

Students' Research Technology in the Educational Process

Ludmila Pavlovna Kachalova, Irina Vladimirovna Kolmogorova, Tatyana Aleksandrovna Kolosovskaya, Lubov Gennadyevna Svetonosova, Larisa Valeryevna Solonina

Abstract: *One of the most important requirements for the educational process at a higher education institution is the organization of students' research activities. They target the ability to make nonstandard decisions and readiness to solve research problems. This determines the goal of higher education, i.e. the acquisition by students of functional research skills, knowledge and abilities, the development of personal qualities, and the accumulation of creative research experience. The subject-matter of the paper is an attempt to substantiate the forms and methods of enhancing students' research activities. The innovation of the research area stems from the research requirements of the pedagogical internship's module. The module incorporates activities targeting active students' research. The students' involvement in the activities of pedagogical internship within the framework of the research module allows students to practically realize their knowledge, to show their individual features. All these aspects contribute to the self-realization of an individual. One of the major findings is the idea that the pedagogical internship has a big potential of the revitalization of students' research activities. It contributes a lot to the acquisition of new knowledge, skills and research experiences by students.*

Index Terms: *methods of enhancing students' research activities, pedagogical internship, the activation of research activities.*

I. INTRODUCTION

The increased public demand for training a new type of teachers who can do research is very urgent nowadays. Modern teachers must follow a scientifically based approach in the organization of their professional activities. It is critical for them to interpret scientific results in a professional teaching format. All these requirements of higher education demand from the graduates an ability to develop the determination to pursue research activities. Consequently, it is necessary to activate research potential among students.

The initial point of the research relates to the functional and instructive prerequisite strategies for enhancing research activities. We proceed from the terminological field of the problem under discussion. Of much importance is the task to describe the main scientific concepts that ensure the specified process of "research activities' intensification". Let us

analyze this concept from several perspectives which provide prominent definitions of the subject-matter.

In scientific sources, there are disagreements in the definition of research activities as an independent discipline. The essence of the term is quite varied in terms of the content, nature and structural components of research activities. There is a well-established tendency to unite the notions of students' educational research work, students' research activities, instructing research activities. All these notions are synonymic in their character. This understanding may be accounted by the fact that the interpretation of research activities depends on what aspect of the problem is being discussed. Therefore, what is needed is the study devoted to the problem of enhancing the research activities of students in the context of the Federal State Educational Standards (FSES) of Higher Education. FSES provide the definition of research activities, according to which a research activity corresponds to the complex search activities in solving specific problems. Research activities related to active mental activities (analysis, synthesis, solution) lead to new knowledge in accordance with the goals and objectives [1, p. 4320]. As far as the enhancing of students' cognitive activity during scientific work is concerned, it is a special kind of thinking, an intellectual activity, a complex process incorporating scientific substantiation of the problem, searching and hypothesizing, as well as designing models [2, p. 38]. From the point of view of structural logic, research activity is defined as the search for an answer to a creative, research task with a previously unknown solution and the structure of which presents the motive, purpose, subject, object, process, product [3, p. 115]. Research activity is also determined through the allocation of specific indicators, i.e. solving problems and tasks without using standard algorithms, using research methods in solving professional problems, forming and developing personal qualities during research activities [4]. Research activities are also specified by the authors in the procedural and substantive plan when they are defined as the implementation of a creative, research task with a previously unknown solution. They are viewed as a problem statement, theory study, material gathering, analysis and synthesis, the selection of research methods, practical mastering of them, and summarizing totals [5, p. 174].

Much attention in the above definitions of research activities is given to a scientific quest which is a special type of research activity, resulting in the independent performance of scientific tasks.

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Ludmila Pavlovna Kachalova, Shadrinsk State Pedagogical University, Shadrinsk, Kurgan Region, Russia.

Irina Vladimirovna Kolmogorova, Shadrinsk State Pedagogical University, Shadrinsk, Kurgan Region, Russia.

Tatyana Aleksandrovna Kolosovskaya, Shadrinsk State Pedagogical University, Shadrinsk, Kurgan Region, Russia.

Lubov Gennadyevna Svetonosova, Shadrinsk State Pedagogical University, Shadrinsk, Kurgan Region, Russia.

Larisa Valeryevna Solonina, Shadrinsk State Pedagogical University, Shadrinsk, Kurgan Region, Russia.



Therefore, research activity is an activity in the course of which students work proceeding from the independent application of scientific methods of knowledge, the search for an explanation and evidence of natural relationships and dependencies, the analysis of facts, phenomena, processes [6]. While implementing this activity students face with the problem of setting cognitive tasks and putting forward hypotheses. They select the conditions of the observation or experiment, describe their results, and formulate conclusions.

Now we focus on the point of activating research skills and activities among students. If we proceed from the definition that activation is a constantly ongoing process of stimulation to energetic, purposeful implementation of activities, overcoming of passive and stereotypical activities, then the activation of research activities of students can be defined as follows:

- a focus on students' awareness of the importance of research experience for their future professional activities;
- the aspect of achievement pleasure arising in the process of research activities while acquiring new knowledge and skills;
- the feature of research results' reflection.

There is a growing body of literature which suggests that the main components of research activities of students are motivational, cognitive, activity-oriented and reflexive ones.

The motivational component includes cognitive, personal, socially significant and professional-value stable motives that determine interest in research activities. They determine searching and creative strategies, research positions, the awareness of the requirement to participate in research activities [7, p. 92].

The cognitive component includes the set of general scientific methodological knowledge and skills, the specific scientific research cognition and skills, the exposure to scientific procedures, and the proficiency in the techniques of scientific research [7, p. 92]. All these skills must be later transferred to the format of scientific and pedagogical research.

The activity component implies the possession of the methods of scientific cognition and algorithms for solving research problems [8, p. 860].

The reflective component includes the awareness of oneself as a subject of research activity; the assessment of readiness to solve research problems; the self-analysis of one's strengths and weaknesses [9, p. 79]. The result of scientific reflection will be in the subsequent student graduation qualification works. Evidence suggests that the combination of these components constitutes the essence of student research activities.

II. PROPOSED METHODOLOGY

A. General description

The paper discusses the forms of students' research promotion, the functionality of the research module of the pedagogical internship. Much prominence is given to the techniques targeting the main components of research activities and their holistic reproduction in active research. The authors' approach is based on the methods of analysis and synthesis of the accumulated scientific knowledge in

teachers' training methodology, the methods for constructing pilot research work.

B. Algorithm

The authors identified the deductive potential of the research module implemented during the pedagogical internship, as well as the methods of enhancing the research activities of undergraduates.

The main objectives of research activities are aimed at the development of creative thinking and initiatives in solving practical problems; research skills; the expansion of scientific knowledge; the mastering of the methods of scientific knowledge; the formation of skills in working with scientific literature, the development of activity in research activities. The organization of research activities of students plays an extremely important role in the formation of independence in scientific research, the ability to analyze and draw conclusions; to build logical outputs and make personal scientific discoveries [1], [10].

It is critical to assume that the achievement of these skills, knowledge, the experience of creative and research activities requires a lot of effort. Students need a specially organized educational process targeting the definitions of forms, methods, methodologies, tools, and techniques for enhancing research activities.

There is much evidence that research activities are very conducive to the development of such logical skills as the ability to set goals, to define problems, and ways to solve them. Research activities stimulate the ability to reflect on the stages of inquiry, to comprehend the logical aspects of the research task and the content of the study. Discovery practices teach students to put forward the hypothesis and to organize experimental procedures; the ability to formulate conclusions and prove their viability.

The focal point of instructive procedures is the development of research activity motivation. Motivation approaches are realizable by means of the inclusion of students in scientific and pedagogical research through nontraditional forms, containing emotionally stimulating resources for scientific knowledge. Therefore, when studying the topic "Innovative processes in education", students are invited to compile illustrative fact-file information related to scientific problem. It is also interesting to create the images of innovation processes based on the analysis of research practices in the school and display the results of this reflection in a presentation supplying it with such comments as "admiration" or "rejection".

C. Flow Chart

There is enough evidence to show that the cognitive component comes from the involvement of students in the work of the scientific reflexive seminar. This seminar consists of three units, i.e. theoretical, practical and reflexive (see Fig. 1).

The theoretical unit targets the formation of a holistic view of scientific research and research activities.



The practical unit, which corresponds to the activity component, is substantively and procedurally directed towards the formation of the skills and abilities of independent research activities. The practical unit also targets the teaching of competent research and the formulation of the results obtained.

The reflective unit reflects the demand for the ability to analyze and evaluate students' own research activities.

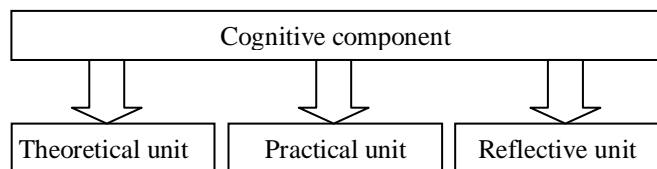


Fig. 1. The cognitive component of students' research activities

Each of these units is accompanied by the "Problem-motivational situation", "Scientific discourse presentation", "Logical thinking", "Scientific illustration and schematization" techniques. Students received an individual and produced personal responses. Magister students were instructed how to use their existing experience in the implementation of their research activities.

III. RESULTS

The pedagogical internship described in the paper plays a significant pedagogical role in enhancing the research activity of students. The analysis of the well-known studies has shown that there are two approaches to the organization of the pedagogical internship, i.e. within the framework of postgraduate education and in parallel with studies at the university. These two practices correspond to a consistent and parallel format [11].

The existing parallel internship allows students to be included in activities along with the training. This practice resulted in a special pedagogical internship program focusing on the research activities of students. The essence of this internship is its integration into the educational process. The content of this internship does not depend on teaching personnel and the lectures' planning at the university. This internship acts as an organizational component related to department work.

Of much practical importance for the pedagogical internship is the emphasis on enhancing the research activities of students. This practice implies a good balance among the practical research activities, theoretical training, and professional reflection. Professional reflection comprises special conditions when students become active "research subjects" involved in research activities. This practice allows students "to adequately and effectively act in the situation of constant changes and uncertainty" [12, p. 221].

Regarding the goal of a pedagogical internship with a research module, it is necessary to emphasize that students must acquire research skills. The concept of a pedagogical internship pursues the goal of developing students' research skills which are very important for their professional activities. Universities provide opportunities to further continue the research at the level of magister studying programs. Therefore, pedagogical internship works as a prerequisite and a condition for the formation of research

competencies and information acquisition. Of paramount importance is the fact that education mixed with research activities produces graduates focused on self-development in the professional pedagogical activity. Self-development plays a critical role because it results in the improvement of scientific and practical training in the chosen professional activity [11], [13].

Evidence suggests that intended professionals become more competent and methodically literate after the pedagogical internship. The internship does not contradict the basic targets of the undergraduate level educational programs and stems from the fact that the internship's common value guide is to make students more knowledgeable than if they were not the subjects of such training [14]. We believe that it is possible to resolve the contradiction between the urgent need for training specialists who are ready for creativity and the profound implementation of the educational program and the innovative educational forms of today. We have found it possible to focus on the educational process organization with an emphasis on enhancing research which stems from the experience gained by undergraduates.

The purpose of the pedagogical internship is to develop students' skills for independent research activities, sustainable motivation for self-education, self-development, improving the results of scientific research.

The functions of the internship of this type are as follows: communicative (the organization of scientific communication in an informal setting), informational and stimulating (the popularization of the research results of master students), accompanying (consulting, developing a bank of research tasks, creating conditions for revealing the personal potential of undergraduates), operational (participation in scientific research, conducting a pedagogical experiment), organizational and instrumental (creating conditions for participation in scientific events).

The organizational and managerial function is focused on conducting subject-related academic competitions targeting the enhancement of students' motivation for research. Other objectives include the selection of gifted and talented students who are capable of scientific activities, organizing personal-group contacts with scientists, working in educational teams implementing innovation projects, organizing scientific exhibitions, doing practical research in the format of final qualifying work, degree design, course research, etc. From the presented functional series, the identification of two forms of students' research activities within the framework of the pedagogical internship is determined by the interaction forms which are as follows: a research seminar aimed at collective discussion of modern education and an individual approach expressed in the individual trajectory of students' research activities. As far as the role of the academic subdepartment is concerned, it is responsible for the orientation of students to participate in various types of research work and to perform various types of research tasks accumulated in the research bank of the academic subdepartment.

Let us consider the following example. In case students need materials corresponding to the form of their scientific interests they may apply to the subdepartment and get the materials from the research bank. The research bank may include the materials which are as follows: selected research methods for the specific topic of scientific research, a pedagogical experiment program, the logical-structural analysis of a scientific article, compiling the synopsis for a research topic, analysis results, preparing a scientific report, etc. Another format of subdepartment's assistance may include the presentation of the research results at the department meetings, the development of the research results to the format of a graduation qualification work. Students perform research tasks related to the presentation of the problem under study, i.e. the development of video materials, the practical application of problem-related issues to school practices, reports' preparation, scientific literature review, the review of scientific articles. Articles' reviews at the initial stage are written according to a provided template and later they must be written independently. Undergraduates also prepare scientific reports, perform individual tasks that contain the elements of research, perform innovative tasks during teaching practice, etc. Students' work at this stage may be organized both as an individual project and a group research product. For example, students (5-6 people) develop an educational and research project "Using interactive forms of teaching in the classroom". They may also compile a terminological dictionary related to a selected research problem (for example, "Developing an axiological attitude to education among students"). Individual tasks contain the forms which are as follow: composing abstracts for a scientific publication, the composition of a scientific article, the design and scientific substantiation of didactic means, etc.

The value of this form of pedagogical internship lies in bridging the gap between the theoretical, practical and scientific components of education, and acts as a condition for the formation of competencies that determine successful entry into the profession [15].

The scope of the pedagogical internship with the "research activity" module is independent. It is not regulated by the university curriculum. The research activity of students is determined by teaching faculty and serves for the development of creative abilities, the acquisition, and improvement of the acquired research experience. The intensification of students' research activities stems from specific assistance in research planning, holding an experiment or a mini-study together with a student, solving research problems, facilitating regular participation in scientific conferences and seminars. All these measures contribute to self-realization and correct understanding of the research activities' significance.

Another important aspect is the methods. Correct methods enhance the research activities of students. Adequate methods involve students in the solution of research tasks, research teams, and working cycles. Right methods make science sections, research grants, and competitions attractive. An additional value of research emerges when students take part in the discussion of scientific research schemes realized by the department. In this case, students receive the opportunity to participate in the discussion and enjoy the "freedom of choice" because they receive a chance to choose

study direction. Among other factors stimulating research activities are public recognition, self-realization, goal achievement, membership in a specific research team, status.

Additional ways of research enhancement may include the increase of the practical significance of the performed work, the opportunity to publish research results in scientific journals and the collections of proceedings, to establish regular contacts with specialists from research centers and research laboratories. Undoubtedly, scientific research competitions (essays, research papers, posters, videos, reports, projects) provide an opportunity to assess the level of knowledge and the ability to solve research problems of professional and pedagogical orientation. Such competitions result in the development of research culture, the acceptance of research activities as values.

IV. CONCLUSION

The data obtained as a result of the study allowed us to identify a positive trend in the research activity of students involved in research during teaching internship. The experimental stage proved that the number of students with an insufficient level of cognitive, motivational, and activity components decreased by 64.7%. However, the number of students with a high level of activity involvement rose to 89.66%. Positive results related to the increased level of self-development, the ability of self-analysis, the ability to set goals while conducting scientific research.

Based on the above, it can be concluded that research activity is one of the most important conditions for training active professional experts who are ready to organize and conduct a scientific search. It is very important to acquire the knowledge and skills necessary for a full-fledged research process. The prerequisites of the research module of the pedagogical internship are based on the potential of students to conduct a scientific search, to promote the awareness of the value and the meaning of research activities.

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