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**INTERDISCIPLINARY INTEGRATION AS A WAY TO UPDATE
MODERN EDUCATION CONTENT**

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Abstract

The article presents modern approaches to the concept of “interdisciplinary integration” in the national and foreign pedagogy, in accordance with which the conceptual series of research is built. The experience of interdisciplinary integration using in the national school is given, its positive and negative sides are revealed. The issues of implementation of interdisciplinary integration in the comprehensive school and in higher educational institutions (high school) that are relevant for modern practice are noted. The authors indicate influence of the newest information technologies, the didactic possibilities of digital educational resources on interdisciplinary interaction. The novelty of the study lies in the fact that interdisciplinary integration is considered in conjunction with school - university (college). The results of the survey of university professors and school teachers are given, which allow teachers to understand the essence of interdisciplinary integration, as well as its level of dissemination in school practice, goals and methods of the interdisciplinary integration using. The survey was attended by teachers from several regions, urban and rural schools. Negative aspects of this process at school level are the following: precision differentiation in integration by cycles (social and humanitarian disciplines, natural- science); lack of integration of different kinds of activity; transfer activity methods from subject to subject; absence of tasks for real-life situations involving the synthesis of knowledge and skills from school practice and social experience of schoolchildren. The study showed that the actualization of educational content through interdisciplinary integration is associated with innovative forms and methods of integration.

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1. Introduction

In the modern period the concepts “interdisciplinarity” and “integration” are becoming one of the factors creating and supporting the development of integrated space of Russian education both at the goal setting level and at the functioning level. Interdisciplinary integration should be viewed as a didactic condition for improving the quality of education, as it focuses on creating a holistic scientific worldview in the minds of students, helps bring education content closer to real life. In addition, interdisciplinary integration initiates teaching and learning activity of students, contributes to the development of their intellectual potencies, create conditions for more explicit observation of cognizable objects in the process of school subjects studying. The merit of interdisciplinary integration is the fact that it performs as a means of intellectual and practice-oriented skills forming, which generally optimize the process of education (Basik, Savina, & Smirnova, 2010; Korosteleva, 2018).

The term “interdisciplinary integration” is a quite new, since until recently it was common in the national pedagogical science to talk about interdisciplinary interaction only in the interpretation of “interdisciplinary connections in learning” (hereafter IDC). It is this term that we find in modern pedagogical dictionaries: “Interdisciplinary connections in teaching reflect an integrated approach to education and training, allows us to isolate both the main elements of educational content and connections between school subjects” (Slovar' psihologo-pedagogicheskikh ponjatij. Dlja studentov vseh spetsial'nostej ochnoji zaochnoj form obuchenija, 2007, p. 17). In the Russian pedagogical encyclopaedia this term has an additional explanation: IDC performs “methodological functions, involves learners in operation with cognitive methods which have general scientific character (abstraction, modeling, generalization, etc.) and thus expands the field of subject knowledge” (Davydov, 1993, p. 467).

Integration considered as “the integration into a whole any parts or elements” (Lokshina, 1971, p.113) seems to us as a deep process in which interdisciplinary interaction, or interdisciplinary connections, is a specific tool for achieving the set learning goal. The importance of interdisciplinary relationships in learning was recognized by such classics of foreign and national pedagogy as D. Dewey, J. Locke, Ya. A. Kamensky, J.H. Pestalozzi, K. D. Ushinsky, V. Ya. Stoyunin, N. F. Bunakov, V. I. Vodovozov and others, believing that these connections should fill the learning process with the meaningful content and increase the level of efficiency. The ideas of the IDC were very popular in the Soviet school, in particular in the 1920s school education was based on the state integrated programs developed by the State Academic Council (SAC), according to which all knowledge was combined in three sections: “Society”, “Nature”, “Labor”. In 1930, the educational “coordinate grid” was created, which reflected all the concepts of subjects, used in the school curriculum, and it greatly contributed to the development of the ideas of interdisciplinary integration in education. In particular, it was connected with the fact that in the early 1930s the Soviet school returned to the traditional education separate in subjects due to declining in quality and results in education.

The traditions of interdisciplinarity came back in the 60s – 80s of the last century, not at the level of separate subjects, but at the level of the interdisciplinary connections while studying related themes. The importance of the use of interdisciplinary connections in the educational process was noted by such national researchers as I.D. Zverev, V.N. Maksimova, V.V. Il'chenko, A.V. Usova, M.N. Skatkin and others.

The idea of interdisciplinary integration abroad has been developed in the 1920s. Later in science and education such terms as “multidisciplinarity”, “interdisciplinarity”, “transdisciplinarity” appeared. The ancestor of the term “transdisciplinarity” is considered to be the Swiss scientist and philosopher J. Piaget. For various reasons, the interdisciplinary approach was not widespread at that time (Audigier, 2006; Bonrepaux, 2007; Drake & Burns, 2004). Today, interdisciplinary integration returns to education again, as it is a bright reflection of the integrative processes taking place in the world. It finds increasing state and public support in such countries as the USA, France, Finland, Turkey, etc. (Denir & Senemoglu, 2017; Drake, Kolohon, & Reid, 2014; New national core curriculum for basic education: focus on school culture and integrative approach, 2016).

Modern foreign educational systems have come to the necessity to introduce interdisciplinary knowledge by adopting an interdisciplinary organization of teaching-learning-assessment models (Adams, 2013; Demirel & Coskun, 2010; Repko & Szostak, 2017). The new method of integrated knowledge is based on knowledge units (Medeiros, 2015; Warren, 2016) They are built on educational needs and real-life problems either which are of great social importance or cannot be solved within the disciplinary approach (Zharkovskaya & Sinel'nikov, 2018; Zharkovskaya, 2017).

2. Problem Statement

Actualization of interdisciplinary integration in modern Russian education is caused by the need to implement Federal state educational standards (primary, basic, complete), improve the quality of Russian education, strengthen its practice-oriented nature, achieve a high world level of education indicators. Federal state educational standards put forward such characteristics of Russian school graduates as the achievement of personal, metadisciplinary, subject results. Metadisciplinary results include the knowledge of the most important common characteristics of the surrounding world (nature and society) and the achievement of universal learning activities. In our opinion, interdisciplinarity is the most important means of forming metadisciplinary results (Korosteleva, 2018).

The concept of "interdisciplinary integration" in the modern period of national education development is of considerable interest both for the subjects of the social and humanitarian cycle (history, social studies, geography), and for the subjects of the natural-science cycle. Each of these groups of subjects, and all learning items as a whole, contain in their information space a common concept list, which allows to build an interaction oriented towards the knowledge of the unity and integrity of the surrounding world (Korosteleva & Krjuchkova, 2018).

In the 2010s the importance of educational orientation towards strengthening the integration unity of subjects is connected with the following factors:

1. New informational situation. The information explosion and an increase in the flow and amount of information in the surrounding world, and especially in the fundamental sciences and school subjects, put on the agenda the need to select information from new positions (information of primary importance, containing key facts about the world; taking into account personal interest when selecting information: personal oriented education, etc.).

2. New information technologies in education. There is emergence of digital educational resources, including electronic form of textbooks. New information technologies are all-objective, rather than subject-specific, and focused on the development of universal educational activities.

Interdisciplinary integration is one of the ways of forming and structuring the content of education, as well as the method of educational process organization. Thus, integration in learning can be associated with mastering the general aspects of content in two or more subjects, or it can be aimed at the formation of universal educational activities (Sukhodimtseva, Sergeeva, Donskaya, Kupriyanova, & Tomashevich, 2018).

The Russian education has gained some experience in integrated education since the introduction of educational standards (2010 - 2012). One of the most optimal forms of integration is elective or modular courses based on an interdisciplinary approach. For example, such elective course was worked out, which aimed at the development of different types of cognitive activity by senior pupils (Koval', Krjuchkova, Lazebnikova, & Djukova, 2017). This approach is a prospective direction in the development of the content of Russian education.

3. Research Questions

Today the Russian education faces a number of issues:

What is the teachers' understanding of interdisciplinary integration essence?

How widespread are integration processes in school practice?

What are the goals and methods of integration?

What subjects are most successfully integrated by teachers?

What results are achieved in this field?

It seems important to clarify the personal attitude of teachers applying interdisciplinary integration to this form of education, as well as the prospects of using cross-curriculum integration in the educational process.

4. Purpose of the Study

The purpose of the study is to clarify the above questions, to present the results of the study in order to orient practicing teachers to the most effective forms and methods of interdisciplinary integration.

5. Research Methods

Research methods: general scientific (comparison, analysis, synthesis, generalization), statistical (questioning of practicing teachers, teachers of pedagogical universities). In order to conduct the study a questionnaire for university professors and school teachers was developed, which also indicated anonymous information about themselves (taught subject, teaching service, type of educational institution and region).

6. Findings

In order to study how school teachers and university professors understand the essence of interdisciplinary integration, its goal-setting and relevance for the development of national education, as well as their participation in its organization in the frame of the educational process, we conducted a survey. It was attended by 136 respondents: 21 are university professors of Moscow, 115 teachers of comprehensive schools in Moscow and Kostroma. About 45% of the surveyed teachers of comprehensive schools had working experience from 8 to 14 years, 33% - from 15 to 40 (or more) years, and about 22% of respondents - from 2 to 7 years.

The majority of interviewed university professors had working experience from 20 to 36 years (78% of respondents), 15% - from 2 to 10 years, and 7% of the respondents - from 10 to 20 years.

To the first question of the open-ended questionnaire “How do you understand the concept of “interdisciplinary integration?” most of the participants in our survey gave the following answers: “unification of subjects of the curriculum for the purpose of consistent and multifaceted disclosure of the studied processes and phenomena”; “An approach in education that allows to establish relationships between objects in order to study a new material”; “The natural interrelation of academic disciplines, sections and topics based on the leading idea with a deep sequential disclosure of the processes and phenomena under study”; “Interrelation of various disciplines”; “A combination of several subjects in order to obtain greater efficiency”; “A synthesis of knowledge obtained from various disciplines”; “The use of material of one subject while studying another one” (about 65% of respondents), etc. Similar answers were typical, although some teachers understand interdisciplinary integration as a specific tool for the implementation of the educational process in the frame of an integrated lesson. The classic answer here is “interdisciplinary integration is an integrated lesson” (10% of teachers surveyed).

With all the correctness of school teachers' reflection on the essence of the interdisciplinary integration, it should be noted that an integrated lesson is only one of the ways of the interdisciplinary integration implementation, which can be carried out in the form of lectures, conferences, creative and distance lessons, practical and research projects, etc. However, the interdisciplinary integration is a deeper notion that goes beyond the “using material of one school subject while studying another one.” Indeed, from a scientific point of view, interdisciplinary integration, activating inter-subject relations, promotes the development of analytical thinking of students, allowing them to attract data from different fields of knowledge in order to form a holistic vision of problems, phenomena, events and ideas about something. At the same time, interdisciplinary integration can be horizontal when pupils' views on the subject are expanded by owing to attracting additional material including from another school subject. And it maybe vertical, when the level of accumulated knowledge allows the student to use them within the framework of other subjects, expanding their own horizons of knowledge and ideas about them. Such kind of integration appeals both to the level of knowledge of the student and the teacher, setting a higher bar for the basic professional preparedness of the latter's. As a matter of fact, these two areas of integration do not contradict each other, although it should be recognized that school teachers are most disposed to the first level of integration, which seems to them the most attractive, since it focuses precisely on the academic subject that they teach. It should be noted that most Russian teachers tend to single out their subject among others, sincerely considering them less significant and valuable in the framework of the

educational process. Indirectly, this is evidenced by the answers of our respondents, in which they admit use of materials from one discipline for the sake of expanding knowledge in another one.

The most complete, from the point of view of understanding the essence of interdisciplinary integration, were the answers of teachers of the Moscow State Pedagogical University, namely: “studying a discipline or topic in order to form a unified educational result based on the content traditionally studied in different disciplines” (21% of respondents). At the same time, many university professors linked directly interdisciplinary integration with the project-based and research methods of teaching: “This is a natural interconnection between sciences and school subjects, which arises when there is a problem, design, research method of studying a particular topic”; others called several interpretations of this phrase: “1. The inclusion of other subjects fragments in the content of the taught discipline: 2. Some kind of integrated course, for example, “history of literature”, etc.; 3. Innovative disciplines that arise with the development of scientific and technological revolution (biomedicine, physical chemistry, etc.)”(34% of respondents). Most university professors believe that “interdisciplinary integration is a conscious appeal in the course of activity in one school and scientific field to methods of other sciences and materials from other school disciplines,” which generally resembled the answers of schoolteachers (45% of respondents).

To the second question of our questionnaire “From your point of view, what does the interdisciplinary integration bring to the effectiveness of learning?” our respondents answered: “Children better understand the topic being studied, remember it better and show interest”; “The cognitive interest is developing, the student has a holistic view of the world around him”; “An opportunity to consider events” in volume “, from the point of view of different sciences”; “Increases the effectiveness of education”; “Fills gaps in knowledge, allowing to consolidate what was learned”; “The student goes beyond the framework of one subject, understands the conventionality of their separation”; “Develops the analytical skills of students”; “Forms a more holistic perception of the material being studied”; “Promotes the development of critical thinking and introduces the child to cultural values”; “Develops student autonomy in preparing for the lesson.” The most typical answer to this question was: “Thanks to the interdisciplinary integration, the pupil gets a holistic view of the world and a more complete picture of the topic being studied, especially when studying new material” (up to 60% of respondents). Such answers by our respondents testify to the correctness of the above conclusion that it is precisely horizontal integration, especially attracts school teachers, since they tend to appreciate its ability to introduce something into their school subject, expand the boundaries of ideas about it, make it more interesting and informative for schoolchildren in general. Only a small part of our respondents noted that interdisciplinary integration “reduces the teaching load on the student”; “Influences the professional orientation of students, enriching their level of knowledge and ideas about the world; “Is a way for students to self-perfection, because it develops their creative thinking and analytical skills”; “Forms universal learning activities”; “Leads to increased learning motivation and ability to organize their own activity.” It is these answers that allow us to conclude that a certain part of the respondents, in fact, see and understand the essence of vertical integration, which is more significant for the development and socialization of the students' personality.

Most of the surveyed university professors noted that, thanks to interdisciplinary integration, “the students' worldview is becoming more diversified, the risk of narrow vision of phenomena and problems

is warned, and the ability to see the connections between sciences and subjects allows a person to show greater flexibility in solving problems, to attract wider argumentation in discussions "; "The integrity of educational results is born, the students' horizons are expanded", "it is possible to distribute study time more efficiently"; "The metadisciplinary competences of students are formed, independence of thinking, a sense of systemic education" is born (64% of respondents). However, some university professors, like school teachers, understand metadisciplinary integration as "an opportunity to prepare students for the perception of new material, which improves the quality of learning and helps students to master key competencies"; "Solving preventive tasks in training and finding the best ways to implement them" (32% of respondents). About 4% of university professors suffer from maximalism, noting that interdisciplinary integration "is intended to prepare young people for a life full of diversity and spiritual component, but in reality not a single curriculum can accommodate all of this".

To the third question of our questionnaire "Do you use interdisciplinary integration in teaching practice? If "yes", then in what form (assignments, lessons (topic), projects, etc.? "The most part of respondents use this method at the lesson (70% of respondents) when explaining new material to make it more voluminous and attractive to students. About 15% of respondents use interdisciplinary integration in practical exercises, during practical lessons, about 10% of teachers do not use the capabilities of interdisciplinary organizations in general and 5% answered that they use it extremely rarely, so occasionally that such an approach did not become for them one of the ways for organizing the educational process. Even with a positive answer to this question, most teachers are focused on searching for the most interesting material when disclosing new educational topics, forgetting that the purpose of the integrated lesson is not only obtaining new knowledge and information by students, but their involvement in analytical work, the development of the ability to think independently and creatively, to compare data and facts, phenomena and events in all their versatility.

The majority of university professors noted that they use the interdisciplinary integration while organizing project and research activities of students, as well as in practicing them (58% of respondents); at lectures (32%); when preparing for state exams (10% of respondents). It should be noted that many professors consciously when preparing lectures expand their materials with the help of the interdisciplinary integration, which can be considered as a positive factor in the development of modern higher education.

On the fourth question of the questionnaire "What subjects do you manage to integrate?" the majority of teachers noted such educational subjects as "history and literature" (35% of respondents); "history and geography", "history and social studies" (15% each); "mathematics" and "surrounding world" (5%); "physics, chemistry and biology" (12%); "economy" and "geography" (8%); "music, literature and the World Art Culture", as well as "English and German languages" with "literature, history and geography" by 5% of respondents.

University professors integrate such disciplines as "Monitoring and statistics in education", "Analysis and monitoring of management in an educational organization" with the subject "Fundamentals of design"; "Theory and methods of teaching and education" New pedagogical technologies "; "Protection of the rights of participants in the educational process" with "Professional ethics of the teacher"; history

and computer technology; geography and literature; geography and history; English and geography; law and history.

7. Conclusion

Based on the results of the research we can conclude that the majority of teachers and university professors in general understand the importance of interdisciplinary integration in the development of the modern education system. Interdisciplinary integration is quite actively used by them in the educational process both at school and at the university. At the same time, the most part of schoolteachers and university professors mainly use the possibilities of horizontal integration for filling new material with additional content. Subjects of the social and humanitarian cycle (history, geography and social studies), subjects of the natural-science cycle (physics, chemistry, biology, etc.), as well as subjects of the humanitarian and social and humanitarian cycles (history and literature; literature and geography, etc.) are actively involved in the interdisciplinary integration, interacting with each other. All other levels of interdisciplinary interaction are used rarer, for example, physics and history, etc.

The study allows us to conclude that schoolteachers use interdisciplinary integration in the traditional form within the framework of one subject. They ignore such new forms of education as interdisciplinary courses that combine information from different areas of knowledge in one subject within an educational module or elective (optional course). Another problem identified in the analysis of teacher experience is the lack of cooperation between teachers in the framework of interdisciplinary integration. Teachers prefer to work in isolation, solving their own learning tasks. They tend to use interdisciplinary integration to a greater extent in explaining new material during the introductory lesson.

University teachers more broadly understand the goals and objectives of interdisciplinary integration, using it in organizing research and project activities of students, creatively integrating the didactic opportunities of different courses, although they also act in isolation as a part of their training course, just like schoolteachers.

Actualization of the content of modern education, in our opinion, will contribute to the development of cooperation between teachers of general educational institutions (schools). The joint work of teachers aimed at selecting concepts, themes, problems, projects that are close to real life and are of interest to students is very important in this process.

We hope that the majority of university professors, realizing the actuality of interdisciplinary integration, when preparing future teachers for professional activity will successfully promote their inclusion in vertical integration, because it is an important component of the development of the modern education system.

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References

- Adams, A. (2013). *Cooperative learning effects on the classroom*. Retrieved from http://www.nmu.edu/education/sites/DrupalEducation/files/UserFiles/Adams_Anthony_MP.pdf.
- Audigier, F. (2006). Une discipline pas comme autres. *Cahiers pedagogiques*, 340, 21-27.
- Basik, N.Ju., Savina, O.O., & Smirnova, O.O. (2010). Integratsija psihologii i obschestvoznanija v osnovnoj shkole. Kakovy vozmozhnosti integratsii psihologii i obschestvoznanija kak uchebnyh predmetov? [Integration of psychology and social studies in base school. What are the possibilities of integrating psychology and social studies as educational subjects?]. *Munitsipal'noe obrazovanie: innovatsii i eksperiment*, 3, 63-65. [in Rus.].
- Bonrepaux, Ch. (2007). *Objectif terre. Le Monde de l'education*. Paris.
- Davydov, V.V. (Ed.) (1993). *Rossijskaja pedagogičeskaja aentsiklopedija* [Russian pedagogical encyclopedia] Moscow: Bol'shaja Rossijskaja entsiklopedija [in Rus.].
- Demirel, M., & Coskun, D.Y., (2010). Case Study on Interdisciplinary Teaching Approach. Supported by Project Based Learning. *The International Journal of Research in Teacher Education*, 2(3), 28-53.
- Denir, K., & Senemoglu, N. (2017). Integrated Curriculum, Cooperative (JigsawII) and Project Based Learning Applications. *International Journal of Scientific Research in Education*, 10(4), 413-424.
- Drake, S., & Burns, R. (2004). *Meeting standards through Integrated Curriculum*. Association for supervision and curriculum development. Alexandria, Virginia US.
- Drake, S., Kolohon, W., & Reid, J.L. (2014). *Interweaving Curriculum and Classroom Assessment*. Engaging the 21Century Learner, Oxford University Press.
- Korosteleva, A.A. (2018). Mezhpredmetnyj uroven' vzaimodejstvija uchebnyh distsiplin v integratsionnom prostranstve sovremennogo obrazovanija [Interdisciplinary level of interaction of academic disciplines in the integration space of the social-humanitarian cycle. Teaching history and social studies]. *Prepodavanje istorii i obschestvoznanija v shkole*, 8, 36-44. [in Rus.].
- Korosteleva, A.A., & Krjuchkova, E.A. (2018). Vozmozhnosti ispol'zovanija v obscheobrazovatel'noj shkole metapredmetnyh zadanih v distsiplinah sotsial'no-gumanitarnogo tsikla. [The possibility of using in general educational school metadisciplinary tasks in the disciplines of the social and humanitarian cycle]. *Prepodavanje istorii i obschestvoznanija v shkole*, 5, 38-43. [in Rus.].
- Koval', T.V., Krjuchkova, E.A., Lazebnikova, A.Ju., & Djukova S.E. (2017). Metapredmetnyj Kurs «Poznavatel'naja dejatel'nost' [Cognitive activity]. *Prepodavaniei storii v shkole*, 9, 62-70. [in Rus.].
- Lokshina, M. (1971). *Slovar' inostrannyh slov*. [Dictionary of foreign words]. Moscow: «Sov. Entsiklopedija» [in Rus.].
- Medeiros, E.O. (2015). Education as interdisciplinary knowledge: production, theory and practice - in search of an essay. *European Scientific Journal. Special education*, 575- 593.
- New national core curriculum for basic education: focus on school culture and integrative approach. (2016). Finnish National Board of Education. FNBE.
- Repko, A., & Szostak, R., (2017). *Interdisciplinary research: process and theory*. Sage Publications, Inc.
- Slovar' psihologo-pedagogičeskikh ponjatij. Dlja studentov vseh spetsial'nostej očnoj i začnoj form obuchenija (2007). [Dictionary of psychological and pedagogical concepts. For students of all specialties full-time and distance learning]. Minsk: BGTU [in Rus.].
- Sukhodimtseva, A.P., Sergeeva, M.G., Donskaya, M.V., Kupriyanova, M.E., & Tomashevich, S.B. (2018). Metadisciplinarity in education: solving actual problems. *Espacios*, 39(2), 27.
- Warren, A. (2016). *Project-based learning across the disciplines; Plan, manage and assess+1 pedagogy*. Thousand Oaks, CA: Corwin.
- Zharkovskaya, T.G. (2017). Organizatsija integrirovannyh urokov kak sposob realizatsii vospitatel'nogo potentsiala estestvennonauchnogo i sotsial'no-gumanitarnogo obrazovanija. [Organization of integrated lessons as a way to realize the educational potential of natural science and social and humanitarian education]. *Standartyi monitoring v obrazovanii*, 5(3), 25-28. <http://dx.doi.org/10.12737/issn.1998-1740>
- Zharkovskaya, T.G., & Sinel'nikov, I.Ju. (2018). Integrativnyj podhod kak sposob mezhdistsiplinarnogo vzaimodejstvija [Integrative approach as a way of interdisciplinary interaction]. *Pedagogika*, 8, 91-95. [in Rus.].