Technical education in kindergarten and primary school - creative preparation for adult life

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***Abstract*— Today's school is intended to provide students with comprehensive development of their personality and prepare them for life in a dynamically changing reality. Curricula should keep up with these changes, which include the economic and socio-cultural spheres, as well as the development of scientific and technological civilization. The tool thanks to which the school can fulfil this task is undoubtedly technical education, introduced at the first stage of education, i.e. in kindergarten and in grades I-III of primary school, and then continued in later years. This article will allow you to understand how properly selected technical education curriculum content, especially in correlation with other school subjects, based not only on simple manufacturing work, but also on introducing the world of technology in general, can constitute the basis for creative and responsible preparation for adult life.**

Keywords— technical education, technology, integrated teaching, creativity.

I. INTRODUCTION

One of the many tasks set before the school is to ensure the comprehensive development of the personality of a student who will live, work, and create in a dynamically changing reality (Bubak et al., 2004, p. 24). In this context, the words contained in the textbook "Didactics of Technology" from 1985 seem to be extremely up-to-date, where already in the introduction it is noted that a modern school must take into account in its work not only the economic, social and cultural, but also the technical consequences of the developing scientific and technical civilization. Curricula - goals, content and methods of education - should take into account ongoing changes and prepare the young generation not only to rationally use the benefits of progress, but also to actively participate in its enrichment and development (Pochanke, 1985, p. 23). An excellent tool to introduce students to the world of technology and science is technical education, which students are exposed to from an early age. Technology lessons in kindergarten and primary school should not, as Drost-Rudnicka notes, be based only on the concept of manualism, where the emphasis is mainly on the development of the manual and motor spheres. This approach does not exhaust the potential of general technical education classes, which significantly support multiple activities, including emotional, receptive, sensory, verbal and intellectual (Drost-Rudnicka, 2019, p. 113). The world of objects, phenomena and technical events in which the child lives allows him to acquire new skills that turn out to be useful in shaping his personality (Kochanowska, 2020) [accessed May 5, 2024].

II. ASSUMPTIONS AND TASKS OF TECHNICAL EDUCATION

The basic condition that should be met by effective technical education of preschool and school-age children is the integration of theoretical and practical knowledge of basic things, activities and phenomena related to technology

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(Kochanowska, 2020) [accessed May 5, 2024]. The concept of technology itself is very broad, because - according to the PWN Encyclopedia - it is a field of human activity whose goal is to produce things based on knowledge (on a scientific basis) and to cause phenomena that do not occur in nature and to transform the products of nature; the main factor in the development of civilization and, together with science, an important component of culture (Encyclopedia PWN, 1999) [accessed May 5, 2024], therefore students should be introduced to the world of technical education carefully, in an accessible but interesting way, adapted to their age and capabilities. Children have an innate curiosity, and willingness to act and help, so it is worth creating conditions from the very beginning for them to engage in all kinds of construction games, tinkering, constructing buildings, or even technical devices, they should also be able to participate in repairs of devices and observe the construction of machines. However, for them to have a chance to gain experience in this matter, they should be allowed to use tools, binders and materials as often as possible. This will result not only in the improvement of motor skills but also in the acquisition of newer construction ideas, as a result of which creativity and imagination will develop (Jelinek, 2014, pp. 257, 258, 263). Constructing teaches the analysis of the structure of objects and also develops spatial orientation regarding the recognition of spatial relations between objects. Mastering the structure of space is an important aspect in the process of acquiring writing skills because it improves the child's abilities in terms of arranging the space of the page, where to start the lines, and the distance between them (Prątnicka, 2022, p. 117).

Komeński, Pestalozzi and Dewey believed that young people should learn by doing (Kupisiewicz, 2012, p. 140). These postulates are now rightly used in classrooms, and the introduced project methods and practical activities are becoming more and more popular and bring excellent results.

The use of the project method, which involves combining content from various scientific fields and theory with practice, already in early school education promotes the independence of students, and they will use it as adults more often, the more creative their profession in the future will be. Szymański, taking into account the optimal conditions for the mental development of children and adolescents, sees several advantages of this method, i.e. stimulating cognitive, emotional and motor development, taking into account the individual needs, interests, and abilities of students, developing creative thinking, strengthening cognitive motivation and integrating school knowledge and extracurricular activities (quoted in Kraszewski, 2002, p. 58).

When looking for other advantages of using this method, it is worth paying attention to issues related to the concept of the so-called new professionalism. It is closely related to the fact that in the labor market there is and, according to forecasts, there will be a demand for employees who are characterized by the ability to think flexibly, the ability to self-educate, creativity, communication skills, the ability to work in a team, calculate risk and take initiative (Kraszewski, 2002, p. 58). If a student - with the support of an educator - starts training in these competencies from an early age, and technical classes provide a lot of opportunities for this, he will be a desirable candidate in the labor market in his adult professional life.

In technical education, methods based on the practical activity of children and young people include, as Kupisiewicz writes, a wide range of activities, which include, for example, processing wood and other materials, work performed in workshops, in school gardens, operating various devices (cameras, computers) or creating a technical drawing. When using these methods - let us emphasize it once again - we should remember the principle of combining theory with practice, and it is also advisable to familiarize students with the full cycle of work organization, only part of which they are supposed to master during classes. They should understand the purpose of the task being performed, analyze the conditions for its implementation, prepare a work plan and schedule, prepare the necessary materials and tools, perform them and assess their quality (Kupisiewicz, 2012, p. 143).

The main goal of technical education is to teach basic practical and technical skills that will be useful in everyday life. The theoretical knowledge provided to students should be closely related to practice, because only then will it bring the expected result. Technical education classes should encourage the awakening of students' interests and cognitive inquisitiveness in the field of technology, as well as influence the social development of students' desired attitudes (Mincewicz, 1995, p. 7).

It is important not to be afraid to use practical methods when working even with the youngest preschoolers. Jakub Tylman, teacher and author of the book How to Color School, recalls that at the beginning of his professional career, he decided to make cakes with a group of twenty-five four-year-olds. His colleagues did not believe in the success of this project, he was aware that the cakes would not be like those made in a confectionery shop, but he knew that they would be unique because they were made by his students. The children could prepare the cream themselves and decorate their cake as they wished. Tylman noticed only the advantages of this task. It aroused joy, interest, curiosity, creativity, commitment, and full concentration in preschoolers, which only reinforced the belief that such activities were worth undertaking. Standard classes where you only talked about making a cake, or showed a film about it, or where you colored the cake on a piece of paper or built it from blocks, would not bring the desired results. Learning is best, especially for children, through experience. Practical classes stay in your memory for longer, unlike strictly theoretical ones. Textbook knowledge is less durable than that acquired through knowledge, practical experience, and creative lessons - not only interestingly told, but also supported by memorable examples. Students like such creative activities and usually remember them fondly, which encourages further learning and expands knowledge (Tylman, 2023, pp. 18, 19).

Drejer (quoted in Drost-Rudnicka, 2019, p. 110) states that in the first years of education, a child moves from play activity to one regulated by the requirements of achieving both operational and organizational skills. By developing the mechanism of action (motor skills), the student simultaneously develops the mechanism of thinking (intellect) and the

mechanism of perception (sensory). The derivative of these processes is the formation of moral, social and aesthetic values.

III. Axiological importance of technical education

The wide scope of application of technical education at school and outside its walls, in everyday life, can be an excellent opportunity to convey to students in various situations how important it is to respect not only their own, but also other people's work. Technology classes can be used in the educational process to show how important it is to shape work culture (Chałas, 1991, p. 7). In addition to respecting the products of human work and their proper use, technology lessons should promote the ability to act efficiently, effectively and efficiently, the ability to work in a team, the willingness to acquire knowledge and the pursuit of achieving a high level in performing tasks.

As a result of completing the technical education program, the student should - as Mincewicz writes - be characterized by socially valuable attitudes, which are manifested in the sense of responsibility for one's work and in the sense of co-responsibility for teamwork, cooperation with others when solving team tasks, and economical management of materials. , energy and time, understanding the need to harmoniously link the development of technology with the protection of the natural environment (Mincewicz, 1995, p. 8).

The educational goals of practical classes in primary school are, according to Chałas, introduction to productive activities, as well as shaping positive attitudes towards work, i.e. respect, commitment and its usefulness. The student should be characterized by thrift, discipline, responsibility, self-control, independence, courage in action, and should also develop - of course under the teacher's guidance - resourcefulness, systematicity, patience, perceptiveness, initiative and accuracy of action (Chałas, 1991, p. 7).

The goals set by Krystyna Chałas can be achieved not only through verbal methods, such as talks but also through direct observation of places where various technological products are presented - e.g. car showrooms, computer fairs, construction exhibitions... Such trips are extremely valuable. for children, because again - as was the case with Tylman's cakes - taken away from school desks and standard activities, they experience something new, alternative and interesting. Another way may be to conduct conversations about the parents' professional activities and general work-related issues, providing access to toys and technical literature, obviously adapted to the child's level of mental development. You can also learn about objects that are the result of engineering thought, i.e. bridges, dams, and construction architecture (Kochanowska, 2020) [accessed on May 5, 2024].

General technical education is considered by many experts to be a humanistic area. This involves the possibility of independently seeking the truth, and striving for goodness and beauty (Burkat, 2016, p. 165). Recognizing the humanistic dimension of technology makes the teacher have an extremely important task of making students aware that the value of technology depends on the way it is used: the same technical skill, or even the same technical device, can be used both to save lives and to destroy him. Guiding a student through the world of technology should not only develop operational efficiency and appreciation for the technical parameters of devices but also take care of the ethical dimension of the way technological products are used. Shaping the so-called technical morality, which is expressed in an increased sense of responsibility for one's actions of a technical nature, is particularly important today, when technological progress allows man to activate huge amounts of energy or control all kinds of devices with just one button (Bubak et al., 2004, p. .24, 25).

Another aspect that is worth focusing on in the process of introducing the student to the world of technology is to draw attention to the fact that technical objects did not appear in his environment out of nowhere, that they have not been there forever, but are a conscious, intentional and constant effect of human influence on nature (Kochanowska, 2020) [accessed May 5, 2024]. This can help develop in the student a sense of responsibility for the state of the environment: care for the proper operation of equipment, reuse of waste, or rational disposal of technical products.

IV. Creativity and technical education

Technical education, next to art and music, is a school subject where students can express and communicate their own experiences and thoughts to themselves and other people. A characteristic feature of children's expression is, above all, spontaneity, which is understood as unlimited activity resulting from the internal need for action. The child, unconsciously accumulating various types of experiences, after some time feels the need to release them. Therefore, he tries to communicate them in the form of, for example, a gesture or artistic activity, to establish contact with his immediate surroundings. Such self-expression should be allowed and even supported because all forms of expression protect the child against one-sided development and also have a positive impact on his or her mental development. An important source of a child's creative activity is a rich imagination, which fulfills several functions in a child's life, e.g. stimulating, and penetrating various areas of his life, i.e. play, artistic activities, or construction activities, which are so important in the case of technical education. A child's creative activity is determined by creative thinking - multidirectional, open thinking, which is characterized by fluidity, flexibility, originality and sensitivity to problems (Prątnicka, 2022, p. 109).

Free experimentation and creation support children in complex thought operations and problem-solving competencies, enabling them to gain experience with themselves and freedom of expression. Artistic works resulting from this freedom give children self-esteem and self-confidence (Braun, 2009, p. 135).

The concept of creativity is integrally accompanied by the concept of creativity. Although the etymological roots of the

word creativity indicate the creation of something new (Latin creare - to beget, to spend, to produce), it means not only the ability to create innovations, but also the ability to adapt to the dynamically changing requirements in our world (Braun, 2009; Tylman 2023). Creativity cannot be taught, everyone has their resources, but it can and is worth developing, starting in early childhood (Tylman, 2023, p. 34). It is considered a synonym for multidirectional, productive thinking and creative problem-solving activities, and thus becomes a desirable educational goal. It is a competence in life organization that improves until adulthood, transfers to all the dependencies of everyday life, and is not limited only to art. It should be supported by accepting the child's personality, its expression and its feelings, ideas and forms of expression (Braun, 2009, pp. 50, 51).

The child should be encouraged and motivated to be creative at every step: the student should look for different solutions to a given problem, e.g. using materials that are familiar to him, but he can use them in a completely new, unique way. You need to allow your child to experiment, be an explorer, learn from mistakes and find the right path. In technical education, motivation for creativity may be provided by enabling subject experiences using everyday things: building materials, foodstuffs, natural materials, tools, fabrics, adhesives... Subject experiences are gained through contact with natural materials and materials. utility. It is worth choosing everyday items that can change their role, use or even structure - pots, screws, nuts, twigs or pebbles collected during a walk. Subject-related experiences support the development of creativity and enable much-needed experimentation and construction. Often, technical education lessons at school are limited to small crafts - for example, weaving from strips of colored paper, which allows you to gain some manual skills and nothing else. But weaving on a really large loom, built on your own from sticks and strings, means you can imagine the creation of large-format fabrics and experiment with various fabrics and wools (Braun, 2009, pp. 67-69). Isn't this the essence of real, valuable technical education?

V. THE ROLE AND TASKS OF A TECHNICAL EDUCATION TEACHER

The many challenges facing a modern teacher include: keeping pace with constant changes and continuous improvement of one's skills in the context of emerging new tools and sources of pedagogical knowledge (Ripp, 2017, p. 14).

The main tasks of a technical education teacher include:

- supporting and integrating the child's mental, manual-motor, and socio-moral development,
- familiarizing students with the social and natural environment in which technology plays an increasingly important role,
- familiarizing children and young people with the essence and meaning of human work (Kochanowska, 2020) [accessed May 5, 2024].

The teacher cannot limit himself to merely imparting knowledge about the world of technology, but must support the child in entering this world, and use his natural cognitive curiosity and activity while carrying out technical education tasks. We can confidently and confidently accept the statement that this is the key task of a general technical education teacher. He is obliged to interest the student in all aspects of technology as a school subject and technology, the definition of which was given at the very beginning of this article.

An important role in technical education is played not only by the teacher's attitude but also by the conditions in which the lessons take place, the topics of the classes, and the teaching materials used during their implementation. These four points, connected and interacting with each other, should constitute the core of every lesson. The ideal lesson plan assumes that a creative teacher, competent, passionate, and very well prepared for work, both substantively and pedagogically, conducts extremely interesting classes in a fully equipped school room, preceded by a thematic trip to a technologically advanced factory, during which students will perform with great committed to innovative design using a variety of materials.

Krzysztof Kraszewski claims that the reality, unfortunately, is completely different: in the Polish system of general education, general technical education is implemented without in-depth theoretical foundations, as a result of which the pedagogical activity of teachers is often based on intuition. As a result, this leads to the implementation of mainly manufacturing tasks in technology classes focused on the simple processing of paper or textile materials (quoted in Kochanowska, 2020) [accessed May 5, 2024]. The classes themselves are conducted in a regular classroom, which does not create optimal conditions for their organization and does not support students' full achievements in all contents of the core curriculum (Drost-Rudnicka, 2019, p. 120). Another problem of the Polish school is the emphasis on teaching schematic thinking. Usually, there is no reward for coming up with a solution on your own, finding a solution, or using your method that will lead to a result in the task, but the use of a given method of completing the task is assessed. The teacher should be aware that he or she is the operator of children's creativity, and that the way young people will develop depends to a large extent on his or her approach. If he expects students to think in a specific way, without leaning in any direction, they will not be creative and the lessons will become more predictable. However, encouraging unconventional thinking and looking for innovative and creative solutions results in more engaged students, willing to deepen their knowledge, work extra hard, and develop their talents. As a result, the lessons will be more interesting, and the knowledge acquired in such conditions - as mentioned earlier - will be more memorable (Tylman, 2023, pp. 37, 38).

Children, as has been emphasized many times, have a natural cognitive curiosity, which can make the teacher's work easier if he uses attractive teaching resources. However, he should have at least basic knowledge of wood technology, textile and paper materials, plastics, and nutrition technology. What is important is his knowledge of the principles of operation of construction utility or technical objects, as well as knowledge of the

principles of solving technical problems (Ordon, Piwowarska, 2013) [accessed May 10, 2024].

Maria Montessori points out that to become familiar with the material, a teacher cannot be content with watching it, reading about it in a book, or having it presented by another teacher. He must exercise on his own for a long time, trying to assess the level of difficulty and which child may be interested in it. He should consider how he can present the given material and try to interpret, even if imperfectly, the impressions it may cause in the child (Montessori, 2023, p. 200).

Illustrative teaching aids play an important role in the process of student learning, but it is a mistake to use only means produced specifically for school purposes. This may create a false image of technical devices in students' minds because these aids are usually created without following the rules of technical construction. Therefore, greater cognitive effects could be achieved if these measures were used to help explain the structure and operation of natural technical devices. Damaged, decommissioned devices, e.g. donated to the school by students' parents, can be successfully used for teaching purposes (Jelinek, 2014, pp. 29, 30).

It is essential to remember that children have innate creative dispositions, which may, however, be disturbed by the inappropriate attitudes of educators. Therefore, they should pay attention to several rules, the observance of which should not limit the natural creative abilities of their students. First of all, teachers must treat children's questions with respect and seriousness, show respect for them, and appreciate the ideas generated during classes. It is necessary to avoid criticism, ridicule, and undermining the importance and rank of students' ideas. It is worth using these ideas during classes. You need to demonstrate to students that their ideas are extremely valuable by devoting time to discussing them (Prątnicka, 2022, p. 110). The teacher's task is not to forget to support students at various stages of their work. Some people just need to come up with an idea and they can spread their wings. Others need to be led by the hand and encouraged before they set off on their own. And some people are so confused that they don't know where to start. Getting to know your students and their working style, giving them the support they need, and spending time building relationships with students will result in great results in the form of their academic results (Ripp, 2017, p. 149).

VI. CONCLUSIONS

For years, technical education was treated as the so-called michałek, a school subject of little importance, unimportant, standing in one row with art, music, or physical education. Fortunately, more and more attention is paid to its utilitarian nature, the positive impact on the overall development of students is appreciated and the possibility, or even obligation, of correlation with other school activities is recognized. The world of modernity and permanent changes in which we live have forced a new approach to general technical issues and technology. Nowadays, general technical education is considered a field of universal and compulsory general education and upbringing, as an important component supporting the comprehensive development of young people (Burkat, 2016, p. 165). A wide range of content covering the subject of technical education ensures the implementation of tasks that face a modern school - a school that should keep up with the rapidly changing reality and which should prepare its graduates for the role of a conscious, self-confident adult citizen whose knowledge and attitude will take care of proper development of the environment in which he lives. Technical education successfully teaches from an early age how to combine pragmatism with the concept of a creative and imaginative approach to solving problem situations. The increasing popularity of this method and the expectations of the labor market prove that it is heading in the right direction.

VII. REFERENCES

Braun, D., (2009), Podręcznik rozwijania kreatywności. Sztuka i twórczość w pracy z dziećmi. Kielce: Wydawnictwo Jedność.

Bubak E., Królicka E., Sochański W., (2004), Technika na co dzień: poradnik dla nauczyciela. Modułowy program nauczania. Warszawa: Wydawnictwa Szkolne i Pedagogiczne.

Burkat M. (2016), Istota zadań wytwórczych w edukacji wczesnoszkolnej, w: Kraszewski K., Nawolska B. (red.), Dziecko i nauczyciel w procesie poznania i działania. Kraków: Wydawnictwo Naukowe Uniwersytetu Pedagogicznego, ss. 164-173.

Chałas K., (1991), Zajęcia praktyczne w szkole podstawowej. Warszawa: Wydawnictwa Szkolne i Pedagogiczne.

Drost-Rudnicka M., (2019), Edukacja techniczna małego dziecka w szkolnej rzeczywistości, w: Ogrodzka-Mazur E., Szuścik U., Minczanowska A. (red.), Edukacja małego dziecka. Konteksty oświatowe. Tom 13. Kraków: Oficyna Wydawnicza „Impuls", ss. 109-121.

Jelinek J.A., (2014), Edukacja techniczna starszych przedszkolaków w domu i przedszkolu, w: Gruszczyk-Kolczyńska E. (red.), Starsze przedszkolaki. Jak skutecznie je wychowywać i kształcić w przedszkolu i w domu. Kraków: CEBP 24.12 Sp. z o.o., ss. 257-275.

Kochanowska E., (2020), Edukacja techniczna małego dziecka - współczesne wyzwania, <http://www.konferencja.21.edu.pl/uploads/6/3/9/9/6399009/1.3.7._kochanowska.pdf> [dostęp 05.05.2024].

Kraszewski K., (2002), O metodzie projektów jako środku integracji wiedzy i umiejętności uczniów z edukacji ogólnotechnicznej, w: Adamek I. (red.), Projektowanie i modelowanie edukacji zintegrowanej. Kraków: Wydawnictwo Naukowej Akademii Pedagogicznej, ss. 51-59.

Kupisiewicz Cz., (2012), Dydaktyka. Podręcznik akademicki. Kraków: Oficyna Wydawnicza „Impuls".

Mincewicz K., (1995), Poradni metodyczny dla nauczycieli techniki. Warszawa: Alfa.

Montessori M., (2023), Odkrycie dziecka. Warszawa: Bellona.

Ordon U., Piwowarska E., (2013), Zajęcia techniczne, plastyczne i komputerowe w edukacji elementarnej, <https://www.pulib.sk/web/kniznica/elpub/dokument/Kancir1/subor/Ordon_Piwowarska.pdf> [dostęp, 10.05.2024].

Pochanke H. (1985), Dydaktyka techniki. (red.) Warszawa: Państwowe Wydawnictwa Naukowe.

Prątnicka K., (2022), Rola procesu twórczego w kształtowaniu motoryki ręki i doskonaleniu technik pisania, w: Arteterapia w Nauczaniu Początkowym. Edukacja Wczesnoszkolna. Zeszyty Kieleckie, Nr 1, ss. 105-120.

Ripp P., (2017), Uczyć (się) z pasją. Jak sprawić, by uczenie (się) było fascynującą podróżą. Gdańsk: Wydawnictwo Dobra Literatura.

Technika, w: Encyklopedia PWN, (1999), <https://encyklopedia.pwn.pl> [dostęp 05.05.2024].

Tylman J., (2023), Jak pokolorować szkołę. Warszawa: Wydawnictwo Mamania.