

# On the Two Types of Resources for Innovative Primary School Teacher Training

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**Abstract:** In the article, the authors substantiate the approach to educational innovations as different types of resources - human and technological. Moreover, the concept of “innovation” is understood by the authors in a broad sense: these are objects, phenomena and trends that emerged recently, experienced unexpected development or require urgent changes. The authors discuss the role of human non-technogenic innovation resources and their prospects in personal and organizational-methodological meaning. The purpose of the article is to outline the prospects for the development of an innovative personality for future teachers and demonstrate them some zones of potential occurrence of innovations. The relevance of the study is due to the fact that the educational technologies gradually drive out the teacher from the main role which threatens education, that has always been anthropomorphic, rather than technocentric. Methods. During the study, philosophical metaphysical methods were used, in particular the method of “monologic debate”, reflection on global trends in education. From more specific methods, an analysis of educational processes, generalization and modelling of possible educational consequences were used. This made it possible to outline possible directions of personal innovative growth of the teacher in the context of global changes (presented in Table 1). The result of the article. The authors also investigated Ukrainian and foreign scientific literature on the topic and evaluated it from the point of view of pragmatics and axiology. They also proved a thesis about the new ontological essence of educational and teacher innovation: the change of social and educational environments, the development of electronic technologies force to modify not so much the environment as the professional self-identification of the teacher, the specifics of their resources, professional and ontological “self”. Now the institutional resource support has become less important for the teacher, and the subjectivity comes to the fore, which actively uses innovative resources and is the source thereof. The international significance of the article is explained by the global crisis of the educational values, substitution of the anthropomorphic image of education with hi-tech, which should attract the attention of all civilized humanity.

**Keywords:** *Innovative consciousness; human innovation resources; organizational and methodological innovations; sources and means of educational innovation; pedagogical skill; change of educational roles.*

**How to cite:** Zaporozhchenko, T., Turchyn, T., Marchuk, S., Boichuk, P., Shakotko, V., & Barulina, Y. (2022). On the Two Types of Resources for Innovative Primary School Teacher Training. *Revista Românească pentru Educație Multidimensională*, 14(4), 40-53. <https://doi.org/10.18662/rrem/14.4/628>

## Introduction

Back in the 90's of the twentieth century Widdowson noticed: rapid development of innovations “requires to review the role of teachers, the nature of the pedagogical competence, which requires such a role, and ways of the most effective preparation for its implementation” (Widdowson, 1992, p. 261). Consequently, teachers are influenced by innovations in the educational policy (macro-level frame resource). Teachers interpret these innovations and put them into school practice according to their style, interest, proposals, etc. At the micro-level it is always the synergy of human, professional and technological resources. These types of resources are again either innovative or significantly updated.

Currently, the important principles of innovation development in the pedagogical theory are sufficiently substantiated. They are based on nature conformability, humanization and technologization of the pedagogical system. It should be noted, that they are characteristic of different scientific and practical value. Even the percentage ratio of pedagogical innovations is determined. The scientists also analyzed the levels of development of pedagogical innovations. They bring out “low” (pseudo-innovative) or innovative by the name, “middle” (partially innovative) or innovative “by the form”, “high” (true innovative) or innovative “in essence” levels that change the system, its main components and determine the enlargement of the products of pedagogical activity” (Demchenko, 2002, p. 39).

A separate problem is the educational stereotype that innovation is something revolutionary, which changes the paradigm. Thus, in the early 2000s, there was a “boom” in the development of information technological electronic innovations, and in education a stereotype set: innovation is always something electronic, multifunctional and unusual: device, program, invention.

The monograph by Collis, Nikolova, Martcheva (1995) almost for the first time disclosed the idea that digital technologies are not so much educational innovation by themselves but rather the tool for modeling and implementing the educational innovations. For example, these scientists viewed information technology as a means of accumulation and transfer of experience as a catalyst for transformational educational processes for countries that integrate into the European educational space as interaction and partnerships (Collis et al., 1995).

James even called that state of education “digital flood”, which covered the United States, Asia and Europe, that do not have time not only to master them, but also emotionally tolerate the multichannel flows of information (James, 2012, p. 35).

In addition to the multifunctionality of digital information communications, teachers tried to emphasize their non-standard use, which is closer to the concept of the innovation. Options that could radically change education have become fashionable (personalized, re-formatted, made remote, online, public, intelligent (Bach et al., 2006; Preston, 2004). That is, the maximum use of the effect of virtuality and simulation. However, in ancient understanding, simulation and virtuality are simulation and fake.

However, the relevance of the article is determined not only by the metaphysical contradictions, but also by the praxeological problems of non-technogenic innovations in education. In accordance with the provision on the procedure for implementation of innovative educational activities, “Educational innovations are newly created (applied) or improved educational, psychological-pedagogical and management technologies, methods, models, products, educational, as well as technical solutions in the field of education, which essentially increase the quality, effectiveness and efficiency of the educational activity” (Ministry of Education and Science of Ukraine, 2000, p. 7). In this order, the authors delimit objects and subjects of innovative educational activity. The objects include knowledge, educational processes, programs, methodological tools and all administrative processes in education. The subjects - educational institutions, scientific institutes and persons involved in the educational and the near-educational spheres. A person as the main source of innovation and the resource of their transmission - distribution is mentioned at the end, which obviously means its fundamental role.

In connection with the sharp progress of digital technologies, the innovative prospects covered all major educational directions. In this regard, a number of fundamental studies on conceptual educational philosophical issues were published in Ukraine (Dubaseniuk, 2014); information and telecommunication educational technologies (Hurevych et al., 2015); the educational potential of high technologies (Kukushin, 2002), etc. Innovation began to be often used next to the term technology - and Ukrainian education began to de-personify. This fact also confirms the relevance of the study on the exclusive role of the teacher, a separate personality in the introduction of innovations in the pedagogical education.

The purpose of our article is to analyze the anthropological aspect of school education in the prospect of the primary school teachers. After all, a person faces complete technologization and digitalization from one's youth. We managed to outline possible levels and ways of innovative self-

manifestation of the young teacher and summarized a number of topical views on innovative technologies and resources.

Such a purpose forced us to use a specific set of methods, including philosophical, analytical (overview of Ukrainian and foreign literature on the topic and its analysis in terms of educational pragmatism and axiology). We also used methods of generalization and modeling of educational innovation conditions.

Multi-aspect analysis of trends, educational realities of certain institutions and scientific literature on the topic allowed to allocate a part of the general problem that has not been analyzed previously - the problem of preserving anthropomorphism of the educational process and self-identity of a young teacher in conditions of domination of technogenic resources.

As part of the analysis of innovations, we often use an important term – a resource, in particular the concept of innovation resource. We argue this by the fact that the rapid change in innovative phenomena flows from one sphere to another. That is, following the analogy to the contemporary edge state of the interdisciplinary sciences expand the concept of innovation. This concept is abstract, while the concept of innovative resource is connected directly with the application and practice. Scientists assert the following: digital and network technologies require from teachers the innovative competencies with a constant renewal and “upgrade”. This, in turn, contributes to the constant updating of methodological tools and other resources and corresponds to the characteristics of the nature of the educational design as transmissive, dialogical and constructivist, illustrating how each element contributes to adapting theory in practice (Turcsányi-Szabó, 2012). It turns out that the main human resource of the future teacher is the digestible innovation based on the possibility, motivation, perseverance and the need to implement them.

### **Human innovative resources. A teacher is the main source of educational innovations**

From previous explanations, it is clear that any educational innovation is created only by the human resources - intelligence, intuition, inspiration, projective and modeling activities. Therefore, we consider it appropriate to discuss the topic “Resource Potential”, that is, we want to find out what makes an individual teacher (we are not talking about educational communities so far) to be a source of professional innovation.

In this regard, an interesting topic for research is the attitude of the teachers themselves to innovations. Avidov-Ungar and his colleagues conducted and processed data of nearly 30 semi-structured interviews and

realized: perception, assimilation and production of educational innovations affects the professional self-identity of the teacher. Scientists distinguished three structural components of the professional existence or formation of the “self-concept” of the teacher in an innovative environment: conceptuality, that is, the very existence, work, that is, on-the-job training, employment; ecology or opportunity to receive environmental support (Avidov-Ungar & Forkosh-Baruch, 2018).

In these articles of contemporary authors, we first come up with the substantiation of such a process as the construction of a professional innovative identity of teachers (Avidov-Ungar & Forkosh-Baruch, 2018). It is important for the practicing and future teachers as carriers and repeaters of innovative information resources that continuous lifelong learning is closely linked to improving digital competence. These two factors is a spectacular example of the synergy of technical and human resources. An obstacle to the total realization of this is a different need for digital improvement and availability of basic digital competencies. For example, in developing countries, scientists observe deficient phenomena in the preparation of teachers to form innovation resources: preference to preliminary experience and the ability to use ICTs, difficulties with the creation of contemporary educational information content, weak multichannel online communication or absence thereof, etc. (Artacho et al., 2020). It is encouraging that the students-teachers and young teachers with little work experience are the most successful in capturing innovative phenomena and self-development. Therefore, the Spanish theorists of higher pedagogical education believe that the constantly updated digital education of future teachers and advanced training of teachers-practitioners is the only way to develop an innovative panorama of study (Artacho et al., 2020).

Therefore, there are two basic sources of the use of innovations in the training of the primary school teachers - anthropogenic and technogenic. Their mutual exchange and synergy allows to discretely imagine and describe separate groups of innovative resources.

Avoiding metaphysics and referring to the pragmatics, the main driving force of educational innovations is a teacher as a creative personality, since the subjective factor is decisive during the search, development, introduction and spreading of new ideas. The executives can only offer a direction or a framework of a working or experimental paradigm, but the specific implementation is always going on at the lower resource level (we are not talking here about changing financing or adoption of general laws, because those are not educational innovations or resources).

A creative teacher or a student has a wide range of opportunities and an unlimited field for innovative activities, since they can in practice experiment and be convinced in the effectiveness of the teaching techniques, adjust them, to carry out a detailed structuring of educational process research, offer new technologies and methods of training. The main condition for such an activity is the innovative potential of a teacher, characterized primarily with a set of personal characteristics of the teacher's personality capable to improve pedagogical activity, introduce new tools and methods of training in order to improve the educational process.

Among the factors considered, which generate personal educational innovations, we prefer the three-component structure by Turyk. Therefore, the main factors that determine the presence of a teacher's innovative potential are:

- creative ability to generate new ideas;
- high cultural and aesthetic level, education, intellectual depth and diversity of interests;
- openness of the teacher's personality to the new and perception of different ideas, thoughts, views, concepts, based on personal tolerance, flexibility and breadth of thinking (Turik & Osipova, 2009, pp. 11-14).

A by-product of innovation as a process of creative activity is the growth of pedagogical skills of the teacher, the level of his culture, thinking and worldview. That is, the creative search and implementation of innovations leads to a new formation in a holistic pedagogical system. Danylenko (2004) defines pedagogical innovation as relevant and systemic innovations that arise on the basis of various initiatives and innovations that become promising for the evolution of education and positively affect its development.

Strilets (2015, p. 451) defines the concept of “innovation in pedagogy” as “introduction into the educational process of a new (facts, methods, techniques) that significantly improves the existing educational system”.

Since innovations in pedagogy relate not only to the content of disciplines, but also primarily to the forms, methods and means of teaching the material, it is appropriate to mention the definition of “means of innovative technologies”, which was first used by Strilets in the educational discourse. This definition consists of two components:

- “sources of information or special devices that help to carry out the educational process in the context of innovations aimed at achieving the main goals of education and, above all, to improve the quality of education;

– all objects and processes that serve as a source of educational information and tools for learning the content of educational material, development and education of students in the context of innovative education” (Strilets, 2015, p.14). Here, a clear division can be provided: sources are the resources, and objects and processes are educational innovations. Although functionally, this division is not clear. For example, a teacher can be the source of an innovation, and can be a means (object, tool) of its retranslation into the student environment. However, we will never say that the teacher is a component of the technology.

In our opinion, a rational calculation of the effectiveness of processes modelled by a man or a machine is put in the basis of the technology. The role of the teacher decreases every year, but he / she embodies anthropomorphism of the educational process contrary to its excessive technologization. That’s why, as we consider, technological inventions will not be able to become full educational sources and resources, but will remain tools of preservation, access, multichannel assimilation, etc. On the other hand, a person cannot be an innovation. Innovations can be results of their educational activity, pedagogical style, professional intention, etc.

### **Organizational and methodological innovations. What can be really changed?**

Taking into account the complexity of the concept of “means of innovative technologies”, we will focus on its individual components. In particular, for convenience and clarity we will consider a relevant for the future primary school teacher problem - methodological support of educational disciplines “Mathematics” and “Methods of teaching the educational field “Mathematics” as disciplines contributing to the further development of the mathematical competence of the future primary school teacher was chosen to illustrate innovation as the hardest and most “innovative” educational subject for children.

From the highest administration level, it is possible to expect innovations in terms of general standards, the basis of which is the expected competence. In fact, it is an independent variable. However, the teacher as a carrier of innovation consciousness and professional competence has a space for methodical variation.

It is necessary to remind that the methodological support for the course traditionally includes the curriculum; working curriculum; practical training plans; guidelines for writing term papers and theses; test packages; didactic support of independent work; criteria for assessing the knowledge

and skills of students; textbooks, manuals, reference books, dictionaries; lecture materials (printed or electronic materials); computer software of the academic discipline; examination papers; visual teaching aids.

Given the systematic process of formation of mathematical competence, which is carried out during the mastering of the discipline “Mathematics” and continues during the study of the course “Methods of teaching the educational field “Mathematics” we consider it appropriate to analyze these disciplines for the possible or already implemented innovations.

According to the educational-professional program of training the future primary school teacher for mastering the discipline “Methods of teaching the educational field “Mathematics” 6 ECTS credits, which is 180 academic hours.

In the process of analysis of this course, we consider it appropriate to take as a basis the study of Haran (2016, pp. 36-39), in which we find a detailed comparative review of curricula for the course “Methods of teaching the educational field “Mathematics” twelve universities in Ukraine. During 2019-2020, the researcher analyzed the normative and working programs of this discipline.

The researcher emphasizes the existence of a significant difference in the distribution of workload by hours, which is explained by the ability of higher education institution to independently set the number of classroom hours in the range from one to two thirds of the total number of study hours. The rest of the time is set aside for independent and individual work. At this stage, we can introduce the concept of the measure of innovation in the structuring of the educational process.

For ethical reasons, we will not list all the analyzed institutions of higher education, and dwell on the most characteristic from the point of view of innovative planning and administration. The analysis conducted by Haran (2016) of the curricula of the discipline “Mathematics” verified that the majority of higher education institutions (for example, the National Pedagogical University named after M.P. Drahomanov) keep to the established list of topics: general issues of methods of teaching mathematics in primary school; methods of studying the numbering of non-negative integers and arithmetic operations in different concentrates; methods of teaching problem solving; methods of studying quantities; methods of acquaintance with fractions; methods of algebraic and geometric propaedeutics in the course of elementary mathematics.

In contrast to the analyzed programs, the State Institution “South Ukrainian National Pedagogical University named after K.D. Ushinsky”

proposed to submit the material concentrically, thus revealing the dynamics of the gradual expansion and complication of educational material. However, according to the researcher, the deployment of educational content related to in numbering and arithmetic operations, fractions, propaedeutics of algebra and geometry, quantities, in the curriculum of the State Higher Educational Institution “Precarpathian National University named after Vasyl Stefanyk” is represented in the same way as in the previous institution, but the teaching methodology for solving plot problems is offered not in concentrates, but immediately from grade 1 to grade 4. Haran rightly notes that such a structure also avoids contradictions between the educational process and pedagogical practice.

On such examples, we demonstrated how methodological recommendations, variability and change of methodological principles lead to educational diversity, and in terms of proving efficacy can become a methodological innovation.

As a result of the formed competence system, a young teacher has domain knowledge and methods of non-standard solutions. He / she can flexibly use them for the development of the personality of each student and take into account a number of factors: from the curriculum documents to the specifics of the learner’s lateral profile; from the regularities of mastering mathematical knowledge by student to interesting and developing extra-curriculum mathematical phenomena. On the basis of these knowledge and with the acquisition of experience, he / she can rationalize a separate component of the educational process, and subsequently to become a teacher-innovator.

The focus of knowledge, emotional and motivational resources on oneself allows the teacher from the student stage to lay the foundation of innovative thinking, and hence activities. According to Haran, on the macro level it is manifested in the skill and desire to “analyze the content of experimental programs and textbooks in mathematics, make changes to the text of mathematical material studied, select and produce didactic material” (Haran, 2016, p.76).

There is a table below with those programmed mathematical competencies of the future teacher which may have the potential for the production of one’s own innovative ideas. In the right column (Fig. 1).

**Table 1.** The innovative potential of mathematical competencies of the primary school teacher: (developed by the authors)

The essence of competence	Innovative perspectives
1. To organize students in the process of acquiring mathematical competencies.	Search for own methods for combating social and informational entropy.
2. Choose and independently compile exercises with a certain didactic.	Construct or modify educational conditions, and not just use them.
3. To identify individual peculiarities of students.	Implement the innovative concept of “unity in diversity” as a value.
4. Possess the methods of organization of an individual-differentiated approach.	Preservation and development of a unique student subjectivity in the multimodal environment.
5. Integrate mathematical, psychological-pedagogical and methodical knowledge.	Find own tools for the integration and integrity of the discrete, “split” world (mental processes, values, science, etc.).
6. To know methods of humanization of younger students’ training.	To implement an innovative paradigm of through humanization, loyalty, acceptance.
7. Combine individual, group and collective activity in junior students	Use the latest properties of the psyche of the “digital generation” children: rapid switching, clip thinking, the speed of making and breaking temporary communicative ties, etc.

The highest level of formation of the innovative educational consciousness of the teacher, in our opinion, implies development of his / her academic, professional, operational and pragmatic resources. Subsequently, this will lead to universal innovation potential. We believe: the most important for the future primary school teacher signs of his / her innovation potential are manifested in a constant solving of non-standard educational tasks against the background of the decline of the educational and reproductive approach to education and providing broad methodic rights to the New Ukrainian School (NUS). A resourceful teacher acts effectively in spite of, not thanks to.

## Conclusions

In order to solve the philosophical problems of this article, we propose to reason as follows: scientific innovations (progress) give rise to digital, innovative, informational, communication and other new

technologies. These technologies based on their validity, flowing into educational innovative technologies. At this stage, the competition of human and technological innovation resources becomes the most important. We have chosen the human resource as a priority, and we discussed in the article on the innovative educational activities, innovative competence, etc. It is logical to continue this series with the prospects of the innovative intentions of the teacher or the structure of his / her personality.

The analysis of theoretical and practical approaches to the training of the subjects of innovative activity made it possible to determine that teachers of a higher pedagogical educational institution should make use of such forms and methods in the innovative environment, which combine information and educational and activity components of training and are aimed at shaping the personality of future teachers capable of fulfilling their professional duties at a high level. At the same time, each motivated primary school teacher can model and use one's own tactical innovations.

Having studied domestic and foreign experience in the selection of innovative education technologies, sharing the views of certain scientists, we consider innovative those technologies that meet the following criteria:

- it is a resource for improving the content of education and the structure of the educational process in accordance with the contemporary social demands (Antoshchuk 2016, Hrabovska et al., 2013, Kosynskyi & Shvets, 2012).

- form contemporary competencies in future teachers (in particular, contribute to the formation of mathematical competence) (Strilets, 2015, Turik & Osipova, 2009);

- provide formation of analytical, organizational, design, communication skills, reflection, creativity, ability to make decisions in unusual situations, the ability to organize their own professional activities (Kurkin, 2008, Strelets 2015);

- enrich the educational process by including active, analytical, communicative teaching methods (Preston 2004; Strelets 2015);

- positively change the perceptions of students and teachers about educational activities (Bach et al., 2006; Strelets 2015; Turik & Osipova, 2009);

- provide the relationship of theory with its practical implementation (Strelets 2015; Bach et al., 2006; Preston 2004).

Thus, taking these criteria into account, we can single out a complex of innovative pedagogical technologies aimed at improving the process of training future primary school teachers. In our opinion, these are the

following technologies: gaming technology; information and communication technologies; design technology; problem learning technology.

We consider each of the above technologies to meet the list of criteria outlined by us and have a positive impact on the formation and development of mathematical competence of future primary school teachers. The innovative content of the proposed learning technologies is revealed through their general characteristics.

### **Restrictions on research**

The conceptual subtext of the article on the ontological essence of human resources and the technogenic innovations in education is too deep and large, so that it can be highlighted in a single publication. But specific problems of the implementation of the educational innovations in developing countries require additional studies.

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### **Acknowledgements**

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Authors thank Mrs. Marina Haran, Professor, Department of the Theory and Preschool and Primary Education Techniques of the Kherson State University for the materials provided, namely educational programs on the course “Methodology of teaching the educational field “Mathematics”. Also, the authors note that all studies conducted by them personally: from reviewing literature and data collection (Tetiana Zaporozhchenko and Tamara Turchyn) to metaphysical reflections and discussions organized by Serhii Marchuk and Petro Boichuk. On the basis of the analytical data Viktor Shakotko was able to outline the prospects of the primary school teachers for innovative activity. Yuliia Barulina has made general remarks and was responsible for the reliability of the use of facts.

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