were analyzed.

The main goal of the exploratory survey was to find out what are the current preferences and needs of selected schools in the Moravian-Silesian Region in the issue of practical implementation of polytechnic education.

Another aim of the paper is to interpret the views and recommendations of kindergarten and primary school teachers in the Czech Republic and compare international experience with other countries that would improve the preparedness of these institutions in an inclusive approach to polytechnic education.

Respondents answered a total of 14 questions:

1. Does your school have enough funds to equip workshops? If so, where do these funds come from?

2. Does your school have educational materials for polytechnic education and a sufficiently equipped workshop/sufficient aids for teaching children/pupils?

3. Does your school cooperate with high schools, universities or technical research institutes? If so, which secondary schools, universities or research institutes do you cooperate with?

4. Does your school cooperate with other kindergartens/primary schools in the field of polytechnics?

5. Does your school cooperate with parents in the field of polytechnic education?

6. Does your school support children's/pupils' interest in the field of polytechnics by connecting knowledge with everyday life and future occupations?

7. Who is in charge of teaching workshops in your school?

8. Would you welcome an external or shared expert for teaching polytechnic workshops?

9. Do you have sufficient financial resources to provide an external expert for teaching workshops and dividing children/pupils into smaller groups for polytechnic teaching?

10. Does your school use the programs "Small Technical Universities", "Improve your technique (VŠB-TUO) or similar programs for experiential learning?"

11. Does your school participate in polytechnic competitions?

12. Does your school support individual work with children/pupils with a special interest in polytechnics?

13. Does your school use ICT in the development of polytechnic education?

14. Is your school interested in training teachers in the field of polytechnics?

Due to the scope of the survey, in the third part we will analyze only selected results.

3 RESULTS

Exploratory question 2: Does your school have sufficient educational materials for polytechnic education and a sufficiently equipped workshop/sufficient teaching aids for pupils?

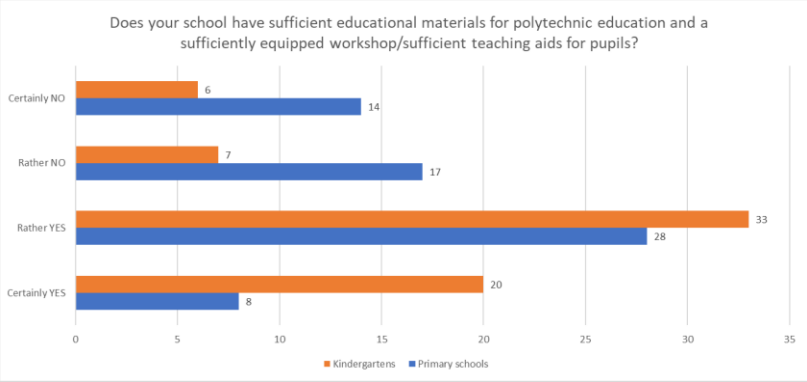

Figure 3. Comparative results from kindergartens and primary schools in the issue of equipping with educational materials and material-technical base. (Source: Own processing)

The results show a big difference between kindergartens and primary schools. As many as 80 % of kindergartens state that their workplace has educational materials available for polytechnic education and a sufficiently equipped workshop/sufficient aids for teaching pupils, only 20 % of kindergartens find this provision insufficient. At primary schools we already received only 54 % of positive answers and 46 % of negative ones, which clearly indicates the absence of polytechnic teaching materials and equipped workshops.

Exploratory question 4: Does your school cooperate with other kindergartens/primary schools in the field of polytechnics?

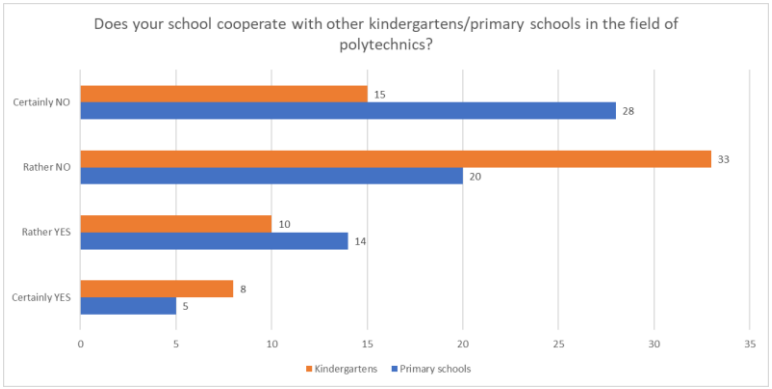

Figure 4. Comparative results from kindergartens and primary schools - the issue of cooperation in the field of polytechnic education with other institutions of the same character. (Source: Own processing)

Cooperation between institutions of the same type in the field of polytechnic education is at a very low level. Almost ¾ (or 73 % in kindergartens and 72 % in primary schools) did not establish any cooperation in this direction.

Exploratory question 6: Does your school support pupils' interest in the field of polytechnics by connecting knowledge with everyday life and future job?

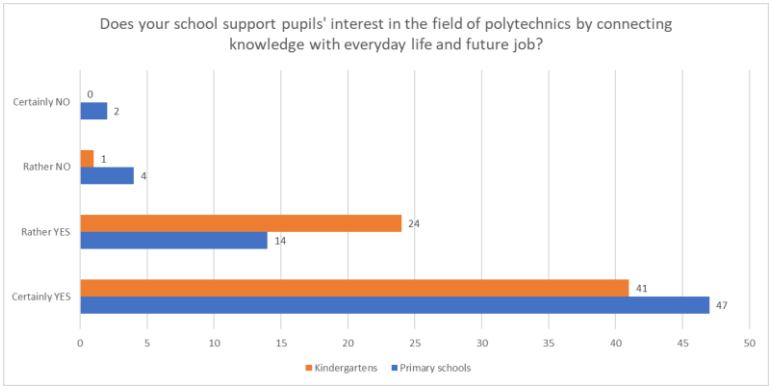

Figure 5. Comparative results from kindergartens and primary schools - the issue of supporting pupils' interests in the field of polytechnics and its knowledge connection with everyday life and future job. (Source: Own processing)

In both types of institutions, the issue of the interconnection of polytechnic education with the knowledge portfolio in the field of everyday life is given a lot of space. We received a positive response from 98 % of kindergartens and 91 % of primary schools.

Exploratory Question 14: Is your school interested in training teachers in the field of polytechnics?

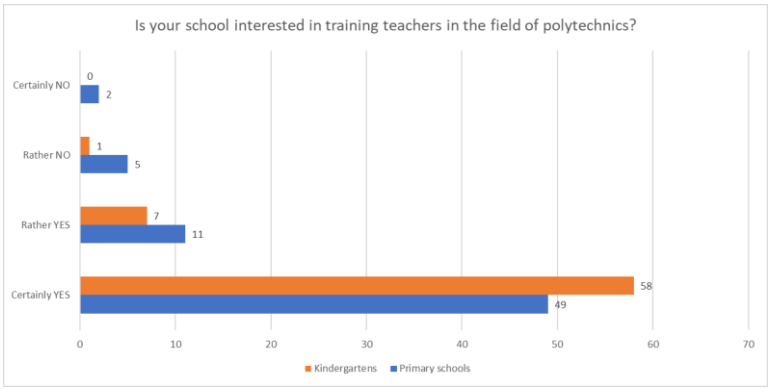

Figure 6. Comparative results from kindergartens and primary schools - the interest of further education of teachers in the field of polytechnics. (Source: Own processing)

As can be seen from Fig.6., the vast majority of primary schools and kindergartens would like to educate their teachers in the field of polytechnic education, so it is necessary to satisfy this demand with well-accredited courses led by experienced teachers who pass on many ideas and tips to enthusiastic teachers of primary schools and kindergartens throughout the Czech Republic.

4 CONCLUSIONS

From the results of the regional measurement, partial results were presented, these results analyze the situation in the area of the current state of implementation of polytechnic education at kindergartens and primary schools in the Czech Republic.

The second exploratory question clearly shows the preferential difference between the two institutions, where kindergartens are probably better prepared in the field of polytechnic education, where up to 80 % of kindergartens representatives state that their workplace has educational materials for polytechnic education and a sufficiently equipped workshop/sufficient teaching aids for pupils.

The weakness was revealed by the survey in question no. 4, when it was found that in the field of polytechnics, only one in four institutions cooperates with each other, so there is no active exchange of experience between teachers, and in this sense the situation needs to be rectified.

Both types of schools try to support pupils' interest in the field of polytechnic by connecting knowledge with everyday life and future job, and they are also interested in educating their teachers in the field of polytechnic education. The Department of Technical and Vocational Education, Faculty of Education, University of Ostrava is open to this idea and ready to help institutions to implement specific requirements, either on the basis of individual courses, training, lifelong learning or on the basis of a bachelor's degree.

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The online survey was launched on March 1, 2021 and data collection was closed on March 14, 2021.

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