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UDC 372.854

SRSTI 14.25.09

https://doi.org/10.52269/22266070_2024_1_191

SUBJECT COMPETENCE OF STUDENTS FROM SPECIALIZED SCHOOLS WITH ACCELERATED CURRICULA AS A PREREQUISITE FOR DEVELOPING FUNCTIONAL LITERACY

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The development of functional literacy of students from specialized schools is currently relevant. The aim of the study is to analyze the process of development of functional literacy and its component of natural

science literacy in chemistry lessons in the conditions of implementation of shortened curricula in specialized general education schools of the Republic of Kazakhstan. The scientific achievements of foreign and Kazakh scientists on the identified problems were studied, on the basis of which conclusions were made about the need to use the capabilities of the activity methodology. This necessity is a consequence of the observed transformation of the education system in the country. The content of normative documents regulating the system of general secondary education is also analyzed, according to which the chemistry teacher has the right to independently determine the number of hours allocated to study, which gives the teacher of a specialized school the opportunity to independently decide on the choice of ways to develop special competencies of students within their subject. The requirements to the tasks related to the assessment of the level of science literacy were studied, and as a result, the necessity of defining the competence-skill as a parameter of competence was revealed. A table of matching skills (competencies) corresponding to tasks with a description of their characteristics was completed. The authors came to conclusion that it is possible to develop tasks that would ensure the development of competencies that include: scientific explanation of phenomena, understanding of the features of scientific research.

Key words: education, functional literacy, scientific literacy, shortened curriculum, specialized schools, key competences.

ПРЕДМЕТНАЯ КОМПЕТЕНЦИЯ УЧАЩИХСЯ СПЕЦИАЛИЗИРОВАННЫХ ШКОЛ С СОКРАЩЕННОЙ УЧЕБНОЙ ПРОГРАММОЙ КАК УСЛОВИЕ ФОРМИРОВАНИЯ ФУНКЦИОНАЛЬНОЙ ГРАМОТНОСТИ

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В статье рассматривается актуальность развития функциональной грамотности обучающихся на уроках химии в рамках сокращенной программы обучения. Целью исследования заключается в анализе процесса развития функциональной грамотности и ее составляющей естественнонаучной грамотности на уроках химии в условиях реализации сокращенных программ обучения в специализированных общеобразовательных школах Республики Казахстан. В ходе проведения исследования были изучены научные труды зарубежных и казахстанских ученых по обозначенной проблеме, на основе которых сделаны выводы о необходимости использования потенциала деятельностной методологии. Такая необходимость продиктована наблюдающейся трансформацией системы обучения и воспитания страны. Также в статье проведен анализ содержания нормативных документов, регламентирующих систему общего среднего образования, согласно которым учитель химии вправе самостоятельно определять количество часов, отведенных на изучение тем, что дает возможность педагогу специализированной школы решить вопрос выбора путей развития специальных компетенций обучающихся в рамках своего предмета. Были изучены требования к заданиям по оцениванию уровня естественнонаучной грамотности, в результате выявлена необходимость определения в качестве параметра компетентности-умения. В ходе исследования была выведена таблица соответствия умений (компетенций), соответствующих им заданий с описанием их характеристик. Сделан вывод о возможности разработки заданий, которые обеспечивали бы развитие компетенций к числу которых относится: научное объяснение явлений, понимание особенностей научного исследования.

Ключевые слова: образование, функциональная грамотность, естественнонаучная грамотность, сокращенная учебная программа, специализированные школы, ключевые компетенции.

ҚЫСҚАРТЫЛҒАН ОҚУ БАҒДАРЛАМАСЫ БАР МАМАНДАНДЫРЫЛҒАН МЕКТЕП ОҚУШЫЛАРЫНЫҢ ПӘНДІК ҚҰЗЫРЕТТІЛІГІ ФУНКЦИОНАЛДЫҚ САУАТТЫЛЫҚТЫ ҚАЛЫПТАСТЫРУ ШАРТЫ РЕТІНДЕ

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Мақалада қысқартылған оқу бағдарламасы аясында химия сабақтарында оқушылардың функционалдық сауаттылығын дамытудың өзектілігі қарастырылады. Зерттеудің мақсаты Қазақстан Республикасының мамандандырылған жалпы білім беретін мектептерінде қысқартылған оқу бағдарламаларын іске асыру жағдайында химия сабақтарында функционалдық сауаттылықты және оның жаратылыстану-ғылыми сауаттылығын дамыту процесін талдау болып табылады. Зерттеу барысында шетелдік және қазақстандық ғалымдардың белгіленген проблема бойынша ғылыми еңбектері зерделенді, олардың негізінде қызметтік әдіснаманың әлеуетін пайдалану қажеттілігі туралы қорытындылар жасалды. Мұндай қажеттілік елдің білім беру және тәрбиелеу жүйесінің өзгеруіне байланысты. Мақалада жалпы орта білім беру жүйесін реттейтін нормативтік құжаттардың мазмұнына талдау жасалды, оған сәйкес химия пәні мұғалімі мамандандырылған мектеп мұғаліміне өз пәні шеңберінде білім алушылардың арнайы құзыреттіліктерін дамыту жолдарын таңдау мәселесін шешуге мүмкіндік беретін нәрселермен зерттеуге бөлінген сағаттардың санын дербес анықтауға құқылы. Жаратылыстану-ғылыми сауаттылық деңгейін бағалау бойынша тапсырмаларға қойылатын талаптар зерделенді, нәтижесінде құзыреттілік параметрі-дағдыны анықтау қажеттілігі анықталды. Зерттеу барысында олардың сипаттамаларын сипаттай отырып, дағдылардың (құзыреттердің), оларға сәйкес тапсырмалардың сәйкестігі кестесі шығарылды. Құзыреттіліктің дамуын қамтамасыз ететін тапсырмаларды әзірлеу мүмкіндігі туралы қорытынды жасалды, олардың қатарына мыналар жатады: құбылыстарды ғылыми түсіндіру, ғылыми зерттеудің ерекшеліктерін түсіну.

Түйінді сөздер: білім беру, функционалдық сауаттылық, жаратылыстану сауаттылығы, қысқартылған оқу бағдарламасы, мамандандырылған мектептер, негізгі құзыреттіліктер.

Introduction. The expediency of studying the topic and its scientific novelty in this article is the problem of developing functional literacy of students from specialized secondary general education schools with a Shortened Curricula of the Republic of Kazakhstan. Our research on studying the works and experimental activities of scientists U.A. Ospanova, G.G. Gafu, M.A. Baimakhanbetov, E.B. Asanbayeva, M.M. Slyamkhan showed that to solve the problem it is necessary to use the potential of activity methodology [1, p. 37; 2, p. 136; 3, p. 263].

The purpose of our work is to analyze the process of development of functional literacy and its component of natural science literacy in chemistry lessons in the context of the implementation of reduced training programs in specialized secondary schools of the Republic of Kazakhstan. Achieving the goal is possible by solving a number of tasks. Among them: to identify the features of the organization of work on the development of functional literacy of students and its important component of natural science literacy, to determine the place of chemistry lessons in this process, to consider ways to optimize this process based on the use of the potential of activity methodology. To present ways and means of solving an important methodological problem.

The relevance of the work lies in the problem of decline the level of formation of functional literacy in students from specialized schools with a shortened curriculum and the analysis of the potential of educational programs of the general secondary education system in the conditions of implementation of reduced programs of specialized schools on the example of teaching chemistry. In these schools, in addition to general education disciplines, students are engaged in other vocationally-oriented activities aimed at developing students' giftedness in music or sports. The contingent of students in these educational organizations have creative or physical potential, which should also be developed through additional specialized workloads.

The novelty of this research is consisted of in the analysis of shortened educational programs on chemistry in the conditions of specialized general education school for the reflection of learning outcomes that ensure the development of functional literacy and its component of scientific literacy, as well as in the development of practical recommendations for successful work in this direction.

The theoretical and practical significance of the research lies in determining the optimal conditions for the development of functional literacy and its component of natural science literacy of a student of a specialized secondary school in the conditions of implementation of abbreviated chemistry programs.

In certain historical periods, there is a change of scientific paradigms. Scientists associate this with cyclical processes that have received the capacious name "industrial revolutions". As research shows, it is based on a fundamental phenomenon – the process of cognition. The human community is in search of new ways, for this it needs important skills, among which practice-oriented ones are of key importance. Thus, at present, "it is important not so much to have knowledge as such, as to have certain personal characteristics and be able to find and select the necessary knowledge at any time in the huge repositories of information created by mankind" [4, p. 84].

It is important to be competent, while competence is a complex consisting of knowledge – understanding, knowledge – action, knowledge – values, motivation [5, p. 25].

Functional literacy acts as a tool that allows you to be competent to use the acquired skills and abilities at a high level of motivation. Accordingly, the subject who transmits vital knowledge should aim to form a personality "capable of navigating in modern society, capable of responding to various demands of time" [6, p. 99].

In the vast arsenal of scientific and terminological apparatus of modern pedagogical research, the theoretical justification of the personal-activity approach in teaching also deserves attention. This theory is actively developed in the works of B.G. Ananyev, L.S. Vygotsky, K.B. Zharikbaev, I.A. Zimnaya, R.M. Koyanbaev, V.S. Lazarev, A.K. Markova, S.L. Rubinstein, V.V. Serikov, L.S. Syrymbetova and others.

The researchers come to the conclusion that it is necessary to conduct "an analysis of the process from the standpoint of activity methodology" [7, p. 99].

At the forefront is the organization of the process of "appropriation" by students of the content of acquired knowledge. The task of the teacher is to moderate this process using a possible and acceptable range of didactically based forms of work. The search and implementation of new methods of working with students is becoming an urgent need for participants in the modernized system of education and upbringing.

Thus, the idea of humanization of education is actualized, based on the recognition of a person as a "supreme value" [8, p. 176]. At the same time, the requirements are imposed on the person himself to be a person who has education – a decisive life value. Orientation to the personality manifests itself in determining the interests of the personality itself as a priority, it is implemented through appropriate technologies of training and education [8, p. 27].

The issue of the development of functional literacy is actively considered in the research of modern scientists. As a working definition, the following definition is adopted: "Functional literacy is the level of education that can be achieved by students during their studies at school, and assumes a person's ability to solve standard life tasks in various spheres of life" [9, p.5].

Undoubtedly, it was important for the results of the study to study the process of formulating goals and expected learning outcomes that enable the development of functional literacy of students in chemistry lessons. A special place is occupied by the subject study of the system of work of chemistry teachers working in specialized secondary schools (music, sports, art). At the same time, it was taken into account that according to regulatory documents, a "content line" was defined for the discipline "Chemistry" in secondary school, which "provides students with an understanding of the essence of chemical phenomena and processes occurring around and encourages them to lead a healthy lifestyle; provides an opportunity to use chemical knowledge to choose quality products and products in daily in practice, improving the quality of daily life" [9, p 7].

Research methodology. During the research, a wide range of general scientific methods was used, the leading of which is the analysis of literary sources recognized by the scientific community as well as regulatory and legal documentation in order to highlight key arguments, data and conclusions related to the issues under study.

Research results and discussion. Specialized schools occupy a special place in the system of secondary special education. Specialized schools include schools – gymnasiums, lyceums for gifted children or narrow orientation, for example, physics and mathematics, chemistry and biology, language and others. However, in addition to them there are also musical, sports, correctional, each of which has its own specifics. Out of 134 specialized schools, 6 work in music and aesthetics, 5 – in military-sports, the rest in natural-mathematical, social-humanities and other directions [10]. As a rule, they are organized and function in order to implement training programs that are aimed at developing certain skills. The field of our research included such specialized schools as music and sports. As part of the development of the course of the discipline "Chemistry" in these schools, in-depth study of the subject is not provided, the standard curriculum does not belong to the category of invariant.

According to the state compulsory educational standard, the content of basic secondary education in the Republic of Kazakhstan is "the composition, structure and volume of the content of basic secondary education, subject to compulsory study in educational institutions, regardless of their type, type and form of ownership, as well as the language of instruction" [11]. Accordingly, students of specialized music and sports schools master a chemistry course, the content of which does not differ from the content in other schools, the curriculum of which does not involve in-depth study of this subject.

The discipline "Chemistry" in the program of basic secondary education belongs to the educational field "Natural Science". This field provides "formation of functional knowledge and skills, skills of planning, analysis and processing, interpretation, systematization, work on the algorithm, improvement of research, experimental skills, evaluation and formulation of conclusions; deepening the understanding of the fundamental concepts, theories and principles underlying the modern natural science picture of the world, methods of scientific knowledge of nature, global and local problems of mankind on the basis of a comprehensive study of nature, economics and society, etc." [12]. Accordingly, for this study, the content of the concept of functional literacy is important in accordance with the field of cognition.

The program document "Quality Education – Educated Nation" presents the goals and objectives of the functioning of the education system of the Republic of Kazakhstan, describes the main indicators of the implementation of the program [13, p. 189]. Along with this, an instructional and methodological letter "On the peculiarities of the educational process in secondary education organizations of the Republic of Kazakhstan" is developed annually and sent as a guide. We have considered a similar document regulating the process of education and training for the 2022-2023 academic year. This document defines the features of teaching the subject "Chemistry" for grades 7-11. At the same time, the implementation of standard curricula is ensured, which reflect the content of basic knowledge of "the subject, sections, topics studied and issues under consideration within the framework of topics, a system of learning goals, a long-term plan". It is stipulated that "the right to distribute the number of hours between sections is granted to the teacher, but the educational material must be fully studied in the specified quarter" [13, p.189]. Thus, each chemistry teacher can vary the number of hours that are allocated to mastering "difficult" and "easy" topics in the classroom. The teacher's decision depends on the specifics of the existing educational and cognitive process, the peculiarities of its course.

In our opinion, this makes it possible for the teacher of a specialized school to determine what is a priority for students (athletes, musicians, artists), which sections will enable the student to apply knowledge on the subject of chemistry for professional growth, contribute to the development of his special competencies.

It is well known that natural science literacy is formed in chemistry lessons. Scientists of foreign and Kazakh scientific and methodological schools are engaged in the study of the subject and content of natural science literacy. In this regard, it is important to determine the place of the development of functional literacy in the system of studying the disciplines of the natural science cycle. The analysis of scientific research on a given problem allowed us to conclude that the main components of functional literacy are the following competencies: the ability to solve practical problems using the acquired knowledge, skills and competencies. At the same time, they must demonstrate their competence in various real life situations. The development of tools through which the formation of functional literacy is monitored is based on approaches that are reflected in the PISA (Programme for international Student Assessment) studies. The components of functional literacy include the following: mathematical literacy, reading literacy, natural science literacy, financial literacy, global competencies and manifestations of creative thinking ability. Each of the components is defined as the ability of the student to act and be in harmony with the surrounding world in the process of solving various life tasks. A detailed analysis of the processes of assessing the quality of knowledge within the subject area under study is reflected in the TIMSS (Trends in Mathematics and Science Study) – a monitoring study of the quality of mathematical and natural science education, developed by the International Association for the Evaluation of Academic Achievements IEA. According to scientists, in order to assess the level of development of functional literacy, it is necessary to initially organize teachers' training on how to develop various classes of educational tasks and apply methods of forming successful strategies for their solution [14, p.120]. Let us turn to the issue of the formation of natural science literacy, since it is at chemistry lessons that the tasks of this direction are solved. According to the definition, natural science literacy is the ability of a person to take an active civic position on socially significant issues related to the natural sciences. Consequently, a scientifically literate person has the ability to participate in the discussion of problems related to natural sciences and technologies. This individual needs to possess the following competencies: Among them, such as scientific explanation and understanding of the main features of natural science research, interpretation of knowledge obtained during training, data and the use of scientific evidence for subsequent conclusions. The requirements for tasks to assess the level of scientific literacy should be based on the ability to solve real life situations. A typical block of tasks includes a description of a real situation, presented, as a rule, in a problematic way, and a number of task questions that are related to the resolution of this situation. Tasks are classified according to many parameters. It is proposed to consider such a parameter as competence or skills. An equal sign is placed between these concepts, since according to studies of the second half of the 20th century, the generally accepted "skills" meant the content of the modern concept of "competence". In particular, in the works of S. Rubinstein notes the presence of "automated actions and operations that merge into a single, holistically flowing act, called skill" [15, p. 10].

The types of competencies to be assessed and their corresponding tasks, their characteristics are presented in Table 1.

Table 1 – Relationship between competences and tasks for their mastering.

Type of competence	Evaluated competence	Characteristics of the training task
Scientific explanation of phenomena	Apply to explain a scientific phenomenon Recognize, use, and create models and representations Predict and justify a prediction Explain the operation of a technical structure or technology	Description of a standard situation using program material Description of a non-standard situation Justify the further development of events Summarize the scientific knowledge of the presented technical design or technology
Understanding the characteristics of scientific inquiry	Understand the purpose Evaluate the way of scientific knowledge Produce a hypothesis and suggest ways to test it. Describe and evaluate ways to ensure the validity of data	Clearly formulate the purpose Formulate the idea of the research, the stages of the research Formulate and suggest possible ways to test the hypothesis Characterize certain elements of the study that ensure its reliability
Interpreting data and using evidence to draw conclusions	Analyze, interpret Transform data Recognize evidence and reasoning in scientific text Evaluate arguments and evidence from a variety of scientific sources	Formulate conclusions based on data interpretation Transform the presentation of scientific data Characterize types of scientific texts: proof, reasoning, assumption Evaluate the correctness and persuasiveness of statements from various scientific sources

Based on the presented table, it is possible to determine the goals and specific tasks of the educational process in secondary school at chemistry lessons. It seems possible to develop tasks that would ensure the development of competencies, which include: scientific explanation of phenomena, understanding of the features of scientific research; interpretation of data and the use of evidence to draw conclusions. Tasks for the formation of competencies-skills are represented by competencies that are supposed to be possible to evaluate. To master the competencies, it is proposed to develop tasks that must meet certain characteristics.

The basic concept taken as a basis in this study is that natural science literacy involves solving real problems in real time. Thus, the principle of personality-oriented learning is realized, which is considered as the basis of the organization of the educational process, as a way of its intensification.

The peculiarity of this approach is that there is a process of "appropriation" of the content of acquired knowledge. From the very beginning, the student includes the full potential of his activity aimed at developing the main groups of professional and social competencies in the conditions of using a didactically based combination of individual and joint forms of work.

Thus, it can also be stated that modern education is characterized by a tendency of depersonalization (withdrawal of the teacher from the educational process), which manifests itself in technological and postmodern pedagogical directions. These directions are pedagogical projections of the corresponding philosophical and ideological orientations in world culture.

Conclusion. This study presents an analysis of the situation of the development of functional literacy of students in chemistry lessons within the framework of a shortened training program.

In the course of the study, it seemed important to analyze the regulatory and legal documentation that regulates the system of general secondary education of the Republic of Kazakhstan. The analysis of the content of normative documents regulating the system of general secondary education in terms of ensuring the results of training for the development of functional literacy in terms of its component of natural science literacy in chemistry lessons within the framework of a shortened training program makes it possible to determine the main trends in the planning of the educational process in this direction. It is important that, according to the normative documents on the organization of the educational process of secondary schools, the chemistry teacher has the right to independently determine the number of hours allotted for the study of topics that allows the teacher of a specialized school to decide on the choice of ways to develop special competencies of students within their subject.

The idea of the need for the development of functional literacy of students, which is the key to the readiness of the individual to live in a changing reality, is confirmed, since it is declared as an important component of the basic competencies of the individual. Along with this, an important methodological problem of finding ways and means of assessing the formation of natural science competence of students in chemistry lessons is being solved.

The analysis of scientific researches to determine the content and objectives of the formation of natural science literacy allowed us to determine that natural science literacy is the ability of a person to take an active civic position on socially significant issues related to the natural sciences.

Along with this, the requirements for tasks for assessing the level of natural science literacy were studied, as a result, the need to determine the ability as a parameter of competence was revealed. In the course of the study, a table of matching skills (competencies), corresponding tasks with a description of their characteristics was derived.

Based on these data, it is possible to determine the goals and specific tasks of the educational process in secondary school at chemistry lessons. Accordingly, it is concluded that it is possible to develop tasks that would ensure the development of competencies, which include: scientific explanation of phenomena, understanding of the features of scientific research; interpretation of data and the use of evidence to draw conclusions. Tasks for the formation of competencies-skills are represented by competencies that are supposed to be possible to evaluate. To master the competencies, it is proposed to develop tasks that must meet certain characteristics.

In this way, the natural science literacy involves solving real problems in real time and at the same time the principle of personality-oriented learning is implemented. Modern education is characterized by the tendency of depersonalization (withdrawal of the teacher from the educational process), which manifests itself in technological and postmodern pedagogical directions.

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