

## Structure-functional model of formation process of master's degree students' willingness for research activity

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**Abstract:** The proposed structure-functional model of process formation of willingness Master's degree student for research activity constructs on basis of system, information and individual activity approaches. It includes motivational-targeted, content-technological and efficiently-evaluative components. Motivational target component ensures the formation of a research position, valuable relation to research activities and installation on the research activities of Master's degree students. Content technological component is intended for assimilation by Master's degree students of knowledge and abilities necessary for implementation of research activity. The effectively-evaluative component provides the timely receipt of information on the Master's degree students' willingness formation of process effectiveness in research activities, about the difficulties and achievements of students in the acquisition of knowledge, the development of the required skills. This structural-functional model is characterized by the orientation on personal experience of Master's degree student, active stimulation to research activities, intended learning outcomes, reproducibility, integrative, ambivalence, adaptability; requires consideration of specific principles and general didactic research orientation of the content of training, methodological support of educational process.

**Key words:** Formation process of willingness Master's degree student for research activity; Structure-functional model; Master's degree students; Willingness

### 1. Introduction

Integration of states into the international community calls for the introduction of new educational models that meet international standards, allowing to unlock the creative potential of young people and to give a powerful impetus to the intellectual development of society.

Kazakhstan's accession to the Bologna Process focused on the modernization of the national education system; increase its competitiveness in front of the challenges of globalization. One of the directions of this process is the introduction of a system of education Institute of Master's degree, which leads us to expect the following results:

Effectively fit into the global educational environment, to promote the convertibility of higher education diplomas;

- To introduce a student-centered model of construction of the educational process, to empower learners choice of individual learning paths;
- Fully take into account the state of the market of intellectual labor, to respond flexibly to changes;
- To solve the problem of selection of talented youth, to train elite professionals for public administration, science, higher education institutions;

- Significantly improve the quality of training, to increase the motivation of mastering knowledge, including at the level of the problems of science and interdisciplinary connections (Bulatbayeva, 2008).

In this regard, at the graduate level of willingness of a student to research activity becomes an important component and system of professional training, as it is not only a goal but also a means of effective development of the personality of a student.

The goal of research is to develop, theoretically prove and implement the model of undergraduates' willingness formation of pedagogical higher educational institution to research activities.

In accordance with the goal and hypothesis of the study were put the following objectives:

- 1) To examine the state of master's education in the system of multi-level education;
- 2) To determine the content and structure of the notion of "willingness to undergraduates in research activities";
- 3) To develop and experimentally verify the structural-functional model of formation of willingness to graduate RA;

The study was conducted using a combination of theoretical and empirical methods.

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Theoretical methods: a) Analysis of regulations governing the work of the Institute of Master's program to justify the relevance of the problem and determine the legal capacity of its decision; b) the historical and pedagogical analysis was used to build the historiography of the research problem; c) theoretical and methodological analysis allowed us to formulate the initial research positions; d) the conceptual and terminological analysis was used to describe the conceptual field problems; e) system analysis served as a holistic consideration of the problem; e) modeling was used to build the model of formation of willingness to graduate RA and identify the conditions for its effective functioning.

Empirical methods: a) research and generalization of the advanced pedagogical experience in the training of masters; b) ascertaining experiment to determine the initial level of willingness to graduate RA; c) forming experiment on the practical implementation of the developed model; d) observation, questioning, testing, self-assessment, the method of expert evaluations.

Scientific novelty of this study lies in the fact that on the basis of the system, information and student-activity approaches the model of formation of willingness of undergraduates to research activity, which includes motivational-targeted, content-technological and efficiently-evaluative components; characterized by oriented to the subjective experience of a student, to actively promote research activity, intended learning outcomes, reproducibility, integrative, ambivalence, adaptability; requires taking into account the specific and general didactic principles of the research orientation of the content of training, methodological support of the educational process.

## 2. Results and discussion

In the most general sense, the model is called specially designed shape of the object to reproduce some characteristics of a genuine object to be learned (Mizintsev, 1997). In our study, we adhere to the following model definition: "The notion model refers to a mentally imagined or materially implemented system, which displaying or reproducing the object of study, is able to replace it so that its study gives us new information about this object" (Shtoff, 1978).

Constructed on the basis of the system, informative and student-activity approach, model of formation of willingness of Master's degree students in research activity is unique to her goals, content, forms and methods and is based on a certain set of principles.

Under the principle, after V.I. Zagvyazinskiy, we understand "tool, given expression in terms of the activities of pedagogical concepts, methodological reflection of known laws and regularities; knowledge of the aims, essence, content and structure of the training, expressed in a form that allows their use as regulatory standards of practice " (Zafvyazinskiy, 2001).

As a result of the theoretical analysis and synthesis of empirical data obtained during the study (Bransford et al., 2000; Donovan & Pellegrino, 2003), we have had the following set of principles: historicism, scientific, systematic and consistent, communication theory and practice, visibility, activity, consciousness and responsibility, professional orientation training, subjectivity, the accumulation of experience as a source of learning, multifunctional, recurrence and discontinuity, technology, elective learning paths, individualization and differentiation.

Highlighted system principles allowed defining a set of requirements to be met by the model of formation of willingness of students of Master's degree in research activities:

- 1) The direction of the process of formation of willingness of undergraduates in research activities to deepen the theoretical and methodological knowledge about the nature of research and testing of the necessary skills;
- 2) Creating conditions for the emergence and taking initiative and activity of undergraduates in the organization of research activity;
- 3) Ensuring the integration of content, forms and methods of training, focusing on the creative master's self-education activity;
- 4) Formation of willingness to graduate research activities in accordance with the phased movement of undergraduates to the self-regulatory activities in the process of formulating and solving problems that arise in the course of research and teaching activities (Middle States Commission on Higher Education, 2003; Derman, 2008).

The developed model is structural and functional because it has a specific structure, number of components, characterized by the interrelationship; each component performs a specific function.

Motivational and target component provides formation of graduate research position, valuable relation to RA, setting to RA. It brings together motivational and target components.

Motivational component involves translating external motives in the internal, carried out by specially organized stimulating effect on undergraduates, ensuring the formation of personally important reasons (Maienschein, 1999).

Development of motivational component is implemented in a subject-subject, equal partnership interaction between teacher and students.

The target component of this aspect includes the process goals of formation of willingness of undergraduates to research. The aim of our research is to develop willingness at undergraduates to research. According to R. Millar (2006), any goal requires its presentation through the sub-targets, i.e. decomposition. As a result of the decomposition process goals of formation of willingness of undergraduates to research revealed a set of sub-goals: formation of motivational-value attitude to the RA, the formation of the theoretical willingness for RA, the formation of practical preparedness to RA.

Content and technological component ensures the formation of willingness to graduate research in the study of specific disciplines, research and teaching practice, in the course of writing a thesis. This component performs the training, educational and developmental functions.

Theoretical training is aimed at acquiring by undergraduates the methodological research knowledge. Theoretical training is implemented through the study of psychological and pedagogical and special disciplines for maximum fundamental training of a specialist at a high methodological level. With the help of developed special course "Theoretical and methodological basics of RA" master students of philosophical knowledge, learn about trends in science, learn general scientific methodological approaches, logical and methodological concepts, principles and forms of general scientific research, scientific concepts. Some academic disciplines have a special place in the system of formation of willingness of undergraduates to research activity as well as the study of these disciplines is necessary to master the methodological research knowledge at the level of concrete scientific methodology. One of these subjects is the "Organization and planning of research in pedagogy." The study in this course promotes formation of undergraduates' knowledge of the methodology of scientific research in pedagogy, acquiring knowledge about the logical structure of pedagogical research and scientific apparatus; procedures and basic characteristics of the experiment, the logic of evidence in pedagogical experiment; the development of research skills.

Practical training within the content-process component model involves the acquisition of knowledge and skills of procedures and techniques of scientific and pedagogical research. The content of the practical part is to perform research tasks by undergraduates in the educational process and conducting research work on writing a thesis. Content-technological component model provides the following forms of training: training sessions, through the use of innovative technologies (slide-lectures, problem lectures, practical exercises with the implementation of research assignments, seminars, discussions, seminars in the form of "business game"), as well as extra-curricular form (training school for young scientists, participation in scientific conferences, competitions, contests).

At the organization of research, we used the following teaching methods: problem-motivational situation, working together in small groups, business game "The scientific debate", research method, project method, the method of logical thinking, parametric analysis, methods of ordering and schematization of information, etc. Each of these methods, performing their functions, stimulates independent and creative activity by relying on emotions, subconscious, individual experience of implementation of research activity by undergraduates.

In our study, one of the important means of formation of willingness to graduate RA is teaching and research practices, as well as independent scientific and research work of a student (writing of a thesis).

All applied means were divided into 3 groups: information (information resources of global and local area networks, computer guide systems and encyclopedias, specialized literature, libraries, etc.), teaching tools (a program of research and teaching practice handbook "Scientific pedagogical aspects of the design of Master's thesis") and training (research tasks, special course" Theoretical and methodological basics of research activity, "self-education program, the program of psychological trainings). Content-technological component of model of formation of willingness to graduate research involves the design of such a structure of educational content, forms, methods, techniques and tools of learning, the use of which in the aggregate in the process of post-graduate training will contribute to the formation of all the components of willingness to research activity in their complex and relationship.

Effectively-evaluative component involves the development of criteria and levels of willingness to graduate RA at certain stages of its formation. With the goal of our research, the structure and content of willingness to RA, we define the criteria by which one can judge the level of willingness to RA: motivational-value, cognitive-operational and vocational-significant personal qualities of the teacher-researcher. Based on the selected criteria, we have identified three levels of formation of studied willingness: algorithmic, interpretive and research.

Effective-evaluation component of the system performs the following functions: informative, controlling, stimulating reflective. Implementation of the constructed model, according to the goal of our study, requires consideration of the following specific principles: subjectivity (in the development and functioning of the model of formation of willingness of undergraduates to research activity a master student should be considered as a subject of the educational process, i.e. to consider its activity); accumulation of experience as a source of learning (the use of previous research experience in the formation of a student willingness to RA); multifunctional (formation of willingness of undergraduates is carried out in the course of research and professional activities); reflexivity and discrete (possibility of a return to any step in the process of formation of willingness to RA in demonstration of necessary operational adjustments of identified deficiencies, and then continue the assimilation of research knowledge and skills); technology (requires flow rates, an active position and a high degree of autonomy of undergraduates, constant feedback, soundness and algorithmization of specific actions); elective learning trajectories (with a choice of subjects, undergraduate determines the pace of progress in training, given their own

personal qualities, abilities, capabilities), individualization and differentiation (is to create the conditions for self-realization of a student, the identification and development of its creative possibilities).

The created model, in addition to traditional pedagogical models for all properties (integrity, openness, flexibility, agility, handling, variability, etc.) is directional in the subjective experience of a master student, actively promoting research activities. The features of this model are planned results (planned results in each direction during the formation of willingness to graduate RA), repeatability (ability to reproduce the model in the educational process of master students), ambivalence (the ratio of theory and practice, rational association which increases the effectiveness of the process of formation of willingness to RA), adaptability (adaptability of the model to the process of training the Judiciary).

In our study the idea is realized that the model operates more efficiently when creating special pedagogical conditions (N.M. Yakovlev and others). Identifying pedagogical conditions for effective functioning of the developed model was carried out by us on the basis of the regulations of the theoretical and methodological approaches, the nature and features of the model, the content and structure of willingness to graduate RA, specificity of master training. As a result, we had identified a complex of three pedagogical conditions:

1. Inclusion of undergraduates in information and research environment at all stages of training;
2. Activation of undergraduates' research activity through the use of innovative learning technologies;
3. Orientation of undergraduates at self-education activity through actualization vitagenic experience,

creating situations of success and return to the reflexive position.

The goal of the experimental work was to test the developed structural-functional model and pedagogical conditions of its operation.

To implement pedagogical experiment were formed four groups: control (CG) and three experimental (EG-1, EG-2, EG-3) (Table 1). With each group of experiments took place over two years and was conducted as follows: in the control groups training was conducted with the use of the individual fragments of the developed model without the purposeful use of pedagogical conditions for its effective functioning. In the experimental groups under different conditions was implemented developed model of formation of undergraduates' willingness to RA.

In the experimental group's 1EG-1 2EG-1, 3EG-1, included in the experiment, respectively, in the first and second year of its implementation, realized model of willingness to RA with the first condition; in groups 1EG-2, 2EG-2, 2-3EG developed model was implemented with two conditions - the first and second; in group 1EG-3, 2EG-3, 3EG-3 the model was implemented with three conditions.

During the experiment, in addition to the original examination was followed by two intermediate and final control examinations. The data obtained as a result of experimental work confirmed the presence of positive dynamics in the experimental group, in which the model was implemented against the background of the complex revealed pedagogical conditions. During the processing of the results of the experiment was carried out a statistical confirmation of our findings using the chi-square and Student's t-test, allowing determining the essential significance of the differences between the two samples.

**Table 1:** Results of criterion of chi-square, Student's t-test on level of formation of undergraduates' willingness to RA (final examination)

Comparative groups	Experiment data							
	Chi-square	Significance level	X sample mean and sample covariance		Dispersion		Student's t-test	
CG EG-1	4,312	0,10	3,56	4,22	0,17	0,06	2, 21*	
CG EG-2	7,413	0,03	3,56	5,34	0,17	0,04	2,24*	
CG EG-3	13,673	0,01	3,56	5,97	0,17	0,03	2,051*	
EG-1 EG-2	1,491	0,45	4,22	5,34	0,06	0,04	2, 26*	
EG-1 EG-3	3,359	0,15	4,22	5,97	0,06	0,03	2, 31*	
EG-2 EG-3	1,164	0,54	5,34	5,97	0,04	0,03	2,14*	

Distribution of undergraduates on levels of willingness to RA in these groups is different. Therefore it can be concluded that the use of the entire complex defined conditions give better results than the use of one or two conditions.

### 3. Conclusion

1. The developed model of formation of willingness to graduate RA contains motivational-targeted, content-technology, efficient-evaluative

components and enables efficient formation of studied willingness.

2. Effective functioning of a model of formation of willingness to graduate RA requires the creation of a set of special pedagogical conditions:

- a) The inclusion of undergraduates to informative and research environment at all stages of training;
- b) Realization of research activity of undergraduates through the use of innovative learning technologies;
- c) Focus of undergraduates on self-education at the expense of updating vitagenic experience, creating

situations of success and return to the reflexive position.

3. Organized in the framework of research, pedagogical experiment showed a significant increase in the level of willingness to graduate RA in the experimental groups, where in the course of undergraduates' training implemented the developed model of formation of willingness to graduate RA.

The study showed the importance of the results for the educational process in the master's degree. At the same time set new issues and problems that need solving. Further study is required by the problem of improving the training of undergraduates in a credit program, as well as theoretical basics of pedagogical conditions conducive to the formation of methodological knowledge of undergraduates.

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