THE IMPLEMENTATION OF THE SPECIALIZED-EDUCATION MODEL AT THE PRESENT STAGE

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Abstract: This article reveals one of the aspects of modern education in secondary school - the problem of preparedness of schoolchildren for a conscious choice of their professional path. The article considers the questions of the differentiation and individualization of the educational process in accordance with the personal features of high school students, the basic aspects and system approaches to the decision of problems of specialized education. In the paper, the principle of the variability of education is stated. This principle promotes the disclosure of individual abilities, aptitudes, interests, and educational needs of students. The article contains a brief description of practical applied work as a means of enhancing the level of intensification of students' cognitive activities in the modern context. The organizational and pedagogical ways and means of optimization of specialized education in the modern context are revealed. In the paper, the conditions of the implementation of the specialized-education model in secondary school are considered. In the article, the problem-oriented analysis for the implementation of pre-specialized training and specialized education is conducted. The quality and efficiency of practical training of pupils with the purpose of the development of specialized education at the present stage are defined.

Keywords: specialized education, scientific and technological advancement, specialization, differentiation and individualization, educational process, cognitive interest, elective component, variability, specialized-education models.

1 Introduction

Nowadays, when the issues of the shaping of a harmonious personality and development of individual abilities of schoolchildren are in the center of attention of the pedagogical science, the differentiated instruction becomes especially important. The current situation in Kazakhstan and in the world puts new demands on the organization of the educational process at high school. The pedagogical science, based on the long and extensive experience of schools, is called upon to describe and generalize this experience and to offer schools new effective solutions to the problem of the real connection of theoretical education with students' practical life and work. (1, 2) In general, the development of this problem in relation to the conditions of general education school is not yet satisfactory.

The network of educational organizations with an in-depth study of individual subjects is not sufficiently developed. Therefore, the specialization of education in high school should make a positive contribution to the solution of these problems. The implementation of specialized education will contribute to the creation of better conditions for the differentiation of the educational process, the development of students' individual characteristics, self-organization, self-realization, and expansion of life and social competence.

Specialized education is considered as a means of differentiation and individualization of education. Due to changes in the structure, content, and organization of the educational process, the interests, aptitudes, and abilities of students are more fully taken into account, and conditions for the education of senior high school students are created in accordance with their professional interests and intentions for further education. (3, 4) We have analyzed the current state of specialized education in Kazakhstan and abroad.

M.K. Akimova, Y.K. Babansky, I.D. Butuzov, N.N. Vernitskaya, G.L. Ginzburg, A.S. Granitskaya, Z.I. Kalmykova, N.G. Talyzina, and others have been dealing with the problem of individualization and differentiation of education in didactics. A.I. Bugaev, A.A. Pinskiy, and others developed theoretical bases of differentiated instruction. According to A.A. Pinskiy, the system of vocational education could have been a moderator of the interaction between school education and the labor market but, unfortunately, it itself is poorly organized in relation to the rapidly changing demands of labor markets and employers. It was noted by A.A. Pinskiy that the declared ideas of high school specialization require a considerable number of innovations. Such innovations include individualized and networked forms of education, the use of new educational technologies, the application of new methodological support, the development of the system of accumulative evaluation, the introduction of new elements of school economics, improvement of training and retraining of teachers. (4) In Kazakhstan, as well as in other CIS countries, new mechanisms are being created to ensure access to high-quality education. The education restores the lost resource potential and gets new means for the realization of its tasks.

1.1 Purpose of the Research

The specialized education will enable solving the following tasks: to provide students with thorough knowledge of the disciplines of the chosen professional area; to activate the need of students to carry out cognitive activities independently; to develop motivation in students for research and scientific work; to shape critical and creative thinking helping students to actively accept information. (4, 5)

The purpose of the research is to enhance the level of scientific and methodological validity of specialty-based differentiation of the modern high school education, to reveal the quality and effectiveness of specialized education. The following objectives of the research are defined in accordance with the purpose:

1. To analyze the state of specialized education at school in view of the requirements of differentiation and individualization of education at the present stage.
2. To develop organizational mechanisms of specialized education on the basis of innovative educational technologies in the modern environment.
3. To create new organizational forms that are the basis of network interaction.

Specialized education is an integral part of the general problem of modernization of school educational content. The main task of specialized education is to provide conditions for the realization of interests, abilities, and needs of a personality. (6, 7) In the context of the Republic of Kazakhstan, the solution of tasks of training individualization, specialization, the cooperation of high schools with professional educational institutions is carried out in interrelation with such directions of modernization of the Kazakh education system as:

- Restructuring of the educational network;
- Development and introduction of a mechanism for normative per capita financing of general education institutions;
- Inclusion of professional education institutions into educational complexes of the districts and cities of the country;
- Informatization of education;
- Renewal of criteria and forms of evaluation of students, teachers, heads of educational institutions, and employees of the education management system. (7)

The experience of the Kazakh and foreign systems shows that high schools with specialized education to a high degree meet the requirements of a social and economic situation. The logic of specialized education is manifested in the concentration of

educational resources on what ensures the readiness of students and graduates to solve problems of practical importance. In the context of specialized education, pupils should be able to receive not "complex notions" (sets of the same subjects and hours for the whole country, made up according to the standards common for the whole country), but work on demand from what a particular school can give them. The educational potential of an institution is a crucial fact in the extent to which our efforts to make high-quality education available can be real and effective. Professionalization of education in high school corresponds to the structure of the educational and life attitudes of the most school students and gives orientation to future professional activities. It is necessary to recognize the fact of unique resource intensity of education, and at the same time, that today and in the near future, the state of personnel, technology, communications, educational and methodical support of the educational process, etc. is insufficient. In this regard, the tasks of economical and rational use of educational resources are particularly relevant. (8, 9) Along with students' individual aptitudes, abilities and needs, the educational environment, the capabilities of particular teaching staff, the professional competence of teachers, material and technological support, as well as the peculiarities of the organization of the educational process in the classroom, at school and beyond are of great importance. The implementation of the principle of accessibility of high-quality education should be embodied in the fact that every high school student has the opportunity to master the chosen specialty using modern laboratory equipment, computer equipment, digital and traditional information resources, and Internet communications. (10-12) Specialized education promotes:

- Mastering the content of education at an advanced level in profile disciplines and studying elective courses;
- Development of independent work and research skills;
- Preparedness of graduates for a conscious choice of a profession and independent creative learning at a university.

2 Materials and Methods

The improvement and modernization of general education and specialized education as its structural part needs scientific rethinking, evaluation of the achieved level, identification of deficiencies and their causes, development of new conceptual theories, definition, and justification of the substantive and procedural basis for the construction of a variation model for its implementation. Previously, the issues of organization of productive activities and self-expression were not principal but it is the main idea of specialized schools. To materialize this reorientation, it is necessary to abandon the ideology and behavioral stereotypes of survival and proceed to build a better model. Such an approach should be laid in the mechanism of institutions providing specialized education in high schools. (13, 14)

The scientific novelty of the paper is as follows:

1. The most important pedagogical conditions characterizing the development of specialized education in the study of school subjects for senior high school students have been defined.
2. The role and place of the variation component in the educational process, providing the character of development of schoolchildren and taking into account their personal features, interests, and propensities are revealed.
3. The conditions of realization of the variation model for specialized education in modern secondary schools are revealed.

The practical importance of the work consists in the following aspects:

- The definition of the problem of specialized education in a secondary school in accordance with the objectives of modern education in the context of innovative technology.
- The development of scientific and methodological recommendations for the implementation of specialized educational technologies in the educational process of secondary school and vocational schools;
- The development of the elective course "New materials in technology."

Specialized high schools and learning resource centers should become similar institutions with constructive activities and, at the same time, adequate to the circumstances of the surrounding reality. (15, 16) The implementation of the specialized-school model, as well as the restructuring of the network of educational institutions in general, will find and already have opponents, significant limitations, and risks. Meanwhile, the positive potential of such institutions seems obvious to us. In our opinion, the implementation of specialized education requires, primarily, the training of personnel who can provide high-quality information work. With all the obviously correct, modern, and relevant interpretations of specialized education, the practical implementation of the specialized-education school model is an undoubted difficulty for general education institutions.

The specialized-education school models have a number of common characteristics with resource-center models. These are institutions where

- The best teachers in a city (district) teach those students who want a high-quality general education;
- High efficiency of investment in education is ensured by the work of relatively large teaching teams consisting of the most qualified teachers specializing in teaching subjects in classes of a particular specialty in order to achieve clearly defined results;
- Intensive use of educational resources is ensured. Each laboratory, computer lab, and media room is used with several classes. (15, 17)

With regard to the organization of specialized education at high school, new requirements for a teacher arise during the transition to specialized education. It should be a high-level specialist, appropriate to the specialization. He or she should be prepared to provide variation and personal orientation in the educational process. A teacher should possess interactive and action-related components of the learning process, i.e. the mastery of project-based, research-based and communication-based methods.

To date, we distinguish two models of specialized education:

- The model of intra-school specialization. In this case, a comprehensive educational institution can be single-specialty (can implement only one selected specialization) and multi-specialty (can organize several educational specializations);
- The model of the network-based organization of specialized education. (18, 19) According to this model, purposeful and organized mobilization of educational resources of other institutions is conducted for the students of a particular school. This model can have two main options. The first option is associated with the unification of several general education institutions around the strongest general education institution that has sufficient material and human resource potential and serves as a "resource center". The second option is based on the cooperation of general education institutions with institutions of additional, higher, secondary and primary professional education and the mobilization of additional educational resources. In this case, students are given the right to choose to obtain specialized education not only where they study but also in educational organizations cooperating with a general education institution (distance courses, distance schools, professional education institutions, etc.). (4, 20)

The improvement of the quality of education is one of the main objectives of high school specialization that, in the new socio-economic environment, should be more oriented to the needs of students and their parents. The variability and difficult

predictability of the market and a limited application of forecasts explain the complexity of solving the problem of interaction between school education and the labor market. Often the choice of profession is conditioned by fashion, and employers need a specialist who will be in demand in 10 years.

The pedagogical essence of high-school specialization is in expanding the freedom of choice and individualization of education, in responding to the pragmatic demand of modern high-school students (associated with their post-secondary life interests and plans), in striving for mass availability of specialized education. When making up specialized educational curricula, it is necessary to address such pressing school problems as health preservation, the normalization of the amount of learning time and education quality improvement. (13, 21)

When developing the content of specialized education, it is important to ensure that all core courses (special, optional, and elective) include both theoretical and practical components. The following components are singled out in the content of profile training:

- Basic invariant component (providing a standard level of knowledge);
- Specialized variation component - mandatory for learning (providing an in-depth study of subjects related to a selected specialty);
- Elective component, which contains a number of modular courses that deepen and expand the basic and specialized courses, as well as identify the specifics of activities and requirements for professionals in various fields. (22, 23)

In the content of textbooks for specialized education, there is a mandatory core and a variation part. In the variation part, the modular principle of educational content presentation is possible. Each individual module includes content corresponding to the type of specialty. For example, the applied module of the physics course reveals its connection with various areas of human activities such as "Physics and medicine", "Physics and economics", "Physics and culture", "Physics in agriculture", "Physics in life", "Physics in industry", "Physics and environmental protection", etc. Therefore, the development of curricula and textbooks for elective courses should be given serious attention in the educational methodological provision. Now, the task of creating an educational methodological set of elective courses related to natural science subjects for specialized education is not completely solved in Kazakhstan. We have revealed the role and importance of physics teaching in specialized education, defined the theoretical basis for the development of physics elective courses for specialized education in high school, and, in accordance with this theory, we have developed a 34-hour program of elective course "New materials in technology" for schoolchildren of 11th grade specialized in physics and technologies. The proposed elective course introduces schoolchildren to the main development areas of science and technologies in relation to the development of new materials, to the general regularities of production and processing technology of materials. The elective course provides good opportunities for the development of students' creative abilities, shaping of polytechnic knowledge and skills in the field of development of materials for modern technology.

3 Results and Discussion

The development of society is inextricably linked to the development of education that, at different stages, was determined by specific forms, means, and models of relations between teacher and pupil and, more broadly, between knowledge carriers and knowledge users. In the modern context, the main problem of education is no longer so much the search for ways to enable a person to master a huge and constantly increasing amount of knowledge or at least orientation in an ever-increasing flow of information as the obtaining, creation, and production of a new intellectual product. (4, 24) One of the most important goals of modern education is to get people prepared in time for the new life conditions that are bringing with them a rapidly approaching future. At present, there is a contradictory attitude of scientists and practitioners to specialized education and the transition from specialized training to the professional education of youth. On the one hand, the changed social and economic conditions have led to a change in the social demand in the field of education: schools are required to create the conditions for more conscious and qualitative self-determination of students. This has led to the creation of diverse educational institutions and the possibility for parents and students to choose one of them. On the other hand, in a context of increasing polarization of society, a process of consolidation of social inequalities through variable education is under way. The education system and each of its links separately can only successfully perform its functions if the structure, content, organization, and methods of work are sufficiently mobile and fully meet the requirements of not only today but also are oriented towards the future. In addition, there are changes in the organization of the general education system associated with its humanization, increased attention to student personality, democratization providing everyone with the opportunity to choose the path and nature of education, differentiation, and individualization of learning, the emergence of new subjects of study. All this has created a number of new problems in both the content and organization of students' labor training. (7, 13)

The content of technological and professional education provides for the study of integrated courses related to general, social, and economic disciplines, special subjects required to master professional educational programs; and the mastery of professional skills in the chosen specialty. In this regard, pre-specialized training is a system of pedagogical, psychological, informational and organizational support for comprehensive-school pupils, which helps them to find themselves. Pre-specialized training implies the provision of information and orientation of ninth-grade pupils regarding their possible choice of a high-school specialty and subsequent study areas for primary or secondary vocational education. (13, 25)

In the course of the research, we have been able to identify those situations in which specialized education is perceived with significant distortions of its meaning, as well as show ways to prevent them. For example, it is important to communicate more clearly to the teaching and parenting community that specialized education is neither a complete "displacer" of non-specialized education nor vocational training. It is also important that specialized education is not designed as an elitist one and is not a motive for closing lyceums and high schools. High-school specialization more clearly demonstrates the redundancy of the main component of the standard and the dominance of formal cognitive approach in high-school education. The conceptual provisions of polytechnic training of secondary-school pupils, its theoretical and methodological basis, and modern provisions of specialized education act as a necessary condition of labor training of the younger generation.

The realization of objectives in multilevel system of specialized training implies the definition of a pedagogical task, i.e. setting of goals and selection of educational content adequate to the prospects of socio-economic and scientific-technological development of a renewed society. To reveal the mechanisms of development and functioning of the process of technological training of students as a system, it is necessary to highlight the system-forming basis of the numerous subsystems, in which the shaping of personality takes place. (15, 26) Such a subsystem is specialized training that ensures polytechnic education. Only a school focused on training a socially mature graduate who can independently set and adjust his or her own educational and professional goals will be more successful among its kind.

It is necessary to expand the practice of combining the capabilities of educational institutions and enterprises; to create educational and industrial complexes "school - vocational school - college - university - enterprise". One of the ideas to solve the problem of specialized training of high-school students appeared due to the interaction of pedagogical teams of the "partnership" schools of the Atyrau region of the Republic of Kazakhstan. The essence of the idea is the following: specialized education was

implemented in the mode of distance learning with the use of information and communication technology. At five "partnership" comprehensive high schools, specialized groups of students were formed, which were mainly studied remotely. (4)

A group of teachers conducted specialized education in different schools. The group consisted of a leading teacher (teachers), teachers of elective courses, and tutors of the specialized groups. The leading teachers were selected from the most trained teachers of the "partnership". The duties of the leading teachers of the specialized and elective courses included the preparation of the teaching materials for the students and teaching them in the distance mode. The tutors of specialized groups organized the process of drawing up individual educational programs for students and were responsible for their implementation. In addition, tutors assisted children during distance learning. They organized the implementation of the received tasks for groups with different age and different training levels, helped to identify difficulties arising in the course of the educational process, formalized requests to the leading teacher or an e-course teacher, determined the need for face-to-face consultations, maintained the interaction with students' parents, etc. At least once every quarter of a year, face-to-face meetings were organized between the students and teachers of core subjects (so-called face-to-face sessions). The goals and objectives of the face-to-face sessions can be different. They can be orientational, exam, practical, researching, etc. Such meetings include the so-called "winter and summer schools", where in addition to the specialized training objectives, the tasks of education and socialization of graduates were solved. When undergoing specialized training, the pupils are better able to master the subject under study; there are more possibilities for the development of their thinking activities, research skills, and practical competence in comparison with the usual forms of organization of the educational process.

4 Conclusion

After having analyzed practical and theoretical aspects of the topic, we made the following conclusions. On the basis of the analysis (23) of different approaches to this problem, having studied the programs of school subjects, including the 3-level one, as well as taking into account the idea of internal and external differentiation, we come to the conclusion about the productivity of the concept of the educational process on the principle of level-based and specialty-related differentiations.

Specialized education will contribute to the creation of better conditions for the differentiation of the educational process, the development of students' individual characteristics, self-organization, self-realization, and the expansion of their life and social competence.

Specialized education contributes to the development of a comprehensive readiness of high school students to continue learning the natural and mathematical sciences at a university. An elective course and methods for the intensification of the cognitive interest of secondary school students have been developed.

The implementation of specialized education displays the development of the educational system in the country and is a natural response to the social needs of the population. In the future, the work on research of specialized education at the present stage can be conducted in the following areas:

- The improvement of the content and system of specialized education in view of the research of modern innovative technologies;
- The development of students' motivation for research activities.

Literature:

1. Imashev G. *Innovative technologies of training in physics at high school*. Almaty: Otan; 2019.
2. Government of Kazakhstan. The concept of development of education of the Republic of Kazakhstan until 2015. Astana; 2003.
3. Dzyatkovskaya EN. Taking into account the individual characteristics of schoolchildren in preparation for profile training. Profile school. 2003; 2:24-26.
4. Imashev G. Theory and practice of polytechnic education in the process of teaching physics in secondary schools of Kazakhstan [dissertation]. [Kiev]; 2007.
5. Stepanova M. *Educational and research activities of schoolchildren in specialized education.* Saint Petersburg: Karo; 2005.
6. Semenin SK. (Ed.). *Profile training: Questions of theory and practice*. Moscow: Pedagogical Academy; 2005.
7. Imashev G. *Innovative approaches in the development of polytechnic education in the process of teaching physics in high school*. Almaty: Otan; 2019.
8. Sergeev IS. Profile training: goals and meanings. Profile school. 2012; 4:50.
9. Bugayev AI. *Methodology of Physics Teaching at High School*. Moscow: Prosveshcheniye; 1981.
10. Imashev G. Profile education - a new stage in the improvement of polytechnic education in high school (Volume 6). Series: Pedagogical sciences. Dnipropetrovsk: Science and Education; 2007.
11. Ladnushkina NM. Pre-profile preparation of graduates of the basic school. Public education. 2006; 1:110-114.
12. Atutov PR. *Politekhnicheskoye obrazovaniye shkol'nikov: sblizheniye obshcheobrazovatelnoy i professionalnoy shkoly* [Polytechnic education of schoolchildren: the convergence of secondary and vocational schools]. Moscow; 1986.
13. Imashev G, Rakhmetova MT. Innovative approaches in the development of polytechnic education in the process of teaching physics in high school. Electronic textbook. Atyrau; 2019.
14. Nemova NV. Profile orientation of ninth-graders: elective courses and "Educational information cards." School Director. 2005; 6:57-63.
15. Imashev G. *The development of technical and technological knowledge in the school physics course*. Almaty: Otan; 2019.
16. Pavlova TL. *Career guidance for high school students: diagnosis and development of professional maturity*. Moscow: Sphere; 2006.
17. Imashev G, Rakhmetova MT. *The development of ecologic knowledge and skills in the process of teaching physics to Mauritius*. Globe Edit; 2019.
18. Galkina TI. *Organization of specialized training at school*. Rostov-on-Don: Phoenix; 2006.
19. Imashev G, Abykanova BT, Rakhmetova MT, Tumysheva AA, Moldasheva RN, Ilyasova SS, Shahimova AA. Development of Polytechnic Knowledge and Abilities in the Course of Studying Physics. International Journal of Environmental and Science Education. 2016; 11(10):3595-3606.
20. Yutkin II. *Polytechnic education in technology*. Moscow; 2005.
21. Imashev G, Kuanbayeva BO, Rakhmetova MT, Salykbayeva Z, Turkmenbayev AB, Issatayeva Z, Murynov B, Gainieva A. Development of modern polytechnic education at physics classes. Ad Alta Journal of Interdisciplinary Research. 2019; Special Issue (09/01-VII.):25-30.
22. Polat ES. Modern pedagogical and information technologies in the education system. Moscow: Academy; 2007.
23. Imashev, GI. *Politekhnicheskoye obrazovaniye uchashchikhsya v protsesse obucheniya fizike v sredney shkole* [Polytechnic education of students in the process of teaching physics in middle school]. Atyrau; 2006.
24. Imashev G, Barsay B, Abykanova B, Kuanbayeva B, Bekova G, Shimakova Z. Variable component of a course of electrodynamics. Life Science Journal. 2014; 1(7s):286-289.
25. Dugarova DP. Programma «Predprofil'naya podgotovka» [Pre-specialized Training Program]. Zav. Prepodavatelem. 2006; 6:63-72.
26. Imashev, G., Zhazylbaeva, N. S., Salykbayeva, Z., Shimakova, Z. G., Yerekeshova, A. K., Suleimenova, B. K., & Syrbayeva, S. Z. (2016). *Applied Aspects of Polytechnic Education in the Physics Course. International Electronic Journal of Mathematics Education, 11*(7), 2099-2111.

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