



DOI: 10.54919/physics/55.2024.93jw4

Development of research skills of secondary school students in the organisation of independent local history work in biology

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Abstract

Relevance. The relevance of the research is conditioned upon the active use of personal experience of students in the implementation of the process of teaching local history work in biology lessons, based on the development of methods of research activity in a secondary school.

Purpose. The value of scientific knowledge, the need to increase the role of science in the education of schoolchildren are associated with the need to achieve cognitive independence of the individual and the organisation of a personality-oriented learning system.

Methodology. There is a fact that the methodology of teaching biology, to date, does not sufficiently reflect the ways of developing research skills in the independent local history work of students. It is also necessary to develop a scientific and methodological approach to the development of research skills and skills acquired in biology lessons. This article describes an experiment in which a survey of biology teachers of grades 5-7 was carried out using a questionnaire. Among the theoretical research methods were used: analysis and synthesis of historical and cultural, psychological and pedagogical, methodological literature, abstraction and generalisation, study of normative documents on the problem of research.

Results. The results of the experiment in this article showed that for this the teacher needs free time, where he will be able to independently solve the issues of interest to him for creative development. Such a process of introducing new educational standards into the education system is of particular relevance for the development of students' research skills in organising independent local history work in biology, which in turn requires teachers to have a high level of training.

Conclusions. These materials can be used in the system of higher pedagogical education, in teacher training courses, and in general education and secondary specialised institutions.

Keywords: local history material; teacher; knowledge; scientific methods; competence.

Suggested Citation:

Jarylkapova S, Aidarbayeva D, Zhumagulova K. Development of research skills of secondary school students in the organisation of independent local history work in biology. *Sci Herald Uzhhorod Univ Ser Phys.* 2024;(55):934-943. DOI: 10.54919/physics/55.2024.93jw4

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Introduction

Today, state educational standards place high demands on school graduates. First of all, to be able to learn, not irradiation. The ability, abilities, desire to learn, to carry out independent cognitive activity in the process of continuing education [1]. Readiness for independent cognitive activity in the process of continuing education becomes the leading competence, in the formation and development of which the school occupies a special place [2; 3]. In the context of the above, the study of independent cognitive work in modern pedagogical science acquires a new meaning and significance when it becomes not so important to predict the range of professions in demand, but the relevance that the development of competencies of cognitive independence of adolescents acquires. It is difficult to overestimate the educational and educational significance of the local history biological and ecological work of schoolchildren. Although the child has no experience in conducting this kind of research, he has a natural inquisitiveness and curiosity, which is activated when in contact with natural objects of his native land. Direct observation of living objects of the nature surrounding the student is necessary when studying all sections of biology, but such an ability is laid at the first stages of systematic study of biology, that is, in grades 5-7. According to Kazakh and Russian scientists [4; 5; 6; 7; 8; 9; 10], the identification of the main features and components of students' research activities in the study of biology will allow to plan, develop and gradually complicate the activities of students in the assimilation knowledge and the formation of skills.

At the end of the XIX century, elements of scientific biological methods began to penetrate into the school: observation, hypothesis building, experiment. The idea of developing elementary research skills in students is beginning to develop. Up to this point, demonstration and illustrative methods were used in schools. According to R.A Babenkov [11] and G. Asbauw [12] the demonstration method was aimed at the mental work of students, and the illustrative one at motor activity, however, these methods could not satisfy the child's need to explore the surrounding world. The 20s of the XX century – the period of development of the research method in the methodology of teaching biology. It is based on the independent work of students and the independent formulation of conclusions by schoolchildren after performing laboratory work or guided tours. The role of the teacher in the research method was reduced to instructing and consulting students if they had any difficulties. In the works of scientists from other countries [13; 14; 15; 16; 17], the research work of schoolchildren connects cognitive and subject-practical activities and combines their functional purposes, namely: equips students with knowledge, intellectual and practical skills; promotes the formation of a scientific worldview, moral, aesthetic qualities of students; contributes to the understanding of the practical significance of science, empirical research, and also develops activity, independence, cognitive interest.

Unlike practical works that serve to illustrate certain laws of nature, research work is inevitably associated with students solving a creative, research problem with a previously unknown solution. Research skills in biology are skills, the mastery of which makes it possible to

successfully solve theoretical and practical problems related to the study of biological objects or phenomena, in a particular case, the conditions of the native natural environment [18; 19; 20; 21; 22]. Students' research skills in biology are understood by K. Pahl [23] as a skill of active educational and cognitive activity aimed at discovering new knowledge about an object or phenomenon of wildlife, in which the independent application of scientific methods of cognition dominates. Success in the implementation of research activities is determined by the skills and abilities formed in students in performing the actions of its components. Based on the analysis of various approaches to the interpretation of the concept of "skill" in the didactic and methodological literature, the author of the article proposed the following definition of the concept of "educational and research skills of students" – a system of interrelated, sequential actions aimed at implementing the stages of research activities in order to study biological theories, objects, phenomena in natural or laboratory conditions. If all the requirements are met, the results will be high, since it is possible to clearly show the connection of learning with life; research skills will develop significantly. The work will be productive with the provision of a good methodological complex.

Materials and Methods

The experiment, during which the research skills of secondary school students were studied, started with the study of methodological and theoretical foundations for the formation of readiness for independent local history work in biology; philosophical ideas about the knowledge of wildlife; scientific and methodological theories in the field of biology teaching methods. Among the theoretical research methods were used: analysis and synthesis of historical and cultural, psychological and pedagogical, methodological literature, abstraction and generalisation, study of normative documents on the problem of research. From empirical methods, pedagogical observation, survey (questionnaire), interviewing, control sections, pedagogical monitoring were used. The study took place in three stages: the ascertaining, forming and control stages of the pedagogical experiment. The experimental base of the study was Abai Kazakh National Pedagogical University. At the initial, ascertaining stage of the experiment, the theoretical study and analysis of the state of the research problem, the definition of goals, tasks, the structuring of the questionnaire, the organisation of the results and conditions in the experiment were carried out. During this stage, the scientific and theoretical foundations of the development of research skills of secondary school students were analysed; a personality-oriented methodology was built and the content of the development of the lesson process was determined, during which, observing and using the acquired knowledge, students of grades 5-7 independently decide how to apply research skills and skills.

At the second, formative stage, the experiment was carried out directly. During this experiment, a survey was conducted among biology and natural science teachers throughout Kazakhstan. The theoretical provisions and conclusions contained in the study create prerequisites for updating the content of education presented in the created new course "Local History". During the survey of teachers,

it was possible to identify the effectiveness of the methodology for the development of research competence in the process of teaching the course. Thus, the experimentally confirmed method of developing students' research skills proved to be effective and was introduced into the educational process of secondary schools through excursions, work using the Internet, preparation for Olympiads and competitions, extracurricular work; not often – a research project based on local history material; and rarely – an ecological trail. As a result, at the third, control stage of the experiment, it was found out that 93% of respondents agree with the statement that the local history work of schoolchildren in biology ensures the development of their independence in acquiring knowledge and skills. Most of them believe that local history work in biology contributes to the development of independence as the main component of the research skills of students in grades 5-7, but this requires serious preliminary teacher training (59.5%). They also do not deny that when organising independent local history work on biology, a carefully developed methodology and long-term practice are necessary.

Thus, the development of the skills stated in the topic of the article on the basis of independent local history research is possible when they are implemented in lessons, excursions and extracurricular activities. The key is that in such a process, students solve creative problems with an unknown solution. The plan of research consists of the formulation of problems and tasks, the selection of

methods, conducting an experiment, data collection, analysis and generalisation, conclusions. To master reality, the student acquires a functional research skill, and also activates the student's personal position in the general education process based on independently acquired knowledge that is new and personally significant. At this stage, methods of mathematical and statistical processing of experimental data, graphical representation of the results were used.

Results

The key in the programme of the SES (state compulsory standard of education) of Kazakhstan is to form students' skills of adaptation to life in society through the development of a common culture of personality, to create conditions in which a student, considering his educational needs and individual capabilities, will make an informed choice of a specialty in the field of mastering professions [24]. In this they can be helped by learning the materials of the course "Local History", which is carried out according to the updated programme, integrating the material into humanities and natural subjects [4]. Considering all the above tasks in this experiment, the author of the article conducted a study among biology and natural science teachers. The survey participants were biology and natural science teachers throughout Kazakhstan, but teachers from the Almaty region showed activity. The characteristics of the focus group are presented in Table 1.

Table 1. Characteristics of respondents who participated in the study

Region in Kazakhstan	Number of teachers
Almatynskaya	19
East Kazakhstan	12
Turkestan	11
Work experience	
0-4 years old	37%
5-10 years old	23
70 years	40%

The majority of respondents have more than 5 years of work experience (63%). One of the respondents has 28 years of work experience – K.H. Adilbekova, OOSH No. 124, Almaty. Answering the question "Do you use

educational and research activities in teaching biology to children?" the opinions of biology teachers differed, but most of them replied that they rarely use this type of activity (Figure 1).

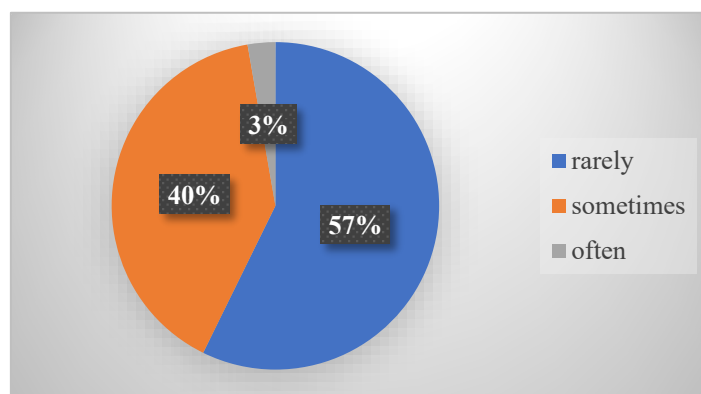


Figure 1. The results of the survey "Do you use educational and research activities in teaching biology to children?"

To the question "Do you set a special goal to develop students' research skills?" 79.1% of teachers' opinions agreed. Yes, they set a special goal to develop students' research skills, but not always, depending on the topic

being studied. Only 9.3% of them make it mandatory and 11.6% find it difficult for students of this age (grades 5-7). As it was known from the survey results, when organizing research work of schoolchildren with wildlife objects,

mostly 65-63% of teachers face such problems as: insufficient methodological materials and developments for organising research work; insufficient necessary equipment and material resources. They also do not deny the lack of a holistic understanding of the methods, techniques, and means of educational and research activities among schoolchildren and the lack of motivation among children for educational and research activities (14%).

In the next question, teachers were given the opportunity to choose one or more answers to get the teachers' opinion "What is the main reason that students currently do not have enough research skills?". The reason that students currently do not have enough research skills

are: limited time allocated to study specific topics 23 (53.5%); lack of equipment 20 (46.5%); in the absence of a special methodological system 17 (39.5%). They also do not deny such reasons as the inability of teachers to organise educational research 11 (25.6%), the complexity of this methodological task for students of grades 5-7 9 (20.9%) and the lack of appropriate motives for students 7 (16.3%). According to the majority of teachers in Kazakhstan, lessons in the organisation of laboratory and practical work have the potential to develop the research skills of students 29 (67.4%), but independent work with local history material 21 (48.8%), extracurricular activities 19 (44.2%) and projects – 8 (16.6%) are not inferior (Figure 2).

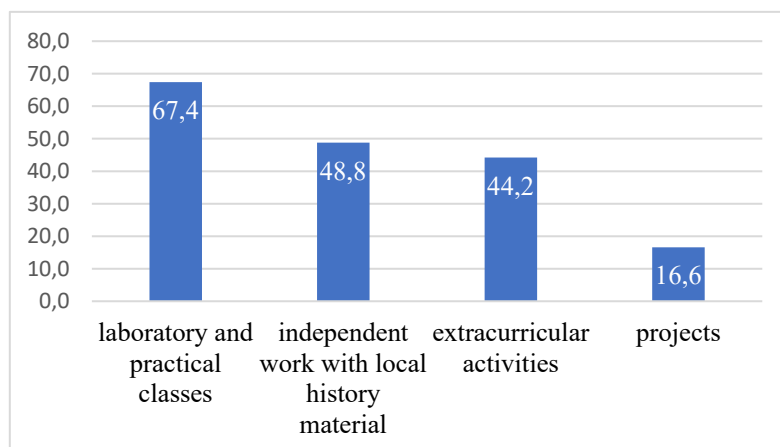


Figure 2. Survey results "What forms of biology education, in your opinion, have the potential to develop students' research skills?"

When teaching biology, the independent work of students in grades 5-7 is not often organised by the teacher

(Figure 3). A total of 37 respondents participated in the study.

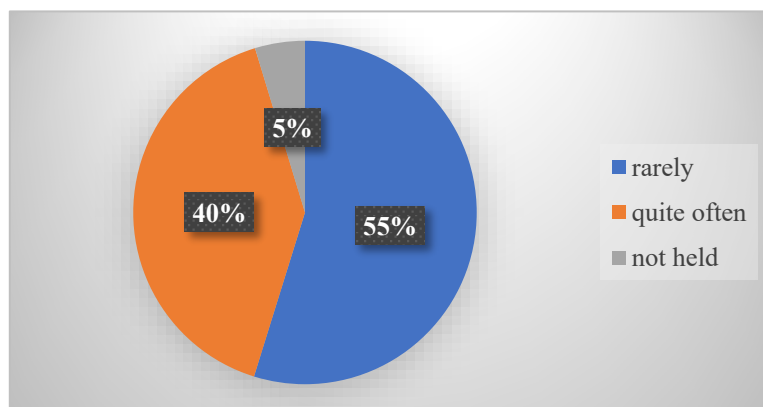


Figure 3. The results of the survey "When teaching biology, do you organize the independent work of students in grades 5-7?"

To the question "Do you think that independent work in biology helps the development of research skills of students in grades 5-7?" they answered "yes, but if only part of the research work is carried out by students on their own" – 24 (58.5%); "yes, if the independent work includes separate elements of research: search and processing sources of information; conducting observations, simple experiments" – 16 (39%); "no, children at this age have not formed skills for independent local history work in biology" – 5 (9.7%); "no, children at this age have no educational motivation for independent local history work in biology" – 3 (7.3%). The results of the survey "Do you agree with the statement that the local history work of

schoolchildren in biology ensures their independence in obtaining knowledge and skills?" 93% of respondents agree with the statement that the local history work of schoolchildren in biology ensures the development of their independence in obtaining knowledge and skills. Most of them believe that local history work in biology helps to develop the research skills of students in grades 5-7, but this requires serious preliminary teacher training 59.5%. They also do not deny that few methods of organising local history research have been developed and a long practice of 9.7% is needed for the development of research skills. In Kazakhstan, biology teachers practice independent local history work very well – an excursion, work using the

Internet, preparation for Olympiads and competitions, extracurricular work; a research project based on local history material; an ecological trail (Table 2).

Table 2. The results of the survey "What types of independent local history work of students in biology that you practice?"

Types of independent local history work	How often are they used	Number of respondents (%)
Excursion	Often	26 (61.9%)
Application of the Internet system	Often	25 (59.5%)
Olympiads and competitions	Often	19 (45.2%)
Extracurricular activities	Often	18 (42.9%)
Research project based on local history material	Not often	43.0 (33.3–45.8)
Ecological trail	Rarely	4(9.5%)

At the final question, teachers were asked to rank according to a 5-point system the potential of types of independent local history work in the development of research skills of secondary school students (Figure 4).

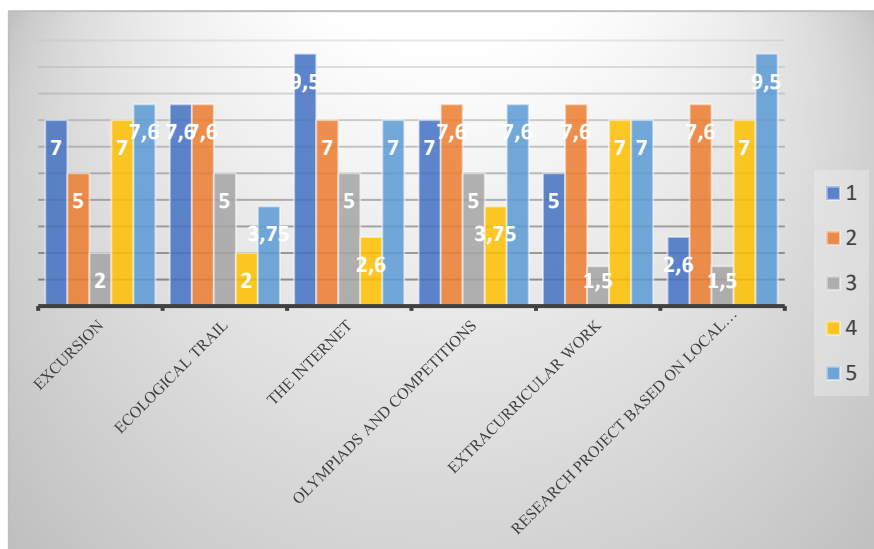


Figure 4. The results of the survey "Evaluate on a 5-point scale (in ascending order of the score from 1 to 5) the potential of independent local history work in the development of research skills of students in grades 5-7 when teaching biology"

Based on all of the above, we can say that when organising independent local history work in biology lessons, students' research skills will develop significantly. However, to organise this type of activity, it is necessary to have a number of factors: compliance of the methodology for developing students' research skills with the updated biology program, increased time for practical work (studying the theoretical part via the Internet), availability of equipment and material support; consider the age characteristics of children in grades 5-7 of secondary schools; qualified teacher training. If there is free time, teachers and students have an interest in engaging in creative development in scientific activities. The teacher independently decides what kind of activity to engage in and teaches this student. If all the requirements are met, the results will be significant, since it is possible to clearly show the connection of learning with life; research skills will develop; work will be productive if students' research activities are provided with a methodological complex. Having developed the necessary methodology for organizing independent local history work for the development of students' research skills, it will not cause difficulties to form a holistic understanding of the methods, techniques and means of educational and research activities among schoolchildren.

Discussion

The author of the article came to the conclusion that the effectiveness of research activity depends on mastering research skills of a theoretical, practical, organisational and communicative nature. The peculiar integration of these skills forms the structure of research skills in biology when performing research work based on the composition of educational skills and the specifics of educational and research activities. Mastering various skills, in turn, depends on the organization of cognitive activity of students in biology lessons, which can be successfully carried out in schools and classrooms, where the necessary conditions are created for the most complete implementation of the research approach in teaching this subject. The value of scientific knowledge and the importance of students' research activities have become especially realised by the pedagogical community in recent decades. The importance and necessity of increasing the role of science and its methods in the education of schoolchildren, designed to enhance the development of methods of cognitive and research activities of students, is noted. The research on the methodology of teaching biology [25] examines certain issues of using the educational and research work of students to develop a

system of biological knowledge, research skills of students in organizing independent work. However, the existing works devoted to this problem do not specify the role of a systematic approach in proving the stimulating influence of the organisation of independent local history work of students in biology on the development of research skills.

According to the author of the article, independent local history work will contribute to the development of research skills of secondary school students, if the theoretical justification of the methodology for the development of research skills considers systemic and personal-activity approaches; theoretical and didactic principles of independent educational and research local history work are substantiated. Since the system-activity approach in mastering the updated content of subjects will allow developing research skills (search, selection, systematisation, analysis and evaluation of information, generation of forms of presentation of research results). It is necessary to organise work for the development of research skills, and also to apply local history materials in the course of this work. But this requires material and methodological support, that is, a comprehensive study of this problem. When choosing the content of the course "Local History", the author of the article focused on the theoretical and practical study of biology. The content of the course "Local History" includes research tasks, the solution of which requires students to use various types of methodological and subject research skills. The goal was that research tasks arouse the need for students to develop creative abilities and thereby contribute to the development of creativity through its main elements. Creative abilities shown in solving research problems are one of the key qualities of the information dimension of competencies. They are necessary for a specialist of the 21st century, because they contribute to the production of knowledge [26].

In this regard, in order to perform research tasks using the Internet, students are invited to use the electronic methodological manual "Local History" [9], which is included in the educational process. It is developed in accordance with the content of the standard programme. Additional theoretical material is presented in the form of hypertexts. In addition, electronic manuals are a means of feedback and assessment of knowledge, as they have interactive tasks with an immediate assessment of the answer. In this electronic manual there are 15 laboratory works, tasks for independent work of students with a teacher, as well as independent tasks that will allow students to develop research activity and increase their interest in the subject. However, O. Zlatkin-Troitschanskaia, R.J. Shavelson, C. Kuhn [27] note that the main contradictions that have developed in the field of scientific and methodological support of the educational process in a comprehensive school for the development of students' research skills during independent local history work in biology are: the needs of practice in realising the educational potential of teaching methods and new tasks of personal development; innovative trends in general education and the level of the readiness of teachers to implement new tasks; the existing methodological conditions of education in a comprehensive school and the potential opportunities of students to master the skills of research activity in independent work.

Thus, the fact that the methodology of teaching biology today does not sufficiently reflect the ways of developing research skills in the independent local history work of students justifies the development of a scientific and methodological approach to the development of research skills stated in the topic of the article. The dynamics of the development of research activities should be traced throughout the entire course of study. This is necessary to analyse and monitor the activity of students participating in the training, and to exclude the possibility of obtaining random results. For example, when performing tasks in their research, N. Cao, M. Amanbayeva, A. Maimatayeva, Z. Unerbayeva, K. Shalabayev, S. Sumatokhin, S. Imankulova, J. Childibaye [28] found out that such mental operations as analysis and synthesis, and the establishment of cause and effect, are the most difficult activities for students of grades 5-7. Students often could not extract basic information, could not process the data obtained during the work. It was difficult for them to summarise the material and draw a conclusion. The leading idea of the article, according to the author, is that in resolving contradictions (external and internal) related to the lack of cognitive independence in modern adolescents, teachers, students and their parents should actively participate, and each group of participants requires special work and programmes.

A. Schepotiev, V. Nadein, I. Demich [5] say that a student's assimilation of certain knowledge in the form of educational activity always begins with a creative transformation of the subject. He also highlights the educational task that the student solves through educational activities. The first action is always aimed at finding a genetically original relation of subject conditions, a situation that will serve as a basis for solving subsequent more specific tasks. This will be followed by other training activities that will allow monitoring and evaluating the solution of the educational task. Successful mastery of the main content of educational activities, according to I. Azizova and M. Gilnich [6] promotes such an organisation of students in which mental activity proceeds in combination with practical. Besides, I. Azizova and M. Gilnich [6] believe that the indicator of learning effectiveness is not only the sum of subject skills, but also the development of the skill to acquire new knowledge. The skill formed on the basis of the methods of activity allows the student, knowing the composition and sequence of actions, to independently and creatively apply it in new conditions.

Research activity, according to E. Bazhenova [7] is a kind of work activity. It, as well as the educational one, is aimed at obtaining information that multiplies the public experience. When carrying out research activities, the initial situation is transformed into the final one, which turns out to be more specific for the observer, i.e. containing information. The solution of research tasks is closely intertwined with creative activity, assumes the presence of characteristic stages: the formulation of problems and tasks, the selection of methods, conducting an experiment or data collection, analysis and generalisation, conclusions. Thus, the author of the article believes that the goals of students' research activities are the acquisition of the ability to explore as a way of knowing reality, and the independent acquisition of new and

personally significant knowledge as a conscious position of a particular student in the educational process. According to R.A. Ershova and N. Kabayan [8] highlighting the main features and components of students' research activities in the study of biology will allow students to plan, develop and gradually complicate the activities of students in the assimilation of knowledge and the formation of skills. Motivated, skillful implementation of a set of research actions of students should be based on a certain level of modern knowledge, skills and methods of activity achieved by them, and the ability to adjust them in accordance with a specific situation. In this case, it is possible for students to achieve a level of competence sufficient to effectively solve research problems.

Research activity, during which students master the skills of independent solving of research problems, provides conditions for a gradual increase in the level of research skills to the level of competence. The author of the article agrees with the definition of competence M. Ekici and M. Erdem [16], which a student can acquire. M. Ekici and M. Erdem [16] argue that the area of intersection of knowledge with skills and abilities generates opportunities for the implementation of acquired knowledge. At the border of knowledge – value, relationships arise, and personal meaning is found. The imposition of skills and abilities on values leads to motivated activity. The area of intersection of all 3 components, in fact, is the acquired competence. That is, the development of competence in general, and research competence in particular, presupposes a deep interrelation of its components: knowledge, skills, values and behaviour. Notably, each author focuses on the definition of research skills as an opportunity for a student to use maximum abilities to work with the subject of research. It follows that regardless of how each of the authors defines the structure of research skills for themselves, the process is primarily aimed at reflecting the activities of students.

Research skills in the field of biology are skills, the mastery of which allows successfully solving theoretical and practical problems related to the study of biological objects or phenomena. In the case studied by the author of the article, these are the conditions of the native natural environment [29; 30; 31]. Such skills in biology are understood by the author of the article as the activation of educational and cognitive interest aimed at discovering new knowledge about an object or phenomenon of wildlife, in which the independent application of scientific methods of cognition dominates. The author of the article identified the principles that are part of the research competence of students in the implementation of local history research. In his understanding, the principle is the basis, the guiding idea, the basic rule in which there are different approaches to determining the principles of learning. According to N. Boshuizen, S. Vosniadou, S. Lehtinen [15] the principles of learning are nothing but regulations that are guided to improve the effectiveness of learning. When determining the principles of learning, it is necessary to consider: learning goals, learning patterns, ways of using patterns, specific conditions in which learning takes place. Some authors believe that teaching biology should be guided by general didactic principles: scientific, polytechnic, systematic, accessibility, visibility,

local history, independence, activity in learning [18; 19; 32; 33].

Therefore, students need to create their own solution scheme, find a new system of methods. In such an activity, the generation of a hypothesis, the principle of solving a problem, the development of a plan and the verification of a solution are of paramount importance. The result of the student's training, in this case, is a specific subject activity due to the fact that the purpose of natural science education is not so much to provide knowledge, but also to develop analytical abilities, to ensure understanding of the research process, to maintain interest and accessibility for different students [28]. Solving research tasks, the student "discovers" (subjectively) new knowledge about the object of research, the method and means of research activity. Thus, the student's personality, his research skills and abilities develop. The second principle of the formulation of the research task is realised – increasing complexity and compliance with the established criteria of complexity. When solving research tasks, the teacher must create the most optimal conditions for the development of mental activity by constructing hypotheses, discussing and evaluating them, participating in a heuristic conversation, drawing up a plan and methodology of an experiment to test the most likely research hypotheses. Since the discussion of facts, conclusions and ideas, and the exchange of opinions and reasoned discussions about models and concepts are an integral part of science, these forms of activity should also be present in the educational process of a future scientist [17; 34; 35; 36]. The student's scientific thinking is formed by analysing and studying the research problem being solved, clarifying the internal connections and relationships between its various elements, a comprehensive objective assessment and determining ways to solve the research problem. Thus, special attention should be paid to how students in biology classes generate and test hypotheses [14], namely, how their scientific thinking works.

Conclusions

Currently, society is forming a request for high-quality and relevant natural sciences education in a secondary school. Such education presupposes compulsory training in the field of research. The student's research competence in biology lessons is an indispensable condition for his scientific literacy. Therefore, its development in the educational process should be the subject of close attention. The model of the methodological system for organising the development of students' research activities in the organization of independent local history work in biology assumes the relationship of the target, motivational, substantive and procedural components. Thus, the level of students' research competence increases. To determine the level of development of research activities in educational institutions of Kazakhstan, the author of the article conducted a survey among teachers of grades 5-7.

Most teachers agree that independent work in biology helps to develop the research skills of grades 5-7 (58.5%). And 93% of respondents agree that local history work contributes to the gradual accumulation of research skills among students, but this requires serious preliminary teacher training and long-term practice. The imperfection

of the educational programme in biology entails, on the one hand, an incomplete understanding by students of the scientific method and methods of obtaining scientific knowledge, which is the most difficult aspect of the development of research competence. On the other hand, it is the teacher's lack of knowledge and skills. Therefore, the introduction of the course "Local History" in the programs of natural and humanitarian subjects is designed in such a way as to promote the development of analytical thinking and the acquisition of experience in setting and solving scientific problems. At the same time, such a programme

will effectively contribute to the development of methodological and high-level professional training of teachers.

Acknowledgements

None.

Conflict of Interest

None.

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Розвиток дослідницьких умінь учнів основної школи в процесі організації самостійної краєзнавчої роботи з біології

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Анотація

Актуальність. Актуальність дослідження зумовлена активним використанням особистого досвіду учнів у здійсненні процесу навчання краєзнавчої роботи на уроках біології, що базується на розробці методики дослідницької діяльності в загальноосвітній школі.

Мета. Цінність наукових знань, необхідність підвищення ролі науки у вихованні школярів пов'язані з потребою досягнення пізнавальної самостійності особистості та організацією особистісно-орієнтованої системи навчання.

Методологія. Існує факт, що в методиці викладання біології, на сьогоднішній день, недостатньо відображені шляхи розвитку дослідницьких навичок у самостійній краєзнавчій роботі учнів. Також необхідно розробити науково-методичний підхід до розвитку дослідницьких умінь і навичок, набутих на уроках біології. У статті описано експеримент, під час якого було проведено опитування вчителів біології 5-7 класів за допомогою анкетування. Серед теоретичних методів дослідження використано: аналіз і синтез історико-культурологічної, психолого-педагогічної, методичної літератури, абстрагування та узагальнення, вивчення нормативних документів з проблеми дослідження.

Результати. Результати констатувального експерименту в даній статті показали, що для цього вчителю необхідний вільний час, де він зможе самостійно вирішувати питання, що цікавлять його для творчого розвитку. Такий процес впровадження нових освітніх стандартів у систему освіти набуває особливої актуальності для розвитку дослідницьких умінь учнів в організації самостійної краєзнавчої роботи з біології, що, в свою чергу, вимагає від учителів високого рівня підготовки.

Висновки. Матеріали можуть бути використані в системі вищої педагогічної освіти, на курсах підвищення кваліфікації вчителів, а також у загальноосвітніх та середніх спеціальних навчальних закладах.

Ключові слова: краєзнавчий матеріал; вчитель; знання; наукові методи; компетентність.