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ROLE OF INTERDISCIPLINARY RESEARCHES IN DEVELOPMENT OF THEORY OF LEARNING

Irina M. Osmolovskaya (a)*, Irina A. Tagunova (b), Mikhail V. Klarin (c), Lubov A. Krasnova (d), Anna A. Mamchenko (e), Albina I. Popova (f)
*Corresponding author

(a) Institute for Strategy of Education Development of the Russian Academy of Education, 5/16 Makarenko St., 105062, Moscow, Russia, didactics@instrao.ru
(b) Institute for Strategy of Education Development of the Russian Academy of Education, 5/16 Makarenko St., 105062, Moscow, Russia, tagunovair@mail.ru
(c) Institute for Strategy of Education Development of the Russian Academy of Education, 5/16 Makarenko St., 105062, Moscow, Russia, consult@klarin.ru
(d) Institute for Strategy of Education Development of the Russian Academy of Education, 5/16 Makarenko St., 105062, Moscow, Russia, la-krasnova@rambler.ru
(e) Institute for Strategy of Education Development of the Russian Academy of Education, 5/16 Makarenko St., 105062, Moscow, Russia, anna-priv@yandex.ru
(f) Institute for Strategy of Education Development of the Russian Academy of Education, 5/16 Makarenko St., 105062, Moscow, Russia, albina-burceva@yandex.ru

Abstract

Problem Statement: To establish how the understanding of "learning" changes in connection with increasing in interdisciplinary research in pedagogy, how these changes affect learning models.
Research Questions: What does a result of interdisciplinary research in education change the perception of learning and what is the role of theory of learning in a interdisciplinary research?
Purpose of the Study: To reveal dynamics of scientific and pedagogical ideas of learning caused by results of interdisciplinary researches in education on the analysis in the field of psychodidactics, social didactic, cognitive science and to establish influence of these scientific areas on the main categories of didactics.
Research Methods: The main research methods are analysis of scientific literature; comparison of the provisions concerning learning in various sources describing results of interdisciplinary researches in education; generalization for the purpose of identification of the priority directions of a research of learning.
Findings: The interdisciplinary research gives the possibility to mark out aspects of development of intellectual, emotional and strong-willed spheres of pupils which occur as a result of learning, respectively; to define those characteristics of process of learning, which provide the effective developing influence; to formulate requirements to manuals; to reveal effective models of learning.
Conclusions: Idea of learning as a result of interdisciplinary researches becomes more volume and relief, so as includes the parties which weren't taken into account earlier. There is an opportunity to empirically prove efficiency of developing learning models.

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Keywords: Education, learning, interdisciplinary researches.

1. Introduction

The theory of learning (didactics) is developed from monodisciplinary to polydisciplinary and interdisciplinary researches.

The object of research in monodisciplinary sciences is in the subject's field of the science, researchers use tools of this science, the research is conducted with a support of the scientific provisions formulated in its research field.

Polydisciplinary sciences are characterized by the fact that any object is studied from different sides by several scientific disciplines. Researchers use results of these studies in these sciences in polydisciplinary area of scientific knowledge. So, for example, the theory of learning traditionally polidistsiplinary: to create a productive process of learning one should know how the process of cognition of a person proceeds, how his mental functions are developing, as far as what is the correspondence of age features and actions and means applied for this purpose. Thus, there is an integration of scientific cognition of psychology, age physiology and also sociology, linguistics and other sciences in the solution of the theoretical problems facing the theory of learning.

Application of the concepts, means, and methods developed in different sciences and synthesized in new science or scientific area for the solution of her specific tasks is characteristic for interdisciplinary researches (Stepin, 2007, pp. 96-102).

An interdisciplinary research not just applies knowledge which is earlier received in different sciences, but during a research opens knowledge, using a conceptual framework, tools of sciences which are integrated in an interdisciplinary research.

Signs of a interdisciplinary research are:

1. The general object of research which is designed especially for a concrete interdisciplinary research.

2. Complementarity of methods of a research characteristic of each of the sciences participating in an interdisciplinary research.

3. A support in a research on theoretical provisions, which belong to integrated sciences.

4. Belonging of a received result is not to one of science participating in an interdisciplinary research, but the introduction of a scientific contribution to every science (Krasnova, Mamchenko, Osmolovskaya, & Zakhlebnyy, 2017, pp.388-396).

The correlation of such scientific fields as psychodidactics, sociodadactics, ontodidactics, cognitive-didactic studies with isolated features of interdisciplinary research made it possible to assert that all these scientific fields are inherently interdisciplinary.

2. Problem Statement

The authors of this article solve the problem of the effect of cross-disciplinary researches on understanding the process of learning; what components of learning become especially important; what aspects of the process of learning are transformed in interdisciplinary models of learning.

3. Research Questions

How does the perception of learning change because of an interdisciplinary research in the field of learning? What is the role of the theory of learning in the organizing and conducting of an interdisciplinary research?

4. Purpose of the Study

Purpose of the Study is to establish how interdisciplinary researches affect scientific and pedagogical ideas of learning. For this purpose, it is necessary to analyse researches in the field of psychodidactics, sociodidactics, cognitive science, ontodidaktics, which subject is learning, and to reveal an effect of these researches on understanding of essence, design, and realization of process of learning, and content, methods and technologies of learning, its results.

5. Research Methods

The authors use generally theoretical methods of a research. They analyze scientific literature in the field of interdisciplinary researches of learning, compare results of interdisciplinary researches describing process of learning from positions of various sciences, generalize material of researches for the purpose of identification of the priority of directions of studying of learning, simulate researches in the interdisciplinary areas which broadening the subject field of the theory of learning.

6. Findings

Interdisciplinary scientific fields study the learning process from various perspectives, which makes it possible to expand its understanding, to make it more voluminous, to change the perception of the structural components of the learning process. Let us show these changes by the example of such interdisciplinary areas as psychodidactics, cognitive-didactic studies, ontodidactics, and sociodidactics.

6.1. Psychodidactics

Studying of researches in the field of psychodidactics has shown that it involves designing in the process of learning on a basis of psychological and pedagogical regularities. The theory of learning places the emphasis on familiarizing of pupils in the course of learning to sociocultural experience during which by-product is the development of pupils, but does not put emphasis on it.

The main thing of psychodidactics is a development of pupils which is carried out during the development of sociocultural experience of them, a process of learning is modelled so that, first of all, both intellectual, emotional, and strong-willed development of the child occurred. For this purpose, the content of learning is specially designed. So, Gelfman and Kholodnaya (2007) developed the theoretical model of learning in the mathematics of school students of the 5-9th classes which are especially aimed at the formation of mental experience of students: development of their mental structures, mental space, mental representation according to the ideas Kholodnaya. Texts of textbooks, manuals, tasks in

workbooks in mathematics are designed so that pupils develop this specified experience (Gelfman & Kholodnaya, 2007, pp. 73-75).

The priority directions of a research in psychodidactics are the problems relevant both for didactics, and for psychology: problems of endowments and development of informative abilities of children; training and creativity, development of creativity; motivation of the doctrine; assimilation as complex of processes of acquisition, fixing, modification and reproduction of cognitive experience and modalities of action of the individual; psychological aspects of modelling of maintenance of school education.

Consideration of title of psychodidactics in some researches leads researchers to a thought that the basic theoretical provisions in psychodidactics undertake from psychology and on their basis, training process is based. Thereby the theory of learning gains applied to character, normalizing process of learning at a basis of psychological theories. It is the quite misleading point of view that was repeatedly proved in classical didactics (Lerner, 1995).

Without knowledge of regularities of learning, its structure, features of deployment in a didactic cycle, it is impossible to construct a productive process of learning. Interrelations of components of the process of learning: the purposes, the content of education, methods, means, forms of education, its results are investigated in the theory of learning, her scientific-theoretical part (performing descriptive, explanatory, predictive functions). In case of the solution of problems of the theory of learning in the field of psychodidactics theoretical aspects of design and realization of process of learning are also solved by the theory of learning, but on the basis of the regularities of development of mentality of the person revealed in an interdisciplinary research in these or those conditions.

6.2. Cognitive and didactic researches

The area of cognitive and didactic researches interfaces to psychodidactics. Origin of this specialized direction of cross-disciplinary researches is connected with the emergence of cognitive science in the second half of the XXth century. The cognitive science contains cognitive philosophy, cognitive psychology, cognitive neurology, cognitive linguistics and other sciences which investigate the cognitive system of a person, namely that "the cogitative mechanism" of infrastructure of a brain which is responsible for knowledge process, i.e. for processing of information arriving from the environment and her transformation into knowledge. The cognitive science studies informative abilities of the person; the thought processes performing a function of rational knowledge; cognitive structures and systems of their representation; the neural activity of a brain in knowledge processes (Solso, 2006; Bermudez, 2014; Carolyn & Sobel, 2014; Thagard, 2012).

The need of the theory of learning to be beyond a disciplinary and to engage in interaction with cognitive science is caused by the need of evidential confirmation of efficiency of the applied training models. Joining in cognitive researches of a process of training, the theory of learning plans to receive data on cognitive functions of the brain, on the mechanisms, which are the cornerstone of his activity at a realization of cognitive activity, empirical data on changes in cognitive structures of a brain of students under the influence of training. It will allow to project and design the training process models adequate to cognitive opportunities for students and providing development of their cognitive (informative) abilities.

In education, there is a worldwide trend to treat neuroscience as a magic wand (Weale, 2017). On the other hand, there is a legitimate observation that teacher training does not match the state of art in cognitive science, and reflects the educational wisdom of the 1970s (Sousa, 2017). In practical terms, educators' hope for cognitive science is related to ensuring the rights to education by adapting to individual students' traits, as well as special training of teachers, allowing them to draw on the conclusions of the neuroscience (Robb, 2016, pp. 175-176).

Cross-disciplinary cognitive and didactic researches change the idea of learning, designating one of his new sides: learning as a process and a way of activation and development of individual mental (cognitive) structures of students who are carrying out a role of the mechanism of perception and processing of educational information.

Cognitive development of the student (development of mental capacities and strategy) becomes the purpose of learning.

The problem of learning includes equipment of the knowledge studying universal tools - ways of intellectual actions.

Learning methods (in the context of educational knowledge) assume the active inclusion of the identity of a student in educational process through forming of structures of knowledge (fancies) in internal and external plans of activity (for example, methods of figurative, symbolical, semantic vision) (Akhmetova, 2009).

Methods gain specificity: they help a student to realize his celebration, they "more appreciate procedures and strategy, than knowledge, and more cognitive factors, than emotional and motivational, they assign an important role to metacognition and mediating processes" (Loarer & Yuto, 1997, pp.17-33).

The arsenal of tutorials extends. In their structure, there are means of cognitive visualization, which stir up the cognitive activity of students, i.e. realize in learning cognitive function. Their main appointment is a creation by means of visual operations of various visual forms, "doing knowledge seen" (Zinchenko & Vergiles, 1969, p. 17). The visualized fancies (structural and logical schemes, mind maps, the map of thoughts, etc. in the form of signs, symbols, and graphic elements) visually display cognitive schemes (structures) of knowledge. They represent a visual model of a cognizable object, visually perceived design imitating essence of an object of knowledge (Raputo, 2010, pp. 138–141.)

Thus, in cross-disciplinary cognitive and didactic researches we also see change of ideas of learning process – promotion into the forefront of a problem of development of mental capacities and the strategy of learning, extension of tutorials at the expense of means of cognitive visualization.

Let us turn to cognitive-didactic research of new experience development in education, viewed as generation of new (subjectively new) personal experience (Kibalchenko & Odintsova, 2016, pp. 310-312).

In the context of innovative education, the subject generates objectively (and not only subjectively) new experience, simultaneously gives it a cultural form and develops it (Klarín, 2016). This aspect of research is of high importance for adult and/or corporate education, i.e. education areas in which situations of generating new experience in combination with its immediate translation are quite typical.

Mastering new experience is unfolding in the process of "living it through", implementing it in life (professional) practice. The translation of the mastered new experience in social interaction becomes an increment of culture (Klarín, 2017, pp. 19-28).

Let us point at a few areas of didactic research that seem promising to us in terms of their potential in interaction with cognitive research.

The priming effects in the learning process. The relevant analysis should be guided by a post-non-classical approach: considering not only "objective reality", but also our perceptions of reality as tools of cognition and action.

The productive biological mode of the organism functioning, stimulating or depressing formation of new neural connections, and thus influencing learning efficiency.

Identification of experience formation phases, and associated neurobiological patterns.

Effects of stress in the learning process.

Effects of rewards and punishments in the learning process.

Motivational dynamics in learning, its relation to success, presence or absence of external stimuli.

High importance of cognitive-didactic research in education is based on the prospect of identifying changes in brain activity during the application of various models of training, proving real effects of education, thus increasing the evidence base of didactics.

6.3. Ontodidactics

Ontodidactics has arisen in 70th years of the XXth century (Lyapunov, 1973), when the comprehensive school was a problem, still relevant and still not solved: how to carry out advanced learning to students, including the content of education is not only traditional but also the latest knowledge of leading science and in the emerging skills are the basic fundamentals of system thinking, so that the school worked for the future, ahead of "March of progress", but not to overwhelm students with excessive amounts of information. Ontodidactics study centered on the educational content, presenting it as a pedagogically adapted the content of specific Sciences, is constantly improving and enriching. The objectives of the new direction included the revision and reorganization of the content of education and the search for new principles and methods for the holistic development of contents, elimination of duplication, and replacement of the existing traditional methods of presentation and submission of material to a new, more concise and effective.

The founders of ontodidactics saw it as a classic addition to the theory of learning, such as the concept of educational content, which allows you to use scientifically based tools to dynamically "cast" the content of science in a didactic form, is available for secondary schools. Metaphorically ontodidactics can be thought as an interdisciplinary area of research, building a permanent bridge between didactic source of educational content (e.g. a particular science) and educational content that defines the dynamic transformation of the content source in the content of education.

The ontodidactic approach used in vocational education, development of learning physical education, science subjects, used in studies aimed at rapprochement between the Sciences and the Humanities content of education. Such developments are carried out both in Russia (Dmitriev &

Zagrevskaya, 2017; Mamchenko, 2017; Novichkov, 2015) and in other countries (Lithuania, Czech Republic, Poland, Bulgaria) (Broks, 2009; Karpińska, 2015).

A modern ontodidactic research is an attempt to build the theory of learning as a whole proceeding from its own bases, by the ontological synthesis of these grounds; to apply methods of conceptual design to the theory of learning; to introduce own didactic units that are not tied to the original content (sciences and / or areas of knowledge and practice); to set deployment of the content of education as an individualized practice of construction and design, as well as to create an accessible methodological support for such a deployment.

Ontodidactic experiments allow to see the ways of creating new theory of learning as a science (part of pedagogy, the science of learning), as a specific philosophy (part of the philosophy of education as a reflection of the ultimate foundations of learning), as a methodology (methodology of education in terms of learning), as a complex of practical methods (learning methodology and technology of learning).

6.4. Sociodidactics

Sociodidactics allows emphasizing social aspects of learning. It is a direction of social pedagogy, which serves to provide pedagogical support to a socially unprotected child deprived of the necessary rut of life and full-fledged education. Social and pedagogical support is treated as an institution within the society and in the form of interaction "a student-a helping adult".

Sociodidactics considers training process as a set of social and pedagogical situations that are presented in three foreshortenings:

1) as special system education in which the child and the adult act as the conceiving and acting individuals as subjects of social action; in the course of training there is an ordering of communications in the system of their interaction;

2) the center of attention of the researcher moves to the area of emotional characteristics of the child – the subject of the valuable and semantic relation to a situation; a process of transformation of situations assumes "work with meanings" and definition of the conditions providing a possibility of a break to a new quality of the relations;

3) in sight of the researcher there is "a child speaking" – a subject which life is complicated by the "stories" imposed from the outside; a transformation of situations is considered as a release from fetters of the imposed history blocking processes of positive social development.

The basis of sociodidactics is the sociodidactic approach, which promotes the socialization of children, adolescents and youth in educational activities, during which a triune of support, maintenance, and mediation is realized (Raschetina & Zaychenko, 2003).

Sociodidic studies expand understanding of the process of learning, it is considered not only as a process of familiarizing of students with sociocultural values, social experience but also as the process providing socialization of children as a process of pedagogical support of a socially unprotected child.

7. Conclusion

The authors considered certain areas of interdisciplinary researches as an example: psychodidactics, sociodidactics, ontodidactics, cognitive, and the theory of learning researches, so they can draw a conclusion on an expansion of the concept "learning process", fixing in it psychological, and sociological, ontological positions. A process of learning is considered not only as transfer to a younger generation of social experience but also as a development of mental experience of students, intellectual, emotional and strong-willed development in general.

The researchers made an attempt not only to consider psychological and sociological regularities in learning process designing, but also to be guided by them as basic provisions, to build learning process, focusing it not only on achievement the purposes of the theory of learning, but also psychological, and social.

Interdisciplinary research changes the main components of the learning process: content, methods, teaching aids. If the goal is a comprehensive development of the child, then the content of education is selected according to this goal. Ontodidactics allows us to build the interaction of science and education, advocates the rejection of the idea of teaching science at school, since the schoolchildren do not have a corresponding conceptual terminological apparatus - a language on which they could be spoken about. The foundations of modern science are too complex for a secondary school. For the school, those unique in different disciplines are important ways of knowing themselves and the world, which the pupil must learn.

Cognitive and didactic researches expand set of the methods applied in the course of learning due to the inclusion of the methods which are especially focused on the formation of mental structures of the pupil and also methods of visualization of knowledge.

Sociodidactics enters set of social and pedagogical situations in which pedagogical support of a specific student is carried out into a learning process.

The role of interdisciplinary research is that using its results, in learning process design the theory of learning has opportunities look not at an average, abstract pupil, but a pupil concrete, with real requirements and interests, difficulties, development potential.

Interdisciplinary researches, especially in line with cognitive science, increase substantiality of knowledge in the theory of learning, allowing to record real changes of cogitative activity of pupils.

The study of characteristics of interdisciplinary researches in the field of education has allowed revealing a role of the theory of learning in these researches, shown that it isn't exclusively applied science in which the ideas of the fundamental sciences adjacent to it are implemented. Whatever ideas have been the basis for designing of a process of learning, without didactic regularities designing cannot be successfully carried out. Moreover, the psychological, sociological, philosophical ideas have to undergo surely pedagogical interpretation before becoming a learning model basis.

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