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Scientific Skills Formation in Research Actions of Master's Degree Students Majoring in Education

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Abstract

The article is devoted to the model of research activity of master's degree students majoring in education. The experience of organizing pedagogical research in the frames of the master degree program in education was based on the gradual mastering of research actions in students. Research activities were included in the practical program (introductory, pedagogical, project, pre-graduation practice) and research work in the semesters. On the basis of mastering research competencies, a technological map was developed for assessing the level of mastering research competencies such as minimum, basic and advanced.

The diagnostics of outcomes showed that students had a high level of scientific skills formation to analyze the situation critically at the stage of graduation and the master's degree thesis defense; 93% of respondents believed that they could determine a research task, develop a general strategy for solving the problem. Graduate students assessed their ability to design their pedagogical activities on the high level and manage a project at all stages. They showed their scientific activity and initiative of developing an independent project and implementing into the practice.

There were some difficulties in the competence formation which included the use of communication technologies and a foreign language to have academic and professional interaction. 20% of the respondents noted the minimum level of formation of communication competence; 27% of the respondents had the basic level. 50 % of the respondents showed the advanced level. It was difficult for students to use international research in their work and to annotate international articles.

Keywords: research; research activities; research competence, research actions, research in education

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Introduction

Adolph Diesterweg (1835) wrote that without striving for scientific work, the teacher inevitably falls into the power of three pedagogical demons: routine, banality, automatism. One of the most important tasks of the master's degree students training is to teach one of the research actions. In the learning process pedagogical master's degree students should master the research activities and complete their studies by writing a Master's thesis as a research project.

Research activities are one of the main activities which a graduate must master in accordance with the requirements of the Russian federal educational standard for a pedagogical master's degree. Research activities are organized in the combination with pedagogical, project, methodological, managerial, cultural and educational activities (Ministry of Science and Higher Education of the Russian Federation, 2018).

Based on the concept of Irina Zimnyaya (2010), the student masters the following types of research activities such as educational research, research activities under the supervisor, independent research. Bachelor's students mainly carry out educational research and research activities under the supervisor. Master's students carry out independent research activities and participate in scientific activities under the supervision (Zimnyaya, 2010). A master's student conducting scientific research should focus on scientific novelty and the practical significance of the results.

According to Russian law, bachelors with pedagogical and non-pedagogical degree can be accepted for training for a pedagogical master's degree in education. However, this creates difficulties in teaching non-pedagogical students to conduct pedagogical research. The students who gained experience in pedagogical research during their undergraduate studies have a higher level of organization of research activities than the students who did not receive such experience. The formation of research actions of graduates of a non-core bachelor's degree should be adjusted to the specifics of pedagogical research. It is necessary to draw up an individualized study program for graduate students who had a bachelor's degree in a non-pedagogical specialty and who did not have experience in pedagogical research.

Purpose and objectives of the study

The purpose of this article is to identify effective ways of mastering research actions at the stage of master's degree training.

Research objectives:

to analyze the competencies in the field of research activities, which are established by the federal educational standard for the master's degree in education;

to describe the model for the formation of research competencies at the University of Tyumen;

to evaluate the effectiveness of this model by interviewing master's students majoring in education;

to propose criteria for the effectiveness of the formation of research competencies.

Literature review

Research activities can be understood as activities that are based on scientific methodology and serve to obtain new, scientifically grounded knowledge. Volodar Kraevsky (2010) considers independence as the main feature in research activity, «independent approach allows you to get really new scientific knowledge that will be effectively used in science and practice».

Research activity can be represented by a set of components that are to be formed. Natsliya Stavrinova (2006) identified the following set of research components: motivational, cognitive, indicative, operational, mastering which allow to solve «research tasks that are significant for the professional activity of a modern teacher». She classifies research activities as an operational component (Stavrinova, 2006).

Lazarev & Stavrinova (2008) believe that research activities should be part of the generalized professional skills of the teacher, since they ensure the quality of solving problems in the field of analyzing the situation of training or education; planning work with students; evaluating the effectiveness of the applied technologies; collecting information; search for ways of enhancing the cognitive activity of students, implementation of innovations in professional activity.

The quality of students' research activities depends on the formation of students' skills in conducting individual research actions. The development of students' skills in research activities is considered to be "the main indicator of the effectiveness of their participation in this activity." (Bishtova, 2008).

The experience of universities in organizing research activities at the master's level shows an effective model for the formation of research competencies of students.

The new curriculum for the research master's program in education has been tested at Moscow City Pedagogical University since 2014. The idea of increasing research activities through the research projects has been implemented.

As part of master's studies, a student independently implements at least one project or research. Research involves four stages: 1) initiation; 2) planning; 3) execution; 4) defense of a research project. Throughout the entire period of study, students are also involved in a research workshop (Vesmanov et al., 2015).

At the Kazan Federal Power Engineering University, the emphasis was placed on the fact that while conducting research, students simultaneously study, acquire knowledge and skills. To organize the research the teams were formed with separate roles of performers and assistants. Research topics were taken from the available nomenclature of journals recommended by the Higher Attestation Commission for the defense of dissertations. During the semester, the undergraduate was involved in various research activities: preparing an essay, making a presentation, preparing a review, writing an essay (Kudakov & Khomochkina, 2009).

At the Krasnoyarsk State Pedagogical University named after V.P. Astafiev, the network research community "School of the Young Researcher" is functioning, uniting professors, associate professors, graduate students, undergraduates, teachers and students of rural schools in the region. The fundamental procedure of the community is to identify areas of research that are relevant for the Krasnoyarsk region. Community members meet on online platforms for conferences, lectures, and discussion of the research progress. The curriculum includes the course "Information technology in professional activity." This course includes a module "Network technologies in the work of a teacher." (Bezrukova & Bezrukov, 2015).

Methodology

The methodological basis of the study was «activity theory» formed by Alexey Leontiev (1977), namely, the provisions of the theory on the relationship between activities and actions. «Human activity does not exist otherwise than in the form of an action or a series of actions. ... The basic “components” of separate human activities are the actions that realise them. We regard action as the process that corresponds to the notion of the result which must be achieved, that is, the process which obeys a conscious goal. Just as the concept of motive is correlative with the concept of activity, so the concept of goal is correlative with that of action» (Leontiev, 1977). Based on the activity theory of Leontiev (1977), we identified independent research actions and formed them a) autonomic, b) in the process of research activities.

Within the framework of the theoretical review, we analyzed the case studies of universities on the organization of pedagogical research. The article presents a model for organizing work to include students in pedagogical research at University of Tyumen.

We have developed a Google questionnaire based on the competencies of the federal educational standard in pedagogical master's degree and on the levels of mastering the competencies. The questionnaire was developed in order to assess the effectiveness of the formation of research competencies in master's degree students majoring in education of the University of Tyumen. 32 pedagogical master's degree students completed the questionnaire on a voluntary basis.

Results

Case study of the University of Tyumen. The system of master's training for teachers at Tyumen State University is based on mastering educational and research activities, which is carried out both independently and under the supervisor.

Research competence is a basic component of the Master's training system. The development of this competence occurs implicitly and explicitly (Chistova, 2016). The explicit component of research competence is presented in the curriculum as "research work". The implicit component of research competence is represented to some extent in each discipline, as well as in the implementation of course projects, creative assignments, presentations with reports and speeches. Such a system makes it possible to bridge the gap in the research training of graduates of pedagogical and non-pedagogical bachelor's degrees. Namely, it brings undergraduates who have no experience of inclusion in pedagogical research to the required level, and creates conditions for enriching students with research actions who are familiar with pedagogical research.

Research training as an explicit component. Research training as an explicit component is carried out within the framework of "research work" in each semester, which is carried out independently and under the guidance of teachers through the implementation of specific tasks. The result of research activity is the writing of a master's thesis. In the process of research activities, students enrich their skills in performing research actions by presenting research results, writing a scientific article, creating a scientific portfolio.

In the process of working on a master's thesis, the student must periodically provide the results of his or her research (intermediate, final). Research results can be provided in the form of a presentation or report. A report as an oral form of presenting the results of research work requires analysis, generalization, systematization, comprehension, generalization of the process and results of the research. The report requires a laconic, competent and accessible presentation of the main scientific theses; readiness to discuss controversial or problematic issues. The presentation, showing the main content of the report, supplements, illustrates, confirms the main provisions of the report in text, drawing, graphical and tabular forms.

Students learn to carry out research actions such as structuring information, preparing visual and illustrative material, and preparing speech texts.

A scientific article is a publication, a completed work describing the results of a study. The article should be included in the subject field of the journal or conference. The creation of a scientific text is characterized by integrity, coherence, semantic completeness, special terminology; availability of facts and evidence and absence of ambiguity and discrepancy. For any type of article, there should be a clear structure and consistency of the narrative. The scientific article reveals the research process, outlines the author's reasoning, which made it possible to draw conclusions. All studies are presented as clearly as possible. A scientific article involves the presentation of their own conclusions and intermediate or final results of their scientific research, experimental or analytical activities.

The portfolio is a folder of individual scientific achievements. The portfolio includes everything that testifies to the advancement of an individual in a particular field of activity: certificates, diplomas, creative work, photos and video materials. A portfolio is a method of recording, accumulating, evaluating, mutual evaluation and self-evaluation of a student's individual achievements. In general, the portfolio allows you to maintain a positive educational motivation and high activity of the student as a subject of the educational process. The portfolio provides a planned approach to building an individual trajectory of skills development, stimulates initiative activity, reflects the process of becoming a researcher in a specific area of professional activity. Students learn to carry out research actions such as collection, design, presentation of their research achievements.

The set of mastered actions provides a qualitative mastery of the general cycle of pedagogical research, which includes: defining the research topic, highlighting the main problems and contradictions in the current situation; analysis of scientific approaches and concepts, regulatory framework for research; process modeling; organizing and conducting a pedagogical experiment; description of research experience; diagnostics and data interpretation; design of research materials; presentation and discussion of research results.

The generalized result of mastering research actions is presented in the table №1.

Table 1. Cyclogram of work on a master's thesis in education.

Step	Content of research activities	Form of research activities	Research actions
Step 1	Selection of a research topic and problem; justification of its relevance; highlighting the main problems and contradictions.	Essay	creation of a coherent text, formation of arguments, justification of the author's position
Step 2	Analysis of the established scientific approaches and concepts; determination of the normative and theoretical and methodological base of the research, analysis of the current state of the study of the problem	Literature review	formation of a base of research sources; accumulation and systematization of the list of viewed literature, description, citation, annotation
Step 3	Description of real experience, current situation	Case	description of the situation, case, event: identifying the conditions accompanying the current situation; generalization, objectification, interpretation of facts
Step 4	Modeling - formalization of the state of the studied phenomenon, process; identification of development trends	Model	design, description, formalization of the studied phenomena and processes
Step 5	Organization and conduct of a pedagogical experiment	Experiment	conducting a representative sample; highlighting the events in which the experimental group is included; description of the experiment
Step 6	Diagnostics of the state of any area of education or upbringing	Diagnostics	selection of diagnostic techniques for the research topic; registration research results; interpretation of the received data
Step 7	Presentation of research results	Report, presentation of research results	preparation of an oral presentation, preparation of scientific and illustrative support for a presentation, defense of the main scientific conclusions in a discussion
Step 8	Preparation of a scientific text according to the requirements for authors	Research article	preparation of a scientific text based on the results of the research

The analysis of work efficiency was carried out on the basis of a questionnaire survey of students. To assess the results of research training, the competencies defined by the Federal Educational Standard 44.04.01 for master's degree program in education were selected. We have identified competencies that relate to research activities in the framework of the master's training. Based on the federal educational standard for the Master of Education program, we have selected the following competencies. The federal educational standard contains 14 competencies, we have selected those that relate to research activities. These are a universal competence № 1 (UC-1) - the graduate is able to conduct a critical analysis of

problem situations on the basis of a systematic approach, to develop an action strategy; universal competence № 2 (UC-2) - the graduate is able to manage the project at all its stages; universal competence № 4 (UC-4) - the graduate is able to use modern communication technologies, including in a foreign language, for academic and professional interaction; universal competence № 6 (UC-6) - the graduate is able to determine and implement the priorities of his own activities and ways to improve them based on self-esteem; general professional competence № 6 (GPC-6)- the graduate is able to design pedagogical activities based on special scientific knowledge and research results. Of course, these competencies do not cover the entire research cycle. However, to assess the effectiveness of research training, we use these competencies, because this is the minimum that the Federal Educational Standard in Russia defines for a Master of Education.

Students can master the competency at various levels. We presented the competencies in the form of Table № 2.

Table 2. Levels of mastery of competencies in research activities.

Competence	Competence formation levels		
	Minimum level	Basic level	Advanced level
to conduct a critical analysis of problem situations on the basis of a systematic approach, to develop an action strategy (UC-1)	to see the problem situation	to determine the research task	to develop a general strategy for solving the problem
to manage the project at all its stages (UC-2)	to know the stages of project work	to develops an independent research project	to carry out approbation of a research project
to use modern communication technologies, including in a foreign language, for academic and professional interaction (UC-4)	to quote for international studies	to annotate one or more articles.	to review international articles
to determine and implement the priorities of his own activity and ways to improve it based on self-esteem (UC-6)	to have an individual research plan	to implement the plan under the guidance of a scientific advisor	to show independence, scientific activity and initiative
to design pedagogical activities based on special scientific knowledge and research results (GPC-6)	to know the basic requirements for research results	to formalize its own results in accordance with the requirements	to have the implementation of scientific research results in the activities of an educational organization

A survey was conducted to assess the effectiveness of the formation of research competencies in master's degree students in education of the University of Tyumen. The survey showed the effectiveness of the model for the formation of research competencies at the University of Tyumen.

At the stage of graduation and defense of the master's thesis, students assessed their ability to critically analyze the situation on the high level (universal competence No. 1 according to the federal educational standard for the master's degree program in education in Russia); 93% of respondents believe that, based on the problem situation, they can define a research task, develop a general strategy for solving the problem. Graduate students highly appreciate the ability to design their pedagogical activities (general professional competence No. 6) and manage a project at all stages of the life cycle (universal competence No. 2). Graduates can show scientific activity and initiative, developing an independent project, carrying out its approbation.

Universal competence No. 4 turned out to be a problem area, which includes the use of communication technologies, including in a foreign language, for the purpose of academic and professional interaction. The minimum level of development of this competence was noted by 20% of the respondents; the basic level was noted by 27% of the respondents. A high level of competence formation was noted by a little more than half of the respondents. Students find it difficult to use international research in their work, annotate articles in a foreign language, and review international research.

According to the students' responses, both external factors (preparation of a master's thesis, promotion, fulfillment of the requirements of the study program) and internal factors (the desire to learn new things, the desire to implement an idea and find ways to solve problems in education) are a motivator for starting research.

In general, at the graduation stage of the master's degree, students believe that they have formed the competencies of research activities, such as the ability to define a research task based on a hypothesis, draw up a research plan, use international scientific sources, operate with statistical data, structure information, write texts, write scientific articles. On a personal and professional level, the following positive results were noted: the development of critical thinking, self-affirmation in professional activity, the ability to build an individual route for personal development, the ability to bring things to an end, and perseverance.

Discussion

We compared the answers of master students with and without teacher education at the undergraduate level. (Figure 1).

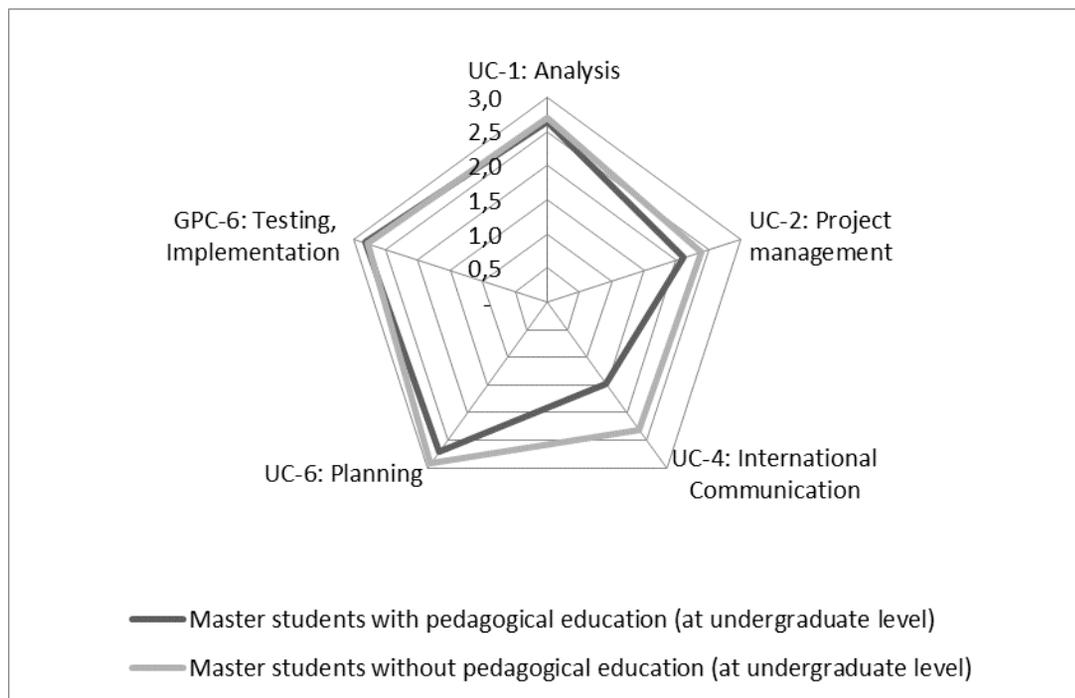


Figure 1. Mastering the research competencies by master's students with and without pedagogical education

It was found that students without specialized pedagogical education showed a higher readiness for research activities in terms of the "international communication" indicator. This makes one think about whether the system of pedagogical education at the bachelor's level possibly provides a lower base for international communication and education than other areas of training at the university. Perhaps there is a need for teaching teachers to include the disciplines of international communication, so that the future teacher has access to international research to improve professional activity.

Conclusion

The formation of research activities will be effective if

- research activities are included in the general cycle of pedagogical research, which provides undergraduates with participation in all stages of research, starting with the selection of a research topic, ending with the provision of a text for defense of the thesis;
- the master's program is based on a combination (complementarity) of pedagogical and research activities, which ensures the achievement of research competence at a level sufficient for independent research.

- the formation of research activities will be effective if the formation of research activities is accompanied by monitoring of the level of their formation, which makes it possible to adapt the research training of undergraduates to the requirements of the Federal Educational Standard in Russia.
- the process of formation of research actions is focused not only on the requirements of the Federal State Educational Standard, but also on expansion, enrichment in accordance with the requirements of research activities.

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