THEORETICAL AND PHILOSOPHICAL FOUNDATIONS OF THE CATEGORY "RESEARCH COMPETENCE"

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Abstract. Further development of the content of education is impossible without taking into account the theoretical and methodological foundations for developing the research competence of the younger generation in the educational process. There is an urgent need to systematize, analyse and generalize all the phenomena and processes associated with engaging the younger generation in research activity, and to determine the possibilities of applying the experience accumulated by domestic physics education in the modern school on the basis of scientific forecasting.

The purpose of the paper – to theoretically substantiate the conceptual foundations for developing students' research competence in light of current shifts in the educational paradigm of instruction.

Methodology of the research is based on the analysis of normative legal documents – in order to clarify the requirements for organizing the educational process on the basis of competency-based, activity-based, learner-centred and technological approaches; analysis of the available instructional and methodological support for developing students' research competence in physics education; and synthesis of the approaches available in the theory and practice of physics teaching for solving the problem – in order to determine the content of the instructional and methodological support for implementing a methodological system for developing students' research competence in the process of teaching physics.

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Practical implications lie in elucidating the concept of research competence and determining its place in the system of key competences.

Value/originality. The paper presents the main functions of the research method, manifested in cultivating cognitive interest; creating positive motivation for learning and education; forming deep, robust and effective knowledge; developing the intellectual sphere of the personality; mastering (at an elementary level) methods of scientific cognition; and developing cognitive activity and independence.

1. Modern Education in the Context of Paradigm Shifts

A radical restructuring of the education system – the necessity of which is demonstrated by the low effectiveness of the functioning of the modern triad *preschool institution – general secondary school – higher education institution*, as well as by the shortage of qualified teacher-graduates on the labour market – must resolve priority tasks concerning the reproduction of the cultural potential of Ukrainians, the acceleration of scientific and technological progress and stable economic development, and the formation of readiness for professional activity under conditions of rapidly changing technologies. Solving these tasks becomes far more difficult in view of the war with the aggressor state, as well as the radical change in the principles of social policy in Ukraine, which have repeatedly aggravated the problems of social stratification (deepening social polarization, the "erosion" of the middle class, rising poverty, unregistered employment, the marginalization of society, etc.).

Against the background of such changes in Ukrainian society, the problems associated with restructuring the country's education system acquire particular importance, since, given effective changes, they will make it possible to produce a new kind of person oriented toward European values. Among these leading values is a person's ability to navigate the flow of information, to pose questions and to find answers to them. In other words, the person as a seeker, the person as a researcher, must become the prototype of a person of the new formation [1].

The current stage of humanity's socio-economic development is marked by a combination of fundamental changes in socio-economic relations with an increasing complexity in the socio-political organization of societies' activity, the most pronounced of which are the phenomena of globalization

(cultural globalization), democratization, decentralization, scientism and pragmatism – consequences of the energy, demographic, environmental and many other "explosions".

As V. Andrushchenko notes, Ukraine, like the whole world, is trying to find a social, economic and scientific-technological platform for survival – a new paradigm for preparing a person for life that would ensure not only an adaptive attitude toward reality but also the development of reality itself in accordance with the human dimensions of life dictated by the ideals of the 21st century. At the centre of this paradigm is education, which develops as a response to the challenges of civilization and, at the same time, as a response to a person's need to find their place and opportunities for self-realization in the new global space [2, p. 6].

Thus, educational processes within the functioning mechanisms of a significant number of states are acquiring particular importance and are gradually becoming a central element of the mechanisms of globalization, democratization, decentralization, etc. Under these conditions, education acquires an "all-pervading" character, since it is represented (directly or indirectly) in all spheres of human activity, which, in turn, confirms the interest of every socio-political sphere in the educational process.

Contemporary socio-philosophical reflections on education in Ukraine are represented by the research of V. Andrushchenko, V. Astakhova, M. Horlach, O. Dusavytskyi, T. Illiashenko, S. Klepko, V. Korzhenko, V. Kremen and others. An analysis of the works of V. Lutai, S. Klepko, V. Korzhenko demonstrates the omnipresence (immanent presence) of the subject of the educational space and the conceptualization of the problem of the subject as a whole, owing to the category "subject" belonging to philosophical universals. The researchers V. Ohneviuk and M. Romanenko thoroughly examine the problem of the subject in the educational space, conceptualizing education in the process as a socio-cultural phenomenon connected with all other spheres of society.

The main tenets of the classical model of the education system are grounded in a worldview based on rationalist and humanist philosophical content – above all, a rational perception of the world and a utilitarian-practical attitude toward it. The "fusion" of ontological and epistemological problems in classical philosophy is reflected in such features of the classical educational paradigm as the obligatory awareness and reproducibility of

education; the primary importance of its transmissive functions; and the belonging of education to the subject who initiates and carries it out as an activity. Here, the subject in the classical understanding of education is always the teacher, and the object is the pupil [3, p. 2].

The classical model of education is based on the following basic principles:

– the main value is exact knowledge (with the specifying motto "Knowledge is power"); hence the orientation, inherent to pedagogical activity, toward instilling a love of scientific knowledge;

– an absolutized normativity that determines the nature of relations between teacher and pupil in the educational process (the teacher as the bearer of knowledge);

– a method of transmitting knowledge according to clearly defined and established methodologies;

– the universality of curricula;

– success criteria are determined by quantitative and qualitative measures of the information mastered;

– the standardization of assessments [22].

These provisions, in general, still apply in education today and are subordinated to its main goal – the acquisition of knowledge and an orientation toward the informational saturation of the educational process. Under these conditions, an "educated person" is, in fact, an "informed person".

Despite significant achievements in various fields of science and technology, made possible, in part, by the existence of a sufficiently effective classical educational model, this model nevertheless has a whole series of contradictions. Thus, on the one hand, the ideological premise of the authoritarian education system – so-called monologism (a set of educational methods now associated by its critics with the classical educational paradigm) – is the rationalist notion of the existence of an "unconditionally correct cognitive position" of the subject.

On the other hand, it is precisely within the European rationalist tradition that the concept of a free and responsible individual is formed, whose formation is the result of education. Overcoming other contradictions of the classical educational paradigm – between an orientation toward personal development and the narrow specialization of education; between declared

rights and social constraints on obtaining a quality education; between the systemic-social function of education and its role as a form of training specialists – determines the directions of its transformation in the 20th and 21st centuries [3, p. 3].

The future of education is associated with the formation of the foundations of a new educational paradigm, which must resolve the pressing problems of education and possess sufficient potential for its further development. The problems of the new educational paradigm – whether a realized phenomenon or a fateful prospect – continue to this day to give rise to a number of discussions in scholarly circles and among pedagogical practitioners. One of the "stumbling blocks" is the very content of the term "paradigm" ("pedagogical paradigm", "educational paradigm").

The term "paradigm" was first introduced into the philosophy of science by G. Bergman. In the philosophical dictionary, a "paradigm" is defined as a set of theoretical and methodological premises that determine a specific scientific investigation, embodied in scientific practice at a given stage. A paradigm (from the Greek παράδειγμα – example, model) is a theory (a model for posing a problem) accepted by a given scientific community as a pattern for solving research problems [4, p. 248].

The concept of "paradigm" essentially functions as a generalized model of one's understanding of the world. The value self-determination of the subjects of the pedagogical process depends entirely on their awareness of the paradigm within which this self-determination takes place.

In pedagogy, a paradigm is understood as a stable system that functions over a long period in the activity of educational institutions, secured by theoretical propositions, normative documents, traditions, and human and material resources.

An educational paradigm is characterized by the particular theoretical foundations of the activity of educational institutions, their goals and objectives, the content of education, the forms, methods and means of instruction, the functions of educators, the position of learners in the teaching-and-upbringing process, and the particularities of managing educational institutions.

Provided that the general meaning of the term "paradigm" is preserved – a system of models, methods, techniques and modes of explanation – the content of the concept "educational paradigm" is elucidated in the context

of the existence of the educational-historical process as a synthesis of the ontological and individual aspects of pedagogical thinking and behaviour.

As for the modern educational paradigm, the philosophy of education distinguishes alternative theories, concepts and views that are directly related to education (Table 1) [5, p. 18].

Table 1

Alternative Theories and Concepts of Contemporary Educational Paradigms

Theories, Concepts	Views, Directions	
Ontological theory	Cosmocentrism: the human being as a component of the world	Anthropocentrism: the human being as a special part of the world
Methodological concept	From general ontology, dialectics and logic – to the ontology of the human being	From the ontology of the human being to the ontology of the world
Ethical-psychological (educational/ upbringing) concept	Axiocentrism: the realization of transcendent-communal (socially significant) values	Pedocentrism: the realization of the child's individual values and needs
Anthropological theory	The ambivalent (positive-negative) nature of the human being	The positive nature of the human being

In contemporary education, the implementation of the above-mentioned historical models of education continues. These paradigms have the right to exist and to be the subject of further scientific and practical research.

V. Kremen asserts that education should shape a person capable of living within a system of constantly changing coordinates, able to perceive and create change, and able to distinguish sensible changes from senseless ones [6, p. 16]. This necessitates a change in the substantive components of education and becomes extremely important against the backdrop of negative processes that have been occurring over the last few decades in the Ukrainian education system: a lack of interest in learning on the part of pupils (students); the low professional qualification of young specialists (including teachers); the increasing unilinearity of the educational process; an orientation toward mass forms of general knowledge, etc.

According to V. Andrushchenko, the newest paradigm must ensure not only a person's adaptive attitude toward reality but also the development of reality itself in accordance with the human dimensions of life. At the centre of this paradigm, in the author's view, is education, which develops as a response to the challenge of civilization and, at the same time, as a response to a person's need to find their place and opportunities for self-realization in the new global space [2, p. 5–6].

In our view, such a paradigm is the new paradigm of the 21st century – the innovative paradigm. It is innovative education that is called upon to preserve and develop a person's creative potential. The main principle of innovative education is that it is oriented toward shaping a worldview based on multi-criteria decision-making, tolerance of dissenting views, and responsibility for one's actions. As a priority task of education (general, secondary and higher), the new paradigm presupposes an orientation toward the interests of the individual that are adequate to contemporary trends in social development.

The new educational paradigm is innovative with a certain caveat. It must reflect the specificity of contemporary education, namely, an optimal combination of traditional and innovative directions. Thus, in I. Borysenko's view, the educational practice of highly technological states shows that a return to traditional forms of teaching, notwithstanding the abundance of modern information tools, is a discernible trend. The electronic system is built into the structure of the contemporary education system as an inseparable part of the information society and is its central system-forming element [7, p. 155].

2. The Phenomenology of a Person's Research Activity

The positive and highly powerful dynamics of change in the socio-cultural context in recent years create the need to develop an individual's heightened adaptability to present-day conditions. An important psychophysiological basis of this personal trait is the search mechanisms, an orientation toward search activity.

Regrettably, the contemporary world is characterized not so much by transnational economic and financial ties as by total internetization, an unprecedented-in-scale process of forming social networks in virtual spaces against a background of the general local atomization of people's lives.

A negative legacy of recent decades is the particular socio-psychological shifts in the contemporary world, which have a negative effect on the transpersonality of the intuitive, coherent and volitional levels of the generalized embodied human being, and which are correlated with that person's spiritual world [8].

V. Budanov asserts that in our postmodern era, talk of spirituality provokes laughter, and in mass culture, Drive and action are far more important than old-fashioned meanings or romantic sentiments. The pace of events is so fast that a person never has time to experience full-fledged emotions. A person is unable to construct a logical sequence of the events taking place, and consequently a mass degradation of culture occurs [8, p. 30]. According to M. Mann, such people need nothing explained to them; they can easily be manipulated at a subconscious level by the methods of neuro-linguistic programming (NLP) and the "25th frame" while consuming yet another dose of informational chewing gum.

But every action has a counteraction, and so there is a way out of the gloomy prospect of the degradation of culture and human nature amid the collapsing torrents of information. The possibility of adapting to ultra-fast information processes lies in making use of a person's rapid creative capacities and the use of intuition. These abilities can be purposefully developed in any person; in fact, this represents the prospects for the work of the school of the future. Today, children of a new formation, with a new consciousness, who are to a significant extent already prepared to work in an intuitive manner, are already beginning to arrive at school.

A serious problem for children is the very orientation of the education system toward a narrowly disciplinary approach without horizontal connections, and a rigid demarcation between the humanities and the natural sciences. This results in a fragmented perception of reality, a devaluation of moral norms, etc. Moreover, pupils suffer from an inability to grasp the complexity of problems and to understand the connections and interactions between material objects. It can be stated with confidence that the vector of change in the education system must be directed toward the plane of the integrity and fundamentality of education, taking into account the paradigm shifts in science at the turn of the 21st century, which consist in the emergence of an educational practice of the public, collective formulation and solution of interdisciplinary projects by pupils of different profiles

(fields of study), with the aim of developing skills in interdisciplinary communication, modelling ways of solving contemporary global problems, conducting research activity, etc. [22].

These processes are directed toward the cognition of the surrounding reality. The decisive confirmation of the process of cognition lies in objective practical activity, which in the contemporary school should be predominantly of a research character.

The process of research activity for a person, in its phenomenology, is based on biological prerequisites (research activity, research response, research behaviour), is revealed through socio-cultural determinants (the contexts, norms and means of carrying out research activity), and rests on an inner position (the ability to seek out and become aware of problems; to respond consciously, actively and constructively to problem situations; to build a research-oriented attitude toward the world, toward others, and toward oneself). The latter partly resolves the problem of personal development by shifting the emphasis from the socialization of the individual (the spontaneous interaction of a person with the surrounding reality) and upbringing (the purposeful process of influencing the individual) toward the value-normative system of the adult world through the assimilation of culture.

In all interpretations of the concept of "culture" (the improvement and refinement of a person's bodily-psychic-spiritual values, inclinations and abilities; the totality of the manifestations of life, achievements and creativity of a people or group of peoples), what is common is the placing (whether through opposition, separation, etc.) of culture beyond the bounds of nature while retaining its interpretation in relation to the human being and society, which, in turn, are the bearers of culture. And even in the very interpretation of the phenomenon of culture there emerges a desire to juxtapose it with the human being, nature, history and society.

The school, with its inherent mechanisms for transmitting culture, is a social institution of culture – that is, the school is both a part of tradition and its bearer. Moreover, in its internal organization, it forms its own traditions, which function in accordance with the regularities of the mechanisms of cultural transmission.

In social pedagogy, there are two approaches to defining the role and functions of the contemporary school: 1) the school as a social institution performing the following functions: cultural-educational, regulatory-

upbringing, communicative, organizational-managerial, socially integrative, and socio-political; 2) the school as one of the micro-factors of an individual's socialization, the unification of their development, and the determination not only of the future professional opportunities of the younger generation but also of their personal characteristics [9].

Consequently, there arises an urgent need to reshape the culture of the school environment in the direction of correcting the basic substantive orientations of the individual. Moreover, in the view of the authors of the study mentioned above, under the present conditions of society's development, the very concept of "school" must also be reshaped, and should be understood as *a place for learning*, *a place where one is taught*, rather than a place where one merely studies. Thus, the school is not bound to a specific place or to infrastructure. The school is a kind of unified environment in which, over an extended period, the formation of the Pupil's Personality takes place under the influence of the Teacher, who can transform any place into a School, provided only that, in that place, the experience of interacting with one's surroundings is transformed into the content of a learning situation.

Thus, it is the school that must help a developing person to emerge with dignity from the situation of choosing between – *investigating* or *accepting on faith*. The latter is possible only by moving the individual out of a state of stability (a state of passive social adaptation of the individual) into an unstable state – a state that requires independence in decision-making and the search for a way out of a non-standard situation.

A person's active adaptation to the world depends largely on the extent to which, in the course of their development, the person builds a research-oriented stance – first of all toward themselves, then toward the surrounding world and toward others. This will ensure an adequate awareness of oneself and of one's own actions and deeds in relation to the world, and will foster the conscious shaping of one's life path and the full acceptance of oneself, of one's own life, and of the world as a whole.

3. The Concept of Research-Based Education as the Foundation of a Paradigmatically Differentiated System

The main productive force of a contemporary society working on knowledge is its epistemic communities – educational and scientific. The

creation of new knowledge and its innovative application are the result of the brain's research function. For this reason, contemporary education must be scientifically oriented, with a corresponding research-based model of cognition that determines the anthropo-social basis of knowledge production. The transition to a modern model of research-based education must take place under conditions of change across the entire educational system of society [10].

At the beginning of the new century, a paradigmatically differentiated structure begins to take shape in higher and secondary education, consisting of separate educational localizations based on various paradigmatic principles. The school, together with the university, is increasingly subordinated to the cognitive-role structure of society. A differentiation occurs in their socio-cultural and epistemic functions depending on their orientation toward cognitively distinct spheres of activity: social service, the management system, the sphere of culture, the sphere of the technological application of knowledge, and the traditionally intellectual spheres, among which are science, medicine, pedagogy, jurisprudence, etc.

The formation of research competence should become a new task for the institution of the school, as confirmed by the results of the analysis of the problem of "education through research", carried out in 2002 by the European expert group Strata-Etan [11, p. 40, 47]. Solving this task consists in building a continuous, successive system of education on the principles of research-based cognition, and in forming a partnership between schools, universities and scientific organizations.

Unfortunately, the education system in Ukraine has proved incapable of withstanding the onslaught of globalization processes, which demoralize a person and render them aggressive, harsh and destructive, devoid of national dignity. Moreover, the quality of our education is not increasing but decreasing with every year, and this process continues unabated. In the general secondary school, the question has recently and constantly been raised of studying only those subjects that will supposedly be needed in life. As a result, some schools do not teach, or maximally limit the teaching of, physics and mathematics disciplines, while others do the same with the humanities [12, p. 10].

The problems of higher education add to the problems of general education. The main one of these problems is the non-conformity of

Ukrainian higher education institutions with the European standard in terms of their scientific-technical base and infrastructure. Such "centres of public education" fall considerably short of the level of universities, since they fail to give young specialists deep knowledge and instead prepare potential unemployed people, overloaded with unnecessary disciplines. Against the background of these problems, there arises an urgent need to reform every link of the education system in Ukraine with the aim of forming and developing a creative personality.

It is precisely within the framework of reforming the education system that the question of using innovations acquires particular significance; a broad range of innovation-related problems, and their active introduction into education, must become a key direction of work for the Ministry of Education and Science of Ukraine and its subdivisions, for scholars in the field of education, and for higher education institutions of Ukraine.

Thus, the main issue in contemporary education, the platform for which is scientific research, must become the question of the pedagogy and psychology of creativity: what conditions must be created so that, within the educational environment, pupils (students) become competent in research activity? Answers to this question must be obtained in the process of establishing research-based education as a separate part of the paradigmatically differentiated education system of a society developing in the direction of a knowledge society.

4. Students' Research Competence: Defining the Content and Place of the Category in the Scholarly Apparatus of Psychological-Pedagogical Science

4.1. The Competency-Based Approach in Education as a Necessary Condition for Improving Its Quality

Recent decades have been marked by a reorientation of European and national education away from the concepts of "preparedness", "erudition" and "upbringing" toward such concepts as "competency" and "competence". The turn to these concepts is connected with an attempt to determine the changes needed in education brought about by changes in society. Accordingly, a contemporary trend in the development of education in many countries is the introduction of the competency-based approach into pedagogical practice. This concerns, first and foremost, the definition

of the goals of the teaching-and-upbringing process and the evaluation of its results. The competency-based approach is recognized as the basic idea for reforming education in the countries of the European Union and is regarded as the core, constructive idea of continuing education.

The impetus for fundamental reforms in the education of many countries was provided by the results of international studies on the quality of mathematics and science education (Trends in Mathematics and Science Study – TIMSS) and the international programme for assessing students' knowledge and skills, PISA, in the areas of "reading literacy", "mathematical literacy", and "scientific literacy" [13; 14]. These reforms changed the ideology of education as a whole. Thus, whereas education systems were previously guided exclusively by "Input" – that is, by the state budget, curricula and syllabi, directives for teachers, examination programmes, etc. – today the policy for developing education and schooling is oriented toward "Output", that is, toward the success of the school and the learning outcomes of pupils.

Under these conditions, the most important characteristics that pupils must possess by the time they finish general secondary school are: formed competences, qualifications, and structures of knowledge, views and convictions. These form the basis for lifelong learning aimed at personal improvement and the fulfilment of social functions. Learning outcomes oriented toward the functionality and social adaptability of the graduate become the decisive starting point for evaluating the school system and the measures for its further development [15, p. 150–151].

It is entirely evident that, nowadays, the competency-based approach has ceased to be a local theory that one can simply disregard, since otherwise society faces economic, social and political problems. Under these conditions, in accordance with the logic of the theory of the civilizational challenge advanced by W. Hutmacher and J. Delors, theorists of the competency-based approach have today not only recognized its expediency but have also created the conditions for fundamental changes in the goals of education, its content, and the understanding of educational outcomes [16].

The introduction of the competency-based approach shifts the focus of attention from the knowledge-based model of education (the traditional education system) toward a competency-based model. According to N. Bibik,

the reasons for such shifts are the excess of knowledge, its fragmentation, and its weak connection with reality and the needs of practice. It is precisely the competency-based approach that makes it possible to overcome the inconsistency between the composition and the relevance of the content of education [17, p. 26].

4.2. The Content of the Concept of "Research Competence" and Its Place in the System of Key Competences

An analysis of the scholarly literature in the field of pedagogy and psychology has revealed that both the very concept of "research competence" as a pedagogical phenomenon, and the place of research competence in the system of key competences, require further thorough philosophical and methodological consideration. Without aiming to provide a new definition of the term "research competence", we shall attempt to elucidate the existing approaches to understanding this concept, among which we shall identify what, in our view, is the most accomplished.

Our study is based on the position that the process of cognition is exclusively individual in character and is connected with a personal perception of reality (G. Batishchev, M. Berdyaev, W. Humboldt, E. Ilyenkov, O. Spengler, and others). Thus, engaging pupils in research activity in physics must be carried out only from the standpoint of problems that are personally significant to the pupils.

An analysis of the scientific-methodological literature shows that research competence is treated differently depending on the methodological and theoretical views held by scholars. Thus, when considering research competence *from the standpoint of a systems approach*, it can be asserted that it is a component of professional competence (V. Adolf, L. Holub, A. Derkach, V. Lazarev, T. Smolina, and others), as well as an integral component of general and professional erudition (B. Gershunsky, V. Laptev, and others).

From the standpoint of the procedural-technological approach A. Khutorskoy understands research competence as a person's ability to possess the corresponding research competency, which, in turn, is positioned by this researcher as the result of a person's cognitive activity in a particular scientific field, the research methods and techniques that the person must possess in order to carry out research activity, as well as motivation and the researcher's stance, together with value orientations [18].

Proponents of the functional-activity approach (A. Markova and others) view research competence as a set of personal qualities necessary for carrying out research activity, namely: a stable orientation toward solving the research problem posed; enthusiasm for the work, non-conformism; criticality and self-criticism, and a constant dissatisfaction with the result achieved, etc.

The competency-based approach has enabled researchers such as A. Derkach, I. Zimnyaya, S. Osipova, V. Serikov, V. Slastyonin, A. Tryapitsyna and others to regard research competence as an integrative characteristic of a pupil's personality, manifested in the readiness and ability to independently master and acquire systems of new knowledge as a result of shifting the substantive context of activity from the functional to the transformative. The basis for such a transition consists of the corresponding knowledge, skills, abilities and modes of activity.

In the works of S. Osipova, research competence is presented as a personal, integral quality expressed in the readiness and ability to independently master and acquire systems of new knowledge as a result of shifting the semantic context from functional activity to transformative activity, based on existing knowledge, skills, abilities and modes of activity. O. Berezhnova views a teacher's research competence as a special functional system of the psyche and the associated integral set of a person's qualities that provide them with the possibility of being an effective subject of this activity.

T. Kuzmychova defines research competence as an integrative quality of the personality that encompasses a set of knowledge, skills and abilities, as well as such personal qualities as independence, initiative and purposefulness, which, in turn, are conditioned by the experience of research activity and ensure independent research activity. She emphasizes that senior pupils' research activity is formed as a result of independent research activity and provides the pupil with the full realization of the process of individual cognition, the result of which is the construction of a system of scientific explanation of the world – on the one hand, as a personal-activity characteristic, and, on the other hand, as the accomplishment of the process of self-development and self-realization, as a personal-evaluative characteristic.

A. Vorobyova presents a schoolchild's research competence through a set of competencies (Fig. 1).

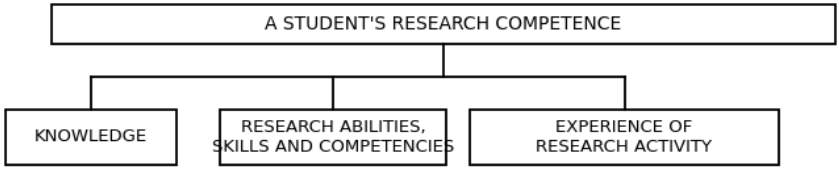


Figure 1. Components of a Student's Research Competence

Each of the groups, as a component of a schoolchild's research competence, contains certain competencies (Table 2).

Thus, there is no unambiguous interpretation of the term “research competence” among researchers, which, in turn, makes it necessary within the framework of our study to examine the theoretical aspect of this phenomenon and to outline our own position regarding its definition.

Within the framework of the problem of introducing the competency-based approach into the educational environment, there exists an enormous number of scholarly works, in one way or another related to the problem of forming and developing the research competence of pupils (students). However, there is one aspect of this problem that has been studied less than others – namely, the problem of developing pupils' research competence under conditions of specialized (profile-based) education [20].

We share the view of V. Slastyonin, according to which the structural components of research competence should coincide with the components of research activity, and the unity of theoretical and practical research skills should constitute the model of research competence. This position is explained by the fact that we consider the concept of competence from the standpoint of a pupil's readiness to act in both standard and non-standard situations.

An analysis of the scientific-methodological literature on the formation and development of pupils' research skills and abilities, together with our own experience, has made it possible to establish that, on the one hand, there are undeniable successes in this process, while, on the other hand, in the process of organizing educational and research work, pupils experience difficulties in conducting research and presenting its results; educational-research activity is directed solely toward the formation of research skills and abilities, without taking into account the personal-semantic aspects of this problem. This results in pupils' research activity, in the course of studying subjects in the natural sciences, having a purely fragmentary character.

Table 2

The Structure of Research Competence

A Student's Research Competence	**Knowledge**	1	of the fundamentals of the sciences (terminology, basic laws)
		2	of the basic terms of research (object, subject, aim of the research, tasks, relevance, hypothesis, methods, practical significance of the work, etc.)
		3	of the main directions of research in contemporary science (at the school level)
		4	of the stages of research activity
		5	of the forms for presenting research results
		6	of the criteria for evaluating research
		7	of the ethics of a young researcher
	Research abilities, skills and competencies	8	to identify a problem
		9	to determine the object and subject of research
		10	to formulate a research topic
		11	to formulate the aim and tasks of the research
		12	to formulate a hypothesis and determine a plan for confirming or refuting it
		13	to draw up a plan for conducting the research
		14	to select information sources on the topic
		15	to generate ideas, ways of solving problems, and project options
		16	to hypothesize the causes of phenomena and processes
		17	to analyse, compare, generalize and draw conclusions
		18	to correlate the result achieved with the stated goals and tasks of the research
	Experience (diligence, behavioural patterns	19	of working with various sources of knowledge, ICT
		20	of choosing methods for conducting a specific study
		21	of working with basic instruments
		22	of organizing a sociological survey, questionnaire, interview, etc., and of working both in a team and individually
		23	of recording and processing the results of the research
		24	of presenting the results of the research and preparing them for defence (a research paper, report, abstracts, publications, presentations, etc.), and of speaking before an audience
		25	of perceiving the practical significance (practical application) of the results of the research

Thus, when speaking about research activity as a whole, we must clearly identify the components of such activity, namely: the ability to identify a problem, to formulate a hypothesis, to select and analyse the data necessary for the research, to choose the appropriate methods for conducting the research and processing the data, to record the intermediate and final results of the research, to discuss and interpret the results of the research, and to apply them in practice [21, p. 58].

Research skills constitute a system of intellectual skills (the ability to analyse and identify the main point, to compare, to specify, to generalize and systematize, to prove, and to classify) and practical skills (working with literary sources, organizing an experiment, observing phenomena and processes, processing and applying the results obtained, etc.) of the individual, which are necessary for carrying out research independently. In fact, intellectual skills are a pupil's ability to effectively perform mental operations when solving problem situations; practical skills are the individual's ability to carry out practical activity purposefully, with quality and success, based on the conscious application of knowledge, skills, experience and values.

By actively refining their skills in the process of research activity, a pupil must become the subject of their own education; and this activity itself should create real prerequisites for establishing continuity between secondary and higher education, make it possible to take maximum account of pupils' interests, capabilities and abilities, and help them to orient themselves correctly in the field they choose for themselves. At the same time, an initiative-driven, independent, research-oriented attitude toward reality, toward other people, and toward oneself as a researcher is one of the most important elements of a conscious approach to the necessity of developing a pupil's research competence.

Research competence reveals the level of development of mental processes and research activity, namely the ability:

– to see and identify problems, to formulate assumptions about their solution, to be able to set a task and identify its conditions;

– to be able to make assumptions about the possible causes and consequences of phenomena of the material and ideal worlds, to advance hypotheses and substantiate them;

– to hold in mind, simultaneously, several meanings of complex phenomena, events, texts, statements, etc.

The formation of research competence is based on the idea of combination and integration, and of presenting the content of research activity as an integral whole; it makes it possible to conduct research at the meta-subject level and to work out technologies that highlight the competence of this research activity: goal-setting; goal-attainment; and reflection on the boundaries and results of research activity [20].

The distinguishing features of research competence (indicators of its multidimensionality) are:

– non-algorithmicity – the use of heuristic approaches in the process of research activity;

– polyfunctionality, universality and supra-subject character – a pupil's use of elements of research activity in other learning and life situations;

– multidimensionality – a pupil's application, in the process of research activity, of analytical, communicative and critical skills, as well as common sense;

– mobility, flexibility and variability – a pupil's ability, as a result of a deep awareness of the goal of future activity, an analysis of external conditions, and an assessment of the probability of achieving that goal, to make optimal decisions regarding the mode of action, to adopt a programme of action, to mobilize their own capabilities to achieve the goal, and to adjust them in the context of the specific nature of the activity [22, p. 12].

Thus, within the framework of this study, by research competence we shall understand the totality of knowledge, abilities, skills and experience relating to the conduct of research, the acquisition of new knowledge, a new intellectual product, the creation of a new project, or a new way of solving a problem; the qualities and skills that a person must demonstrate in the process of effectively investigating any question.

An analysis of the scientific-methodological literature has revealed that, firstly, research competence is regarded as one of the important professional competences, which can be classified both among the basic competences and among the subject-specific ones. The classification of research competence among the basic competences is, to a certain extent, justified, since its formation presupposes a combination of a certain set of knowledge,

skills and abilities that pupils acquire both in the course of mastering the entire content of education and in the process of studying various academic disciplines.

Secondly, research competence is classified among the cross-curricular (general subject) competences, since without it the successful mastery of academic disciplines that require a high level of awareness of systematization and generalization is impossible.

We share the position of many scholar-pedagogues (V. Bolotov, I. Zimnyaya, S. Osipova, O. Ushakov, A. Khutorskoy, and others), according to which research competence belongs among the key competences. These scholars believe that research competence is formed on the basis of an innate quality of every person (research behaviour) and also contains an entire complex of elements belonging to various key educational competences. For example, I. Zimnyaya regards research competence as a particular component of competency belonging to a person's sphere of activity. At the same time, A. Khutorskoy regards research competence as part of cognitive competence, while A. Barannikov assigns research competence a separate place among the key competences. In other words, research competence is a key competence, which is precisely what determines the importance of its formation and development.

CONCLUSIONS

The innovative educational paradigm, under present-day conditions, is called upon to preserve and develop a person's creative potential, and its main principle consists in the fact that it is oriented toward shaping a worldview based on multi-criteria decision-making, tolerance of dissenting views, and responsibility for one's actions. The new educational paradigm must reflect the specificity of contemporary education, namely, an optimal combination of traditional and innovative directions.

The vector of change in the education system must be directed toward the plane of the integrity and fundamentality of education, at the basis of which are practices of the public, collective formulation and solution of interdisciplinary projects by participants of different profiles (fields of study), with the aim of developing skills in interdisciplinary communication, modelling ways of solving contemporary global problems, conducting research activity, etc.

The formation of research competence should become a new task for the institution of the school, with its main motto being education through scientific research. Solving this task consists in building a continuous, successive system of education on the principles of research-based cognition, and in forming a partnership between schools, universities and scientific organizations.

An analysis of the scholarly literature in the field of pedagogy and psychology has revealed that both the very concept of "research competence" as a pedagogical phenomenon, and the place of research competence in the system of key competences, require further thorough philosophical and methodological consideration. Without aiming to provide a new definition of the term "research competence", we have attempted to elucidate the existing approaches to understanding this concept, among which we identified what, in our view, is the most accomplished.

The formation of research competence is based on the idea of combination and integration, and of presenting the content of research activity as an integral whole; it makes it possible to conduct research at the meta-subject level and to work out technologies that highlight the competence of this research activity: goal-setting; goal-attainment; and reflection on the boundaries and results of research activity.

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