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#### **FORMS AND METHODS OF IMPLEMENTING INTERDISCIPLINARY APPROACH TO SCHOOL EDUCATIONAL PROCESS**

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#### ***Abstract***

The authors have substantiated the actuality of the scientific theme of forms and methods of implementing interdisciplinary approach to school educational process, which is directly correlated to the settlement of the “discipline-centrism” problem (discipline-based conceptual structure of curriculum) and to the challenge of postindustrial school formation. Interdisciplinary interaction has been considered in three aspects: conceptual, content-related, organizational-methodological. The research has presented rightly recognized interdisciplinary approach practice and given the investigation results of interdisciplinary interactions in theory and practice both in Russia and abroad. The authors have analyzed the experimental innovative technology format in application to school environment, forms and methods of interdisciplinary interactions as a means of provision of quality school education in the conditions of Federal State Educational Standards of General Education. The research has stressed some negative aspects of pedagogical activity stating rather low level of teachers’ competency, the lack of their readiness to the goal-directed, methodologically correct interdisciplinary interactions in school educational process. The novelty of the research involves analysis of interdisciplinarity at school in the sense that its forms and methods have been conducted from the position of concepts of information and competency-based approaches, which permits to increase development of an individual component of a personality in the condition of creating newest educational content. The authors have provided examples of implementing complex methods within the discipline framework “Foundations of Social Studies” – an essentially integrative course allowing to form personal values and socially important attitudes of school students, development of their independence and creativity.

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**Keywords:** Interdisciplinary interaction, integration, class, forms, methods.



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## 1. Introduction

The actuality of the theme is related to the fundamental problem of integration being discussed both in the pedagogical scientific literature and in professional societies of practitioner teachers. The “Discipline-centrism” (the rigid discipline-based conceptual structure of curriculum) has been increasingly understood to impede innovative processes of post-industrial society.

The acting Federal State Educational Standards of General Education has established the curriculum disciplines and simultaneously imposed requirements to use additional educational, didactic materials focused on formation not only disciplinary but also meta-subjective and personal educational results of students. Interdisciplinarity contains the potential which has not been fully applied to the school education so far including formation of personal values, socially important attitudes of school students, development of their independence and creativity. Integration approach has caused newest scientific research interest as the method allowing to bring the following categories together: the aspects of educational content and formation of holistic world perception and intellectual powers of school students

## 2. Problem Statement

It has been stipulated both at the levels of theory and practice there exist a great deal of unsettled questions on forms and methods of implementing interdisciplinary approach to school educational process in part of increasing students' personal potential development and interdisciplinary interactions.

The problem of interdisciplinary interaction in school education has been studied by the Centre for Social and Humanities Education of FGBNU “The Institute for the Development Strategy of Education of the Russian Academy of Education” within the federal task for research on “The renewal of the Contents of the General Education and the Teaching Methods in the Conditions of Modern Information Environment” for the years of 2017-2019. We consider the term “interdisciplinary interaction” as methodological principle of systematicity in educational process organization with integration of contents of disciplines, methods ,teaching and learning techniques, both within and without the framework of a discipline, aiming at formation of a holistic world perception and development of life experience of school students. Aiming at realizing this principle effectively it is essential for all the participants of educational relations to be involved in the process integratively.

Implementing interdisciplinary approach to educational activity is slow in coming, firstly, due to the propensity of teachers to stay within their professional disciplines, which has caused students' deficiency in understanding of interconnections and interactions inherent to the processes and phenomena of the real world (Lazebnikova & Franzuzova, 2017). Secondly, forms and methods of employing interdisciplinary approach to a school educational process have not been elaborated thoroughly by Pedagogy and actually have not been widely used in practice of schools in Russia so far.

We consider forms and methods of pursuing interdisciplinary approach as a tool of systematization of education process in the relation to its subjects, their functions, and also completeness of the educational cycles, structural units of teaching and students' development over time. This is a pedagogical idea by RAE academician Novikov (2011). It permits to increase the subjective component of a personality of a student expressed in the categories “competency” and “professional integrity”. A

good deal of research works on competency-based approach to education have been published in the pedagogical scientific literature recently, for example, Vorovshchikov (2010).

Accordingly, the forms and methods of implementing interdisciplinary approach to educational process are related to competency-based approach “as the foundation for educating a personality in entirety and forming students’ abilities to solve important practical tasks” (Novikov, 2011, p.54). Competency tends to develop in activity. The activity of a modern student takes place in the context of the notions “post-industrial society”, potential of which is determined by “the full scale of information and knowledge” (Novikov, 2011, p.7). Thus, a significant problem of creation of an innovative type of both a school and a teacher has emerged in the society. This embraces a great deal of complicated technical systems, teaching and learning technologies and formation of a student as a personality of the newest epoch able to master ever growing information flows to take major decisions in the economy of knowledge.

As a result, we consider forms and methods of conducting interdisciplinary approach to education in close connection with the competency-based and information approaches. Information approach can be addressed as the framework of abstract-generalized description and learning of information aspect of functioning and structure-building complex systems, data connections and information relationships in the language of information theory (Shtanko, 1992). We believe interdisciplinary interaction being performed from the position of these approaches allows for a school to take into account subjective component of a student’s personality, forming values, professional interests and developing competency to become a successful person based on school and extra-school experience.

### **3. Research Questions**

High social demand for the advance of innovative scientific theory and practice of education has required to find the answers to a number of research questions:

- What is the significance of the phenomenon “interdisciplinary interaction”?
- What is the role and position of interdisciplinarity in the school activity?
- What are forms and methods of pursuing interdisciplinary approach at school?
- What are the major problems of employing interdisciplinary interaction at school? The article supplies a partial answer to the questions.

### **4. Purpose of the Study**

At present the final stage of the research is being carried out. The theory and practice of interdisciplinary interaction in the system of education in Russia and other countries have been recently analyzed. The objective of the present research is to reveal optimal means of interdisciplinary interactions realization at modern Russian school. The authors of the article are supposed to cover the issue of potential methodologies of implementing interdisciplinary interactions in school educational activity. The research is to investigate forms and methods of performing interdisciplinary interaction in school educational process.

## 5. Research Methods

The principal methods of the present research have been the study of relevant scientific literature and professional websites on Pedagogy, the method of scientific observation and supervision of school curricular activity, the method of expert opinion survey. The following instruments of the survey have been elaborated and applied. They are a questionnaire, Google – account resource, online-office. The questionnaire has got three structural units: inquiry on personal data and social position of the survey participants, on the evaluation of the level of their comprehension of interdisciplinarity, on the evaluation of their work experience in the field of interdisciplinarity. There have been created special experimental educational areas on school basis in Moscow, Tver, Irkutsk regions of the Russian Federation under the directorship of Sukhodimitseva (2018). The present research work has involved 1402 teachers into the sphere of professional interdisciplinary interaction.

## 6. Findings

The research has explored the aspects of interdisciplinary interactions, defined the substantial role of meta-subjectivity and interdisciplinarity in the foreign scientific literature: the subject matter of interdisciplinarity has been studied at the level of phenomenon “interdisciplinary research” (IDR) (the term “interdisciplinarity”) has been scientifically recognized in the exact definition of W. Newell and J. Klein of American Association for Interdisciplinary Studies (Newell, 2013; Klein, 2017) based on the principles of strict understanding of key role of integration of fields of knowledge of different disciplines and provision of solid footing of fundamental structure of scientific knowledge of a concrete discipline. The definition and its notions have been further developed in parameters of IDR methodology, i.e. its philosophical (Arvidson, 2015) and conceptual aspects (Szostak, Gnoli, & Lopes-Huertas, 2016; Lury et al., 2018; Tobi & Kampen, 2018) as well as analysis of IDR teaching practice (Repko & Szostak, 2017); Repko, Szostak, & Buchberger, 2017; Klaassen, 2018). The authors have given examples of content construction of school disciplines, analyzed the viewpoints of foreign colleagues (Adams, 2013; Bellisario & Donovan, 2012; Broesma, 2014; Tsvetanov-Churakova, 2016) on school educational process organization, described the methods, i.e. educational content structural-logical modelling and teaching forms, i.e. integrative classes and courses, projects, school days and weeks, fulfillment of individual and group research tasks. Interdisciplinary construction requires notions and content integration of a number of disciplines evaluating educational and developing content potential of each integrative class as a form of pedagogical activity. The research has studied interdisciplinary forms of teaching in foreign literature (cooperative learning) (Adams, 2013), integrative planning, integrative courses (Bellisario & Donovan, 2012; Slavin, 2011), integrative digital methodology (Zajda, 2011).

Interdisciplinarity in Russian system of education has been considered as integration of content of different school subject areas in the field of Social Sciences and Humanities and as the form of interaction of all participants of educational relations. There have been analyzed new forms (educational and methodical complexes of materials in electronic format) (Aleksashkina, Vorozheikina, Korolkova, & Rutkovskaya, 2017), didactic methods, i.e. the method of meta-subjective educational tasks which enables school students to perceive knowledge of different school disciplines and provides for the tools,

techniques and means of work in interdisciplinary format. As a result of study of forms and methods of interdisciplinary approach we must state there has been one of its firmly established forms: the Programme of Interdisciplinary Education (PIE) "A gifted child" (the author of the Programme is Shumakova (2016)). The above school educational programmes presuppose for school students to master the vast knowledge on the following fundamental themes such as "Alteration", "Influence", "Order". The programme allows to shift the emphasis in terms of content of education from traditional curricular structural thematic units to more complicated and volumetric divisions of knowledge. Such a kind of organization of the content of education aims at developing the potential and gradual self-realization of individuality of a school student, development of his or her systemic thinking, holistic understanding of the world.

The exploration of school educational practice has been carried out by observation of the professional work of a teacher realizing a programme of interdisciplinary education at primary school level at the basis of State Budgetary Educational Institution "School № 1569" "Sozvezdiye" ("A Talent Pool"), Moscow. The analysis has revealed the 3 key components to have given overwhelmingly positive results in the course of interdisciplinary interactions:

- 1). Interdisciplinary content of education, including the study of vast universal themes;
- 2). The educational problem research method models a school student's inherent process of learning and perception of the world as well as self-reflection;
- 3). The system of subject-subject relationships provides for cooperation, dialogue, creativity and personal growth of a school student, a teacher, parents.

It is immediately obvious integrative forms present intrinsic relationship between major components of the educational process system. They are the issues and components of educational content, of process – technological standard, of a personality development.

The results of the experimental interdisciplinary practice research which has taken place on the basis of special school areas have proved the following:

- the experiments have demonstrated that a small number of teachers understand the substance and therefore the importance, timeliness, urgency of the phenomenon "interdisciplinarity" in the system of school education;
- half of the teachers engaged in the experiment understand the importance of interdisciplinary interactions but have shown lack of professional readiness to work effectively in the interdisciplinary formats;
- the teachers are inclined to realize interdisciplinary interactions only in the framework of their professional school subject and do not comprehend the role of Planning of Practical Interdisciplinary Interactions with other teachers of school;
- almost 40 % of the teachers (the participants of the experiment) have asserted they conducted classes based on interdisciplinary technology together with their colleagues but nevertheless the documents of their Interdisciplinary Class Planning have shown that they planned it as a traditional disciplinary class.

With the aim of solving pedagogical problems the following strategies of employing interdisciplinary approach to school educational process have been elaborated (Sukhodimitseva, 2018): 1)

complex study of an object by means of an array of different school disciplines; 2). the study of different objects by methods of a definite discipline; 3) the study of different objects by different disciplines by means of the identical theories, concepts, principles, rules. 4) development of cognitive activity and independence of school students on the basis of methodology of educational activity.

We should demonstrate examples of implementing complex methods of interdisciplinary approach to the school curricular course “Foundations of Social studies” from the position of some of the strategies stated above. Its interdisciplinary character is determined by its content based on the scientific notions requiring to apply both to the facts of social practice and to different scientific disciplines. Also, its structure is built on the basis of a body of scientific disciplines: Sociology, Economic Theory, Politology, Cultural Studies, Jurisprudence, Ethics, Social Psychology, Philosophy. Special pedagogical work is being done in order to enable school students to learn and acquire scientific notions within the framework of the strategy “Complex Study of the object by means of different scientific disciplines”. The notions present theoretical abstractions. Acquisition of substance of abstractions is not possible without giving concretization. The wider the field of abstraction is the farther the abstraction lies from the real life experience of a school student and, therefore, the more precise and professionally correct concretization the notion should be. From this perspective, the necessity to apply to various examples aiming at transforming a piece of abstraction into an object which becomes clear and concise for school students predesignates integrative character of the course “Foundations of Social Studies”.

In order to prove it, we consider the notion “The Truth” which 10th-year-school students are required to cognate in order to acquire an abstraction which is absent in the direct perception of school students because an abstraction is a theoretical product of human mentality. Concretization in the form of an illustration as part of disciplinary knowledge presents a necessary component explaining new pieces of knowledge to be learnt by school students. In this example it is not possible to solve the problem by means of merely another knowledge unit of the discipline “Foundations of Social Studies” without applying to notions, facts, rules of a number of school disciplines. For another instance, presenting new information to students, we can ask a question about the temperature of water boiling point. The trueness of this knowledge is beyond any doubt and has been learnt in Physics. Nevertheless, comprehension of this piece of knowledge by the students is not possible without understanding the principle of relativity in the sense that the truth is exact, that our knowledge of the definite object to be acquired can change depending on the conditions and environment of the object. Applying to Mathematics and Physics enables the teachers to prove and illustrate this very quality of the truth for school students. For example, continuing a dialogue, a teacher can ask school students a question about the correlation of the physical parameter of pressure to height increases upon gradual climbing up a mountain. The school students mastered and acquired this piece of knowledge from the discipline “Physics” definitely well – they are certain to find the right answer. Further, the teacher states that there is a strong direct correlation between the parameters of pressure and the temperature of water boiling point. With decreasing pressure the temperature of water boiling point also goes down. For instance, the temperature of water boiling point at the height of, say, 305 meters above sea mean level is 98,9 degrees Centigrade, but at the height of 2667 meters above sea mean level the temperature of water boiling point is only 90,8 degrees Centigrade. Proceeding the explanation the teacher directs the students’ attention to the fact that the well-known result

of multiplication of  $2 \times 2 = 4$  and the record of the result is far from being unequivocal. It is in dynamic correlation with the system of calculation. In particular, dyadic notation implements only two figures – zero and one (0 and 1), therefore, the number 2 is written as 10 and, consequently,  $10(2) \times 10(2) = 100$ . The result of multiplication with the changes of manner of putting down numbers is to alter in ternary and quaternary systems of notation and equals 11 and 10 respectively. Then the rhetorical question is to be asked: ‘Where is the truth? What is the true temperature of water boiling point or the result of multiplication?’

Thus, the school students have been driven to the comprehension of a category of relativity of truth and understanding the position that absolute truth consists of lots of pieces of relative truth. This illustrates that a theoretical abstraction is a true indicator of students’ reflection of the intellectual material to be thought over and acquired properly.

Let us consider a number of tasks. The school students should apply to the knowledge of different school disciplines to find the exact and in-depth answer to them.

School students are to acquire the notion “Social Role” on the basis of strategy “The Development of cognitive activity and independent thinking of school students grounded on methodology of learning and educational activity”. For this purpose, in order to conduct multi-aspect analysis of social life phenomena and to increase the educational and cultural potential of the course “Foundations of Social Studies” a teacher should apply to all the might of literary texts (Korosteleva, 2016).

The educational and cultural potential allows to reveal latent powers of the interdisciplinary course “Foundations of Social Studies” in the process of personal values formation of school students. For these purposes, the article has presented a fragment of Olport’s (2002) “A Personality Formation” where the author considers three components of a social role: the theoretical concept of social role, assumption of the role, performance of the role. The students have been given a task upon the reading of the fragment. They have been required to reveal the correlation between the concept of the social role, assumption and performance of the social role. They are also supposed to give an answer to the following question: Does the theoretical concept of social role of a concrete individual always coincide with the methods of the performance of this social role? And how strong is this correlation? With the objective to give arguments for their thoughts in this debate the students should implement the examples of Literature.

Therefore, tackling the above task lies beyond the framework of the course “Foundations of Social Studies”. This is concerned with the following:

- a) the knowledge of Literature, which allows for students to choose and analyze the literary characters for the purpose of revealing and comparing the two components of a social role;
- b) to the skill of analyzing a behavior pattern of a chosen literary character from the viewpoint of performance of a social role and implementing certain criteria emphasized by Olport (2002) as well as to the skill of creating and putting forward a logical set of arguments as opposed to the stories in a narrative manner.

Fulfilling educational tasks integrates both disciplines “Foundations of Social Studies” and “Literature” and universal learning activities.

Let us consider one more type of a school task based on the strategy “The study of different educational objects by means of a definite school discipline”. On studying a school theme dedicated to

social conflicts, the three statements are proposed to be discussed. The students are asked to prove the trueness of one of the statements with the support of the knowledge of History and facts of contemporary social reality:

- a) Social peace is impossible due to the fact that social stratification causes social conflicts;
- b) Social conflicts are not caused by social stratification. They are provoked by lazy, untalented people who envy those who are talented and successful in life;
- c) As an engine of social progress social conflict is a boon to the society.

In order to substantiate the correct choice of one of the statements provided above school students should:

- a) apply to the criteria of social conflict and choose those which are exact, accurate, correct and logically substantiated for validating the truth of the statement chosen.
- b) consider both positive and negative aspects of the social conflict;
- c) apply interdisciplinary skills of multi-aspect analysis including research of different historical and modern facts on the topic of social conflicts; the processing of the fact with the consideration of the statement to be proved.

Stemming from the examples, the implementation of interdisciplinary knowledge and skills is a logically necessary component of the cognition and comprehension of the course “Foundations of Social Studies”. It is impossible for school students to achieve in-depth analytical understanding of a given discipline without acquisition of interdisciplinary knowledge and skills.

## 7. Conclusion

Interdisciplinary interaction in school educational process is one of the most important conditions for school students to master generalized aspect of learning activity, to develop holistic knowledge and generalized methods of activity which can be successfully applied to educational process at higher levels of education and in different situations of solving complex real life problems.

The theme of interdisciplinarity presents actual value for Russian school since it is essential to educate a creative personality with critical thinking in the conditions of post-industrial society. Russian school education system has elaborated both traditional and innovative forms and methods of organization of educational process but often school students are taught in the framework of explanation-illustration pedagogical technologies rather than in the field of interdisciplinary interactions.

In order to make effective implementations of interdisciplinary approach it is necessary for teachers:

- to effect professional interdisciplinary communication skills and to consider the level of personal intellectual development of students;
- to have modern programme-methodological material complex
- to hold interdisciplinary work format while teaching a concrete discipline;
- to pursue the above strategies of implementing interdisciplinary approach to school educational process.

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