

EDUCATIONAL AND METOTODOLOGICAL SUPPORT FOR THE ADAPTIVE CYCLE OF TECHNOLOGICAL EDUCATION IN THE GYMNASIUM OF UKRAINE

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The article analyzes and summarizes the results of an empirical study of the problem of providing programs and textbooks of technological education in gymnasiums of Ukraine. The requirements to the model program of technological educational branch of the State standard of basic secondary education are theoretically substantiated. The necessity of creating new textbooks for students of 5-6 grades of the subject "Technology" as a component of the educational and methodical complex of the adaptation cycle of technological education in the gymnasium is proved. The composition of the educational and methodical complex for the effective study of the general subject "Technology" in the 5th and 6th grades of the gymnasium and the conditions of its creation are determined.

The peculiarities of textbooks of the adaptation cycle of education and the requirements for their preparation on the basis of competence-oriented learning are revealed.

On the basis of the conducted pedagogical experiment the influence of the textbook on creation of the innovative environment of technological education in the New Ukrainian school and efficiency of training of technologies in the conditions of distance and mixed training is shown.

Keywords: curriculum; textbook; the content of general secondary education; technologies.

Formulation of the problem. With the adoption of the new State Standard of Basic General Secondary Education [1] there was a discrepancy between the requirements for student learning outcomes and textbooks published in previous years for technological education in primary school.

The content of textbooks on labor training recommended for 5-9 grades of secondary schools of Ukraine was developed according to the curriculum, which has already expired and has significant differences with the updated curriculum [2].

Conceptual approaches, teaching content and methods of technological education have been changed.

To change the subject "Labour training" in gymnasiums in accordance with the Standard educational program the subject "Technology" [3] will be studied. The introduction

of a new subject in the gymnasiums of Ukraine requires the development of appropriate software and educational and methodological support.

The purpose of this article is to analyze the state of educational and methodological support of technological education in gymnasiums and to reveal the requirements for new curricula and textbooks on technology.

Analysis of recent research. Changes in curricula and teaching and methodological support of technological education in grades 5-9 of secondary schools of Ukraine have received mixed reviews from scientists, methodologists and teachers.

In particular, in the publications of N. Borynets, S. Diyatlenko, Y. Palii, A. Tereshchuk, T. Machachi, V. Yurzhenko, Stryzhova [4, p. 8-9] give conflicting assessments of the current curriculum for labour training.

The authors of the updated curriculum for grades 5-9 [2] pay attention to its focus on achieving learning outcomes, the formation of key competencies, overcoming "subject chauvinism", the application of the project method.

Methodists in technological education of postgraduate pedagogical education institutions of Ukraine and 95% of the 420 teachers of labor training we interviewed noted that the curriculum provides ample opportunities for teachers' creativity .

However, a detailed analysis and discussion of the curriculum at the All-Ukrainian Forum of Technological Education [5] and scientific conferences showed that the program removed the content of labor training on tools and technological processes, there are many significant shortcomings in its structure and inaccuracies in defining concepts, tasks, design objects.

The algorithm of students' design and technological activity proposed by the authors needs to be adjusted.

Critics of the updated curriculum note that it does not define the purpose of the subject (indicates only the purpose of general secondary education), violates the didactic principles of consistency and continuity, there is no systematic reflection of the content of education, the age characteristics of students and the state of educational and methodological and logistical support of technological education are not taken into account [4, p.2-9].

With the adoption of the new State standard of basic secondary education to the mentioned shortcomings of the current curriculum its inconsistency with the requirements and content of this normative document were added.

The analysis of the textbooks' content on labor training created in previous years shows that they do not meet either the current curriculum or the requirements of the new standard.

It was illegal from the point of view of ensuring gender equality to publish textbooks on labor training separately for boys and girls. This decision can be explained by the need to save public funds for the publication of textbooks. But the publication of textbooks that do not meet the curriculum and modern requirements for the textbook cannot be economically justified.

In the textbooks on labor education recommended by the Ministry of Education and Science of Ukraine for grades 5-8, insufficient attention is paid to the formation of key and subject design and technological competencies, their content is mainly aimed at acquiring knowledge and skills in technical and service work.

Only the latest editions of the textbook on labor training for 9th grade [10] and technology for 10-11th grades reflect the competency approach, pay sufficient attention to attitudes, values, cooperation, development of critical thinking, offer competency tasks and creative projects.

Some authors note that it is almost impossible to create new textbooks in accordance with the current curriculum for labor training due to the uncertainty of its content, structure, role of the textbook in the process of creative design and technological activities of students. Due to this, the printing of textbooks on labor training for grades 5-9 has been stopped in recent years.

Attempts of creative teachers in collaboration with publishers to create an e-textbook on labor training based on their own experience have been failed. According to the results of expert evaluation, the experimental electronic textbook on labor education for the 5th grade of general secondary education institutions has not been awarded a state order for publication [5]. And this is no accident, because a modern textbook, including electronic, should be designed on a scientific basis, provide new opportunities for cognitive activity of students, be a means of forming key and subject competencies, meet a number of didactic, methodological and sanitary requirements.

Domestic and foreign scientists are paying more and more attention to the pedagogical principles of developing electronic textbooks for general secondary education institutions. In particular, UNESCO scientists G. Harold, D. Draculitz, J. Monnard define the essence of the concept of "electronic textbook", the main approaches to the creation and classification of electronic textbooks (classical model, didactic model, digital platform model), distribute them according to the degree of interactivity, reveal the criteria for assessing the quality of different types of electronic textbooks, prove the benefits of using electronic textbooks in the classroom (representation of educational material in different types and forms of information, automation of feedback, activation of students' learning activities). Research also points to restrictions on the use of electronic textbooks due to insufficient provision of secondary schools with computers, software for lessons with interactive tools, increased time for preparation of classes [6, p.46-48].

Scientists of the Institute of Pedagogy of the National Academy of Pedagogical Sciences of Ukraine, taking into account domestic and foreign experience, competency principles of textbook creation [9, p.26-29], designed the content of technological education, based on which a new generation of its educational and methodological support can be created. Competence-oriented textbooks, educational and methodical manuals on technologies are being created and experimentally tested.

Presentation of the main material. The development of technological education on the basis of competence-oriented learning requires new software and educational and methodological support, the development of pedagogical technologies, the creation of an appropriate educational environment.

Currently, a draft model curriculum of the adaptation cycle on the subject of "Technology" has been developed, which will be implemented in gymnasiums of Ukraine.

According to the Law of Ukraine "On Education" [7], teachers have the right to develop independently their curriculum on the basis of a model program in any subject or integrated course, to determine its content, which allows to achieve the expected results of students' learning activities.

Students together with the teacher or others can select design objects, propose their own projects and implement them in the process of learning technology. Thus, the project-

technological competence of students is formed, and the educational process becomes personality-oriented.

However, the question arises, how to create textbooks, if the curricula of different teachers may have significant differences in content?

Before answering this question, let's find out what requirements the textbook of the adaptation cycle on the subject of "Technology" must meet. One of the main requirements for any textbook is its compliance with the program. If the teacher can develop his curriculum, then the textbook and other teaching aids (methodology, visual aids, workbooks, handouts, pedagogical software, etc.) he must also create in accordance with the author's program. This is a difficult task for a teacher, the solution of which requires a lot of time and considerable effort. As a rule, this task is successfully solved by author teams, which may include scientists, methodologists and teachers who work closely with publishing specialists (artists, designers, programmers, editors, etc.).

The model program should help to ensure that the textbook meets the didactic and methodological requirements. It is with the help of a model curriculum the textbooks' content can be unified.

The model program determines the approximate sequence of achievement of students' learning outcomes in the subject or integrated course and the types of students' educational activities recommended for use in educational processes in the manner prescribed by law.

According to the project of the model curriculum developed by us the purpose of a subject "Technologies" in 5-6 classes is formation of the creative person's qualities capable of design and technological activity, change of environment without causing it harm, rational use of technics and technologies for self-charge, cultural and national self-expression.

Due to the adaptive cycle of learning and students' age characteristics, the following tasks can be solved in the process of studying the subject "Technology" in grades 5-6:

gaining experience in design and technological activities and partnerships in new conditions;

development of technical (conceptual-figurative-effective) and critical thinking, psychomotor skills, ability to combine mental and physical work;

mastering graphic literacy, ways of designing products, rational use of the most common materials, skills of safe handling of the simplest means of work, application of equipment and technologies for the implementation of their own projects;

formation of design and technological competence, creative attitude to work, self-sufficiency, entrepreneurship and innovation, readiness to protect nature and change the environment rationally through design and technology.

The educational process for the implementation of the model program of the subject "Technology" in grades 5-6 is designed on the basis of competence, personality-oriented, activity and cultural approaches and is aimed at achieving the expected results of students' cognitive activity.

The adaptation cycle's content of the subject "Technology" is built around current issues, taking into account the students' first experience of design and technological activities and new learning conditions (training in specially equipped for design and technological workshops and laboratories, class division into groups, other teachers, etc.) .

The fundamental objects of the model program's content "Technology", according to which it is structured, are the methods of design and technological activities and the basics of materials science, engineering and technology.

The integrity of the content and learning process and its effectiveness are ensured by following the principles:

child-centeredness and nature-appropriateness;

taking into account the age and individual characteristics of students, the relevance of the education content to the forms of their thinking;

personal and social significance of design and technological activities;

accessibility, continuity and continuity of education;

scientific, systematic, integrated and varied learning content;

problems, creativity and cooperation in the process of activity;

competence orientation of project-technological students' activity and interconnected formation of key and subject competences.

Project pedagogical technology is system-forming in the acquisition of technological education by students. It combines the purpose, objectives, principles, content components,

forms, methods and tools of technology training, ensures the achievement of expected learning outcomes.

The main content components of education in grades 5-6 are the following training modules:

- I. Design and technology.
- II. Decorative and applied arts in design and technological activities.
- III. Design and technological activities in everyday life.

Textbooks of the subject "Technology" for 5th and 6th grades of the gymnasium should be consisted of the above training modules. This structure of textbooks on the subject of "Technology" will provide an opportunity to change the order of learning modules taking into account the learning conditions, to choose relevant topics of projects, to achieve the expected results of students' learning activities. For example, in the case of quarantine and the introduction of distance learning, students can be asked to study not module I "Design and Technology", which is more effectively assimilated in the workshops but module III "Design and technological activities in everyday life", which can be studied with the help of textbook at home.

Distance and blended learning should be served by interactive links to educational videos, electronic textbooks, pedagogical software for self-monitoring and checking the level of student achievement.

To test the effectiveness of training using the textbook "Technology" [8] we conducted a pedagogical experiment. The experiment covered 160 students of 10 control and 162 students of 10 experimental classes of secondary schools of Zhytomyr, Vinnytsia, Mykolaiv and Kyiv regions of Ukraine.

Experimental pedagogical research has proved the feasibility of using textbooks to master the content of technological education by students in both full-time and distance and blended learning. As a result of the application of the experimental textbook "Technology" in 87.5% of students in experimental classes there is an increase in interest in learning technology, in 75% increase in the level of design and technological competence, in 92% improvement of attitude to the subject.

At the same time, it should be noted that the creation of a new textbook does not solve all the problems of educational and methodological support of technological education.

The textbook in the New Ukrainian School should be an integral part of the educational and methodological complex - a set of normative and educational and methodical materials necessary for effective mastering of educational content, ensuring the integrity of the educational process in the unity of its goals, content, organizational forms, methods and teaching aids. Textbooks should target the students to achieve the expected learning outcomes and become an information and activity model of students' learning and cognitive activities.

In addition to informative, which provides disclosure of the program's content and the formation of knowledge, the modern textbook also performs motivational, organizational, communicative, creative and formative assessment and other functions. This is facilitated by goal setting, questions for updating basic concepts, problem presentation of educational material, laboratory and practical work, competency tasks, educational projects, rubrics "Why do you need it," "For the most curious", tasks for working in pairs, independent research, self-control, testing level of academic achievement.

The textbook "Technologies" should help students to notice the problem and consistently solve it in the process of subject-transformation activities.

In addition to knowledge and skills, the textbook should form values, attitudes, enrich students with experience in applying the information obtained, cooperation, planning, develop critical thinking, organization, entrepreneurship, innovation, responsibility for decisions.

Particular attention in the new textbooks of the adaptation cycle of technology must be paid to the development of interests and motivation of students' learning activities. As experimental studies show, increasing interest, increasing the level of students' intrinsic motivation, change their attitude to the subject, become a driver of increasing the level of academic achievement.

Conclusions of the study and prospects for further exploration in the chosen direction. The analysis of the state of educational and methodological support of technological education showed that one of the main problems in creating textbooks on labor training and technology is the imperfection of the curricula on which they were created.

Textbooks on the new subject "Technology" must become one of the main, but not the only means of learning to ensure the adaptive cycle of technological education in the gymnasium.

Modern textbooks on technology (including electronic) as part of a new educational and methodological support of technological education should be aimed at the formation of key and project-technological competencies, strengthening the motivation of learning, development of technical thinking and students' creative abilities.

Given the importance of the methodological apparatus of the textbook, further research on the development of methods for implementing the content of technological education in the gymnasium is promising.

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НАВЧАЛЬНО-МЕТОДИЧНЕ ЗАБЕЗПЕЧЕННЯ АДАПТАЦІЙНОГО ЦИКЛУ ТЕХНОЛОГІЧНОЇ ОСВІТИ В ГІМНАЗІЯХ УКРАЇНИ

У статті проаналізовано та узагальнено результати емпіричного дослідження проблеми забезпечення програмами і підручниками технологічної освіти в гімназіях України. Теоретично обґрунтовано вимоги до модельної програми технологічної освітньої галузі Державного стандарту базової середньої освіти. Доведено необхідність створення для вивчення учнями 5–6-х класів предмета «Технології» нових підручників як складової навчально-методичного комплексу адаптаційного циклу технологічної освіти в гімназії. Визначено склад навчально-методичного комплексу для ефективного вивчення загальноосвітнього предмета «Технології» в 5-х і 6-х класах гімназії та умови його створення. Розкрито особливості підручників адаптаційного циклу навчання і вимоги до їх підготовки на засадах компетентісно орієнтованого навчання. На основі проведеного педагогічного експерименту показано вплив підручника на формування інноваційного середовища технологічної освіти в Новій українській школі та ефективність навчання технологій в умовах дистанційного і змішаного навчання.

Ключові слова: навчальна програма; підручник; зміст загальної середньої освіти; технології.

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УЧЕБНО-МЕТОДИЧЕСКОЕ ОБЕСПЕЧЕНИЕ АДАПТАЦИОННОГО ЦИКЛА ТЕХНОЛОГИЧЕСКОГО ОБРАЗОВАНИЯ В ГИМНАЗИЯХ УКРАИНЫ

В статье проанализированы и обобщены результаты эмпирического исследования проблемы обеспечения технологического образования программами и учебниками в гимназиях Украины. Теоретически обоснованы требования к модельной программе технологического образования Государственного стандарта базового среднего образования. Доказана необходимость создания для изучения учащимися 5–6-х классов предмета «Технологии» новых учебников как составляющей учебно-методического комплекса адаптационного цикла технологического образования в гимназии. Определены составляющие учебно-методического комплекса для эффективного изучения общеобразовательного предмета «Технологии» в 5-х и 6-х классах гимназии. Раскрыты особенности учебников адаптационного цикла обучения технологиям.

Ключевые слова: учебная программа; учебник; содержание общего среднего образования; технологии.