Developing research competencies in secondary school teachers within the context of contemporary educational content

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Abstract

This article presents the initial findings from the first phase of a study aimed at fostering research competencies in secondary school teachers by implementing a tailored model within the context of contemporary educational content. The primary objective of this research is to evaluate the efficacy of the devised model in cultivating research competencies among secondary school educators within the educational process. A comprehensive description of the teachers' research competencies is provided, along with an exposition of their content components. We conducted an analysis of key, professional, and specialized pedagogical competencies, which informed the identification of essential research competencies for teachers as they pertain to the modernization of educational content. Subsequently, we developed a model for fostering research competencies in teachers within this context. Our analysis of preliminary experimental results suggests the need for modifications and refinements to the model, employing the hermeneutical phenomenology method during educational and professional interactions among participants in the educational process. The approaches and proposed model discussed in this article can be utilized in the development and enhancement of pedagogical research skills, as well as in continued professional development. Moreover, the findings of this study may be applicable in organizing a certification system for teaching staff, although that is not the primary focus of this research.

Keywords

Teacher research competencies – Research competency model – Competency-based approach – Hermeneutic approach.

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Desenvolvimento de competências de investigação em professores do ensino secundário no contexto dos conteúdos educativos contemporâneos

Resumo

Este artigo apresenta os resultados iniciais da primeira fase de um estudo destinado a promover competências de pesquisa em professores do ensino médio, implementando um modelo sob medida no contexto dos conteúdos educacionais contemporâneos. O objetivo principal desta pesquisa é avaliar a eficácia do modelo desenvolvido em cultivar competências de pesquisa entre educadores do ensino médio no processo educacional. Uma descrição abrangente das competências de pesquisa dos professores é fornecida, juntamente com uma exposição de seus componentes de conteúdo. Realizamos uma análise das competências pedagógicas chave, profissionais e especializadas, que informaram a identificação de competências essenciais de pesquisa para professores no que diz respeito à modernização do conteúdo educacional. Posteriormente, desenvolvemos um modelo de promoção de competências de investigação em professores neste contexto. Nossa análise dos resultados experimentais preliminares sugere a necessidade de modificações e refinamentos do modelo, empregando o método da fenomenologia hermenêutica durante as interações educacionais e profissionais entre os participantes do processo educacional. As abordagens e o modelo proposto discutidos neste artigo podem ser utilizados no desenvolvimento e aprimoramento de habilidades de pesquisa pedagógica, bem como no desenvolvimento profissional contínuo. Além disso, os resultados deste estudo podem ser aplicados na organização de um sistema de certificação para o corpo docente, embora esse não seja o foco principal desta pesquisa.

Palavras-chave

Competências de pesquisa do professor – Modelo de competência de pesquisa – Abordagem baseada em competências – Abordagem hermenêutica.

Introduction

The widespread availability of information for participants in the educational process (teachers, students, and parents), facilitated by global information networks, underscores the issue of diverse perceptions. In our study, the concept of a "teacher" in a secondary school encompasses not only teachers, but also principals and their deputies, who must possess fundamental knowledge of organizing and conducting pedagogical research, "lesson study," and "action research" (A TEACHER'S GUIDE, 2012; BURNS; FLORIAN; MARC, 2016; DUDLEY, 2014; NOFFKE; SOMEKH, 2009; YIN, 2018). Teachers should be able to interpret the learning process and the activities of all participants

in the educational process (including their own, colleagues', students', and parents' activities). Moreover, teachers are expected to engage in ongoing, purposeful activities to acquire new educational and pedagogical information. In other words, teachers need to continually develop their research competencies by performing various cognitive and research functions (LITHWOOD; HARRIS; HOPKINS, 2020).

The updated educational content, as outlined in the State Compulsory Standards (RESOLUTION, 2012), is based on a constructivist approach, emphasizing the development of students' metacognitive abilities. The school educational process relies on a competency-based approach called competency-based education (FORD, 2014), which is student-centered (UTOMO; SANTOSO, 2021). The educational reform in Kazakhstan assumed a trilingual language policy, a revised curriculum, and pedagogy informed by a constructivist view of learning, criteria-based assessment, and 12-year schooling (MCLAUGHLIN; AYUBAYEVA, 2021, p. 177). Teachers are required to master the technologies of "lesson study" and "action research," as well as the basics of project-based learning.

The impact of a teacher's research activity on improving the learning process in Kazakh schools has been studied (MCLAUGHLIN *et al.*, 2014). English researchers regard teachers' research activity as a response of the education system to political changes during the transition period, expressed in state support for school education. They identify three factors affecting the learning process in schools: cultural aspects of education reform, the established nature of vocational training, and continued professional development for school teachers (MCLAUGHLIN *et al.*, 2014, p. 6).

The research project conducted by English scientists primarily examined the learning process in Nazarbayev Intellectual Schools, which are available in every regional center of the country. To work with mainstream schools, specialists from the Faculty of Education have been training trainers since 2012 (including the author of this article) to work with teachers and school leaders in order to organize cascade training. The training was conducted in conjunction with the practice of students in their schools. To date, all managers have been trained according to a nine-month program, and teachers have been trained according to three-month programs. Teachers in all schools have been introduced to Action Research and Lesson Study. In every school across the country, we have trained teachers as leaders at the school level, school staff (school coaches), focus groups of teachers, and leaders of classroom instruction (the author of the article has been conducting advanced training courses for school leaders and school coaches for nine years). Teachers were equipped with specific knowledge, techniques, forms, and methods of active learning; however, their value-based acceptance is crucial alongside their technical use.

We have identified the following characteristics of Kazakhstan schools within the framework of the updated educational content:

- curricula are developed based on differentiation, integration, and professional orientation of the educational content, employing the "backward design" technique;
- a combination of academic and practical orientation of general secondary education;

- expected learning outcomes are specified for each section of every academic subject;
- gradual deepening of knowledge, taking into account age characteristics and the construction of a spiral curriculum;
- development of functional literacy through active teaching methods and techniques;
- implementation of a criteria-based assessment system for evaluating students' educational achievements;
- the unity of education and upbringing based on the interconnectedness and interdependence of educational values and the system of expected learning outcomes;
- competence approach - the expected results are presented as a set of competencies expressing what exactly the student (teacher, learner) will know, understand, and demonstrate at the end of the learning process;
- educational values - guidelines for building a system of learning goals based on universal values;
- the use of a coaching approach alongside a mentoring system when working with teachers;
- the integration of teachers into research methodologies, such as Lesson Study and Action Research.

These characteristics are representative of the schools involved in this study. However, data collected from 76 secondary schools in the West Kazakhstan, Aktobe, Atyrau, and Kustanai regions showed that the widespread use of active teaching forms and methods often does not reflect their systemic nature. The implementation of the "action research" methodology does not find proper development due to the low level of development of teachers' meta-subject research competencies (data collection was based on a questionnaire developed by the authors and analysis of thematic essays).

Despite a significant number of scientific papers addressing general, professional, and special competencies of secondary school teachers, the development of teachers' research competencies during the educational process remains understudied. The results of a study by the Faculty of Education at the University of Cambridge conducted in Kazakh schools revealed a direct link between emotions, knowledge, and research during the implementation of action research, a process described as "[...] deeply personal and emotional" (MCLAUGHLIN; AYUBAYEVA, 2015, p. 65).

During the research process, teachers should understand its significance for students, the school team, society, and themselves personally, i.e., infuse the research work with meaning. Meanings are understood as a derivative "from the real-life relations of a particular subject" to this meaning (LEONTIEV, 2022, p. 89).

A deep understanding of the processes under study is possible with a certain emotional experience of them, as phenomenologists note when the studied "[...] does not touch, does not shake, does not speak to us, then the question arises: do we really understand its meaning at all" (VAN MANEN, 2007, p. 19).

The philosophical approach, or more specifically, the application of hermeneutical phenomenology ideas in the process of developing research competencies, defines it as

one of the key activities of a teacher-researcher. The techniques and methods of the hermeneutical-phenomenological approach in implementing Lesson Study contribute to enhancing the teacher's professional motivation for research activities based on value-semantic perception of the studied pedagogical situation.

The research sequence is as follows: first, teachers develop the competencies themselves (taking into account the use of hermeneutical-phenomenological approach techniques), then the process of forming research competencies is carried out, based on the developed model, where the content-criterion part is the developed competencies, and the procedural part is the techniques and methods of the hermeneutical-phenomenological approach. The result of this work is considered to be the list of research competencies obtained by us, as well as the preliminary results of forming a motivational and value component.

Review and analysis of literature

Teacher's research competencies

The notion that a teacher's activity possesses a research nature has been explored in numerous scientific works and pedagogical practices. A common thread uniting researchers in the discussion of the necessary qualities and competencies for effective research is an emphasis on education, student orientation, and individualized work (SCHON, 1984; HUTMACHER, 1997; ZIMNYAYA, 2004; KHUTORSKOY, 2007; KRAEVSKY, 2001; CYDIS, 2014; FORD, 2014; GERVAIS, 2016).

The development of a teacher's research knowledge and skills during training can occur not only within designated courses, but also throughout the learning process (KAN-KALIK, 1976; KUZMINA; REAN, 1993; HILMEEVA, 2002; ZAGVYAZINSKIY; ATAKHANOV, 2005; BURDINA, 2007; NÓVOA, 2009; GODFREY, 2013; CORDINGLEY, 2015; DARLING-HAMMOND, 2017; LOMAKINA; DZYUBENKO, 2017; CUI; GONNY; DOUWE, 2018; VUORIKARI, 2019). Due to the constant changes in school education, this direction remains perpetually relevant.

Developing research skills with the axiological positions of a hermeneutic-phenomenological perspective on teacher professional development is recognized as a vital factor in the effectiveness of the learning process (VAN MANEN, 2007; ZAKIROVA, 2011; BUSYAGINA, 2009; FINLAY, 2012; FRIESEN; HENRIKSSON; SAEVI, 2012; MCLAUGHLIN; AYUBAYEVA, 2015; LEITHWOOD; HARRIS; HOPKINS, 2008; BREW, 2020). This aspect of developing a teacher's research competencies in the context of ever-changing school education is dynamic, influenced by the globalization of education and human values. We will now examine the last two aspects of developing a teacher's research competencies in more detail.

Characteristics of hermeneutical phenomenology in research design

Projecting a hermeneutical view of the pedagogical process and its participants (teachers, students, and their parents) from a hermeneutical-phenomenological standpoint requires describing the pedagogical situation and life experiences under investigation.

In doing so, the teacher assumes responsibility for shielding themselves from external influences and refraining from prejudices and stereotypes regarding pedagogical situations and participants in the educational process, acknowledging that the research process is "deeply personal and emotional" (MCLAUGHLIN; AYUBAYEVA, 2015, p. 65).

From a hermeneutics perspective, forming research competencies of a secondary school teacher involves approaching the unknown as if it were known based on previous knowledge, while examining the familiar as if it were new, shifting viewpoints. Utilizing the information gathered, the teacher then proceeds to "develop their reactions to their unique context" (LEITHWOOD; HARRIS; HOPKINS, 2008, p. 6). Let us elaborate.

Self-actualization and identifying the sources of internal regulators can be viewed as a hermeneutic examination of the current pedagogical situation, analyzing prior situations that led to the current one, and projecting potential future scenarios while limiting external influences. Within the chosen scope of pedagogical situation analysis (hermeneutic horizon), the teacher employs phenomenological reduction methods such as intuition, analysis, and description. In reality, these thought processes often occur in a teacher's activities without proper reflection (capturing the moment), resulting in one-time experiences and ideas that do not find systematic use in subsequent practice. This observation leads us to identify the motivational-value component as one of the primary elements in the formation of a teacher's research competencies, and the hermeneutical-phenomenological approach as a crucial factor in their development model.

Hermeneutical interpretation is understood as the comprehension of meaning, which is "a subjective value of objective meanings" in pedagogical activity (ZAKIROVA, 2011, p. 147). We will now discuss some aspects of the phenomenological and hermeneutic approaches.

For the phenomenological approach, the essential task is to identify the core structure of an experience or phenomenon, i.e., to articulate those invariant themes that appear consistently across situations and individuals. Through "description," the aim is to achieve a "relatively 'pure' consciousness, not clouded by a set of judgments presupposed to experience." In contrast to phenomenology, understanding meaning in hermeneutics involves utilizing personal experience, pre-arguments, and pre-opinions that are questioned externally (BUSYAGINA, 2009, p. 57-59).

Thus, the process of forming the research competencies of a secondary school teacher within the context of updating educational content includes: research activities driven by internal motives; a value-driven approach to the learning process and participants in the educational process; a creative foundation for solving pedagogical problems (hermeneutic aspect); and a commitment to selectivity when examining problematic pedagogical situations (phenomenological aspect). An analysis of philosophical and psychological-pedagogical literature enabled us to clarify the concept of the hermeneutical-phenomenological approach as an active research position for the teacher, which encompasses both philosophical categories and cognitive processes such as sensation, perception, imagination, understanding, and interpretation. These processes facilitate educational interactions between participants in the educational process. Additionally, teachers serve as organizers and conductors of complex emotional-value processes accompanying pedagogical situations (identifying needs, motives, emotional experiences). The description of the studied and life experiences is carried out in such a way that the

teacher takes responsibility for protecting themselves from external influences and refrains from prejudices about the degree of reality of the phenomenon under consideration. In other words, the value-semantic comprehension of reality, pedagogical situations, and the activities of participants in the educational process is hermeneutic in nature.

The value-semantic aspects of research training in pedagogical education are discussed in the work of A. Brew and C. Saunders (2020). In this context, the ideas of a "thinking practitioner" based on value guidelines and the teacher's acmeological orientation toward organizing educational interaction (SCHON, 1984, p. 50) are considered. In our study, the definition provided by A. Khutorskoy (2007) serves as a basis: research competence is "the knowledge, ideas, programs of action, system of values, and relationships that are then identified in research competence in active, relevant manifestations." The primary condition for a teacher's research work is their personal interest in this type of activity, grounded in the value categories that characterize them as an individual. For the formation and subsequent assessment of the level of development of research competencies, they were divided into three components (SURJANTI *et al.*, 2022).

The most comprehensive components of creative, research activity in I. Isaev's (1993) classification are axiological (motivational-valuable), technological, and personality-creative. The axiological aspect also includes 21st-century competencies such as "teacher's spirituality, personal development, and professional qualities of a teacher" (LAKSANASUT, 2019, p. 210), which generally align with the classification presented by Isaev (1993).

As already noted, research competencies can be inherent to a teacher in the conditions of their consistent formation during the educational process as one of the forms of professional development.

Professional development of school teachers

What is the best way to build a system for the formation of research competencies of teachers in the context of the renewal of educational content in schools and the adoption of universal values? For this purpose, we examined the works of S. Sydis (2014) on the formation of teachers' competencies in assessing the learning process and its results, Godfrey (2013) on the development of a research school culture through four key factors: systemic interconnectedness; leadership in knowledge creation; teaching as a research-based practice; and school as a teaching organization. Research from the Center for Innovation in Education, which presented a list of key competencies of a school teacher (EPIC, 2017), and Vuorikari (2019) on the example of 30 innovative practices of teacher training, were also helpful.

The works on teacher training by Cui, Gonny, and Douwe (2018); Linda Darling-Hammond (2017), as well as an analytical review on the role of research in effective continuous professional development and teacher training (CPDL) conducted by Cordingley (2015) as well as Nóvoa and António (2009), provided valuable insights.

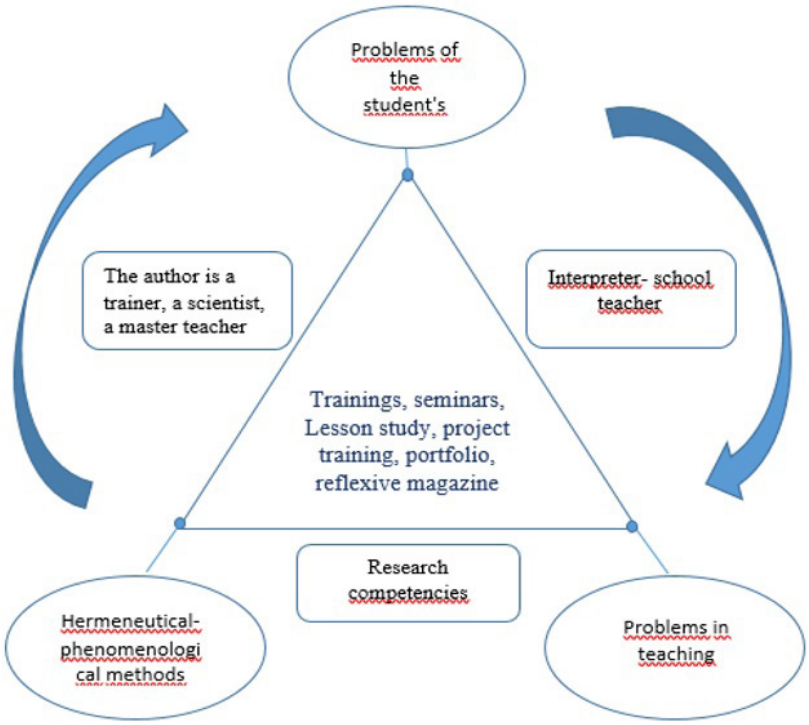
Professional standards have been established in educational institutions in the USA and Australia, which include a set of competencies that determine current practice. These standards involve creating assessments of teachers' performance within the framework of professional standards, focusing on "student orientation, teacher personality, and service

to the profession and society" (DARLING-HAMMOND, 2017, p. 296). In Finland, the curriculum for teachers is immediately aimed at training teachers as researchers.

In our country, teacher training is based on teachers identifying learning problems and students' needs, but at the same time, teachers have significant difficulties in such work. Nóvoa (2009) writes that teacher training should be "...organized, preferably, on the basis of specific situations related to school failure, school problems, or educational action programs." The main condition for effective professional development of teachers is considered to be a process directly related to their daily professional practice, which has five aspects: "knowledge, professional culture, pedagogical tact, teamwork, and social commitment" (NÓVOA 2009, p. 209, p. 216).

In our research, this idea is presented in the form of a monitoring system based on hermeneutical triangles (Figure 1).

Figure 1- Monitoring scheme using the hermeneutical-phenomenological approach



Source: Authors' design.

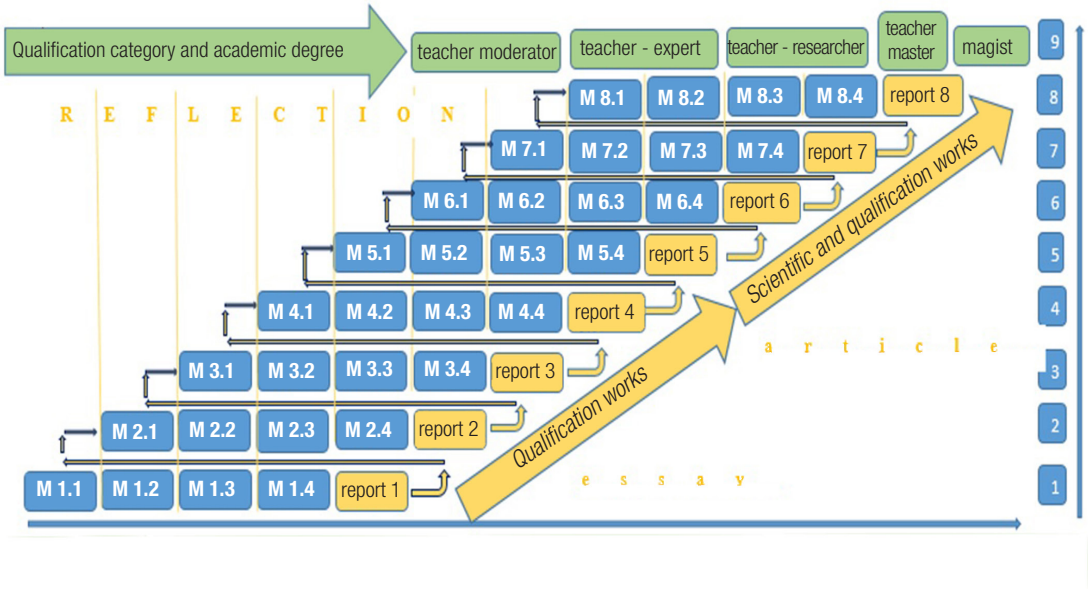
The vertices of the triangle highlight problems in teaching students, problems in teaching, and the hermeneutical-phenomenological method for solving them. The triangle contains the forms, methods, techniques, and strategies for solving the identified problems based on the hermeneutical-phenomenological approach. The teacher-interpreter, under the guidance of the teacher-author, plans and implements changes in the learning process, during which specific research committees are formed.

Additionally, an essential aspect of the study is the development of a teacher's personal self-awareness, the teacher's acceptance of the meaning of the profession, or in other words, the formation of a value-based approach to the learning process and participants in the educational process. This "does not fit only into the technical or scientific matrix" (Nóvoa, 2009, p. 213). The results of our research confirm this statement, highlighting the motivational and value component of research competencies as the most critical direction in working with a teacher in the formation and development of research competencies.

Another important judgment that we have taken as the basis of the proposed model is the active involvement of the teacher in network professional communities "so that educational work is transferred outside the school" (NÓVOA, 2009, p. 215). Lesson Study lessons, based on the identification of students' values, create a school and interschool collaborative learning environment for teachers, setting the stage for meaningful research in action.

Thus, the analysis of pedagogical literature in our research allows us to determine a set of research functions related to the emotional-sensual, logical-constructive, mental, and creative activities of a teacher. We can distinguish three main components of research competencies: motivational-value, cognitive-theoretical, and organizational-activity. The process of forming research competencies should be carried out in stages within schools during the educational process through various forms and methods of working with teachers, organizing, and conducting Lesson Study. The duration of the process of forming research competencies can vary from three to seven years. Figure 2 shows a procedural characteristic when a teacher completes four modules annually, while the completion of each module is assessed by a reflective report, and the completion of a block of four modules is assessed by writing an essay.

Figure 2- Dynamics of modules for the formation of teacher research competencies



Source: Authors' design.

The transition from one block of modules to another occurs as certain requirements for competencies are formed from the zero to the third level. In the process of implementation, the authors proposed using this dynamic to assign qualification categories to school teachers, but this issue did not find a proper response in the education authorities.

In conclusion, the research competencies of a secondary school teacher in the context of updating the content of education include: research activities based on internal motives; value attitude to the learning process and participants in the educational process; creative basis in solving pedagogical problems (hermeneutic aspect); commitment to selectivity in the study of problematic pedagogical situations (phenomenological aspect).

Participation in the common sense, expressed in the awareness of the significance of the identified problem for the student's progress, assistance in teaching, understanding, and interpretation of true, implicit learning problems (phenomena), the search for adequate, effective forms and methods of teaching that contain meaning, is the essence of the hermeneutical-phenomenological approach to research.

These components formed the basis of the developed model as a technology for the formation of research competencies of secondary school teachers, considering the conditions for updating the content of education (see Figure 3). We rely on the developed system of criteria for assessing the levels of formation of the professional and pedagogical culture of a higher school teacher, adapting it to monitor the formation of the research competence of teachers in a secondary school: 1) value attitude to pedagogical reality; 2) technological and pedagogical readiness for research; 3) creative activity of the teacher's personality; 4) integrative skills and meta-subjectivity; 5) the degree of development of critical thinking; 6) the desire for professional and pedagogical improvement (ISAEV, 1993).

We have identified the following organizational and pedagogical conditions for the formation of research competencies of a secondary school teacher:

- Joint research: Organization of professional and creative interaction of teachers conducting research activities, inclusion in focus groups for the development and conduct of research lessons (Lesson Study). Participation in professional online communities.
- Practical orientation and support of the administration: The practical orientation of the teacher's research activity on the real problems of teaching in specific classes, as a single component of the learning process. Support from school administration and management bodies.
- Dialogue and discussion: Presentations of the results of teachers' research work at pedagogical councils, methodological associations, seminars, and scientific and practical conferences, in online communities. Receiving supportive feedback.
- Guidelines for creative growth: Availability of a list of research competencies as guidelines for professional development. Monitoring the dynamics of a teacher's research competencies based on three components: motivational-value, theoretical-cognitive, and organizational-activity.

• Reflection and analysis of the pedagogical situation: Teaching the skills of reflection and introspection based on the methods of hermeneutical phenomenology, with the inclusion of elements of sensory, imaginative perception of the studied.
• Meaningful research activity: The focus of the classroom and extracurricular process of teacher training on the study of pedagogical phenomena that have personal significance for the teacher.

Research method

As mentioned earlier, our research is divided into two distinct blocks based on the application of hermeneutics-phenomenological methods. The first block focuses on defining the list of competencies, while the second block examines the process of forming research competencies. Our primary research tools include expert surveys and assessments, specialist interviews, document analysis, professional-graphic descriptions, comparative analysis, psychological and pedagogical testing, and analysis of dynamic changes in personal and professional development. We used mathematical statistics methods to process the results of experimental work and the SPSS computer program for statistical data processing.

School teachers have varying levels of readiness for creative and research activities, with significant age differentiation; there is a need to consider individual teacher characteristics. This necessitates the use of a modular approach in organizing the process of forming research competencies.

To determine the list of research competencies for a secondary school teacher (Block 1), we studied works in the field of general (social) key competencies and special pedagogical competencies, including a list of research competencies for a teacher, using the triangulation method.

We used the adapted technique of sequential condensation of meaning to identify the list of research competencies for a school teacher, which was previously developed during teacher training courses from 2013 to 2016. Sequential condensation represents a movement towards meaning through a structured process that relies consistently on data. The description of condensed meaning includes expert opinions that have received intersubjective consent or when "repeated observations of the same phenomenon by different observers should yield the same result." (KVALE, 1996, p. 189).

Several stages of work involved 76 principals and 180 secondary school teachers in the West Kazakhstan region. In the first stage, teachers selected the 15 most important competencies according to their opinions and determined their classification. As a result of processing and classification, five variations of the list of research competencies were obtained. Afterward, the same survey participants were divided into 16 groups at 16 leading schools. Each group, along with subgroups of four people, worked with one of the list options. Each subgroup made changes, additions, and comments that were discussed within the group. At the end of the discussion, a protocol was drawn up, either with a new version of the list or with comments and suggestions to the old one. An expert group, consisting of six principals and 14 experienced teachers and university professors, then

decided on one integrative list of research competencies for a secondary school teacher in the context of updating educational content.

The second block (Block 2) of research pertains to the process of forming research competencies in school teachers. The sample consisted of 120 respondents: the control group (CG) included 54 teachers, and the experimental group (EG) comprised 66 teachers.

The pedagogical experiment consisted of three main stages:

1) Stating: a list of research competencies was determined based on the technique of sequential condensation of meaning; control (54 people) and experimental (66 people) groups were formed; preliminary monitoring of the level of research skills and abilities was conducted in the groups.

2) Formative: the educational process during the Lesson Study in the experimental group was organized based on hermeneutical-phenomenological methods and techniques; monitoring of changes occurring in the EG and CG was established.

3) Control: assessment of the levels of development of research skills and abilities in teachers; verification of the results obtained using mathematical statistics; comparative analysis of the results from the ascertaining and formative stages.

In the experiment, the totality of a teacher's research competencies is determined by three main components: motivational-value, theoretical-cognitive, and organizational-activity.

The experimental group (EG) consisted of teachers from secondary schools No. 16 and 23 in Uralsk, who participated in activities designed to form research competencies according to the developed model. The control group (CG) included teachers who did not receive any specially organized training and conducted a Lesson Study based on their previously acquired knowledge and experience.

Toolkit for determining the level of research competencies formation

The criteria and evaluation tools included: the author-developed proforma for determining the level of research competency development; an adapted methodology for self-assessment of a teacher's research skills (BRYZGALOVA, 2004); an adapted diagnostic tool for assessing teachers' motives for creative growth (SHAKUROV, 1985); and a questionnaire for determining the level of reflexivity development (KARPOV; KORNILOVA, 2004). Additionally, adapted questionnaires were used to determine the level of knowledge on the basics of research activities; conducting cross-sections to determine the initial and final levels of formation in control and experimental groups; analysis of observations and conversations with school teachers; expert assessment methods; and essay analysis methods.

Determining the level of research competency formation is carried out in several stages. The results of the formation of a secondary school teacher's research competencies, based on hermeneutic phenomenology methods, are obtained by triangulating intermediate results: 1) the corresponding level of research competency formation based on our

developed proforma resource (Table 1), 2) a critical report on conducting action research or a series of research lessons; 3) based on the results of psychological and pedagogical questionnaires (in the context of research competency components).

Table 1- Criteria and descriptors for evaluating the formation of a motivational and value component

Competences	Levels			
1) orientation in the system of universal values; 2) readiness for social interaction based on accepted moral and legal norms; 3) willingness to be responsible for maintainig trusting partnerships	3	2	1	0
	(high)	(above average)	(medium)	(low)
	Full acceptance of all items	Not full acceptance of at least one item	Not full acceptance of any two points	Not full acceptance of all items
1) understanding of the social significance of the teaching profession; 2) willingness to share the value orientation of teacher and students for their personal development; 3) willingness to take professional responsability participants in the educational process;	Full acceptance of all items	Not full acceptance of at least one item	Not full acceptance of any two points	Not full acceptance of all items
1) the ability to critically assess their full strengths and weaknesses; 2) the willingness to rethink the accumulated experience, to outline ways and choose means of self-development; 3) a tendency to flexibility and constant learning, to doubt their own pratice	Full acceptance of all items	Not full acceptance of at least one item	Not full acceptance of any two points	Not full acceptance of all items
1) the ability to contribute to personal growth; 2) focus on improving the effectiveness of other participants in the educational process; 3) the ability to take the position of a "critical friend"	Full acceptance of all items	Not full acceptance of at least one item	Not full acceptance of any two points	Not full acceptance of all items
1) the desire for constant self-development of professional skills, 2) the ability to make non-standard decisions, solve problematic situations; 3) the presence of high internal motivation to carry out research activities	Full acceptance of all items	Not full acceptance of at least one item	Not full acceptance of any two points	Not full acceptance of all items

Source: Author's design.

During triangulation, the formation of research competencies is assessed based on the following criteria and descriptor indicators: attitude towards search and research, creative activities (receptiveness to scientific and pedagogical information and modern education requirements); awareness of the value of psychological and pedagogical knowledge; personal significance attributed to search and research, creative activity); practical readiness for search and research, creative activity (knowledge of research methods, logic for search and research, creative activity, and the ability to carry it out); innovative readiness for search and research, creative activity (awareness of pedagogical innovations, desire for modifications in the pedagogical process, adequate formation of pedagogical reflection); desire for self-improvement (presence of an individual system for search and research, creative activity; attitude towards personal experience and colleagues' experiences, mastering self-improvement experiences).

Each research competency component contains five competencies, which consist of four levels (high, above average, medium, low) with corresponding descriptors. The

assessment is based on the opinions of experts, teachers from the same school, inter-school network community with participation from higher education institutions, continuing education institutions, parents, and the public. Then the total number of points for each component is calculated. The formation of each component among individual teachers can be unique (reproductive, basic, heuristic, creative).

Practical activities on forming research competencies within the framework of Lesson Study implementation are aimed at developing each of the three components of research competencies sequentially, in accordance with the model: from Module M1 to Module M4 during the academic year, moving from the development of the teacher's methodological culture to identifying problems in teaching practice, searching for and developing forms and methods of teaching to address learning problems, and further, from reflecting on one's own pedagogical activity to activating it within the context of pedagogical communities.

Results and discussion

The experiment results demonstrate the importance of using hermeneutical-phenomenological methods in forming research competencies during Lesson Study, showing an advantage over the standard practice of Lesson Study technology. At the ascertaining experiment stage, it was noted that the motivational and value component was the most problematic aspect of a secondary school teacher's research activity. The hermeneutical-phenomenological approach to organizing and conducting the process of forming research competencies increased the teacher's professional motivation to study learning problems, by changing their professional activity in accordance with students' value orientations. The implementation of the developed model revealed difficulties in teachers' understanding of pedagogical research methodology and interpretation of data analysis results, which determines plans for further research and development of a model for the formation of research competencies in the medium term, integrating with the certification procedure of teaching staff and coordinating the content of the model's modules with the master's degree curriculum.

Model for the formation of research competencies of a secondary school teacher

The research competency formation model (Model) has horizontal and vertical components (Figure 3). Horizontally, teachers must learn to integrate individual modules; vertically, they must deeply master the content of each module (FORD, 2014; GERVAIS, 2016). This implies a mutual logical connection and continuity of all four modules of the Model, while maintaining a certain autonomy of the modules when organizing the process of not only the formation but also the development of the teacher's research competencies in the future.

Figure 3- Model of formation of research competencies of a school teacher in the context of updating the content

Formation of research competencies of a school teacher		
Content component		
Approaches		
System-activity, competence, cultural, personality-oriented		
Organizational and pedagogical condition		
Point research; pratical orientation and support of the administration; dialogue and discussion; guidelines for creative growth; reflection and analysis of the pedagogical situation; meaningful research activity		
Components of research competencies		
Motivational and value	**Theoretical and cognitive**	**Organizational and activity**
MV_2; MV_2; MV_2; MV_4; MV_5	**TC_6; TC_7; TC_8; TC_9; TC_{10};**	**OA_{11}; OA_{12}; OA_{13}; OA_{14}; OA_{15};**
Principles		
Scientific; unity of consciosness and activity;correspondence; relativity; complementarity; unity of personal and professional; combination of self-education and pedagogical support; mutual reflectability of science and art		
Functions of research activity		
Reflexive, introspective, design, integration, prognostic		
Criteria for the formation of competencies		
Research activity based on internal motivation	knowledge of the methodology of pedagogical research	Creative implamentation of research skills and abilities

Procedural Component (Academic year)			
Modules - stages of the process of forming reseach competences			
Module I (I quarter)	**Module 2 (II quarter)**	**Module 3 (III quarter)**	**Module 4 (IV quarter)**
Development of methodological research culture of a teacher	Identification of problems in the practice of teaching	Reflection of the learning process	Activation of the activity of pedagogical communities to discuss the results
Results			
Formation of motivational-value and theoretical cognitive components (from low to high level)	Formation of the organization and activity component (from low to high level)	Essay, reflexive report. Increasing the level of formation of the components of research competence	Presentations, speeches, publications with discussion in online communities, work adjustments
Organizational forms, methods and means			
Forms	**Methods**	**Tools**	
Lectures, seminars, trainings, conferences, case studies, creative tasks	Mentory and coaching system- (MaC). K. Levin's "force field", SWOT analysis, SMART	Lesson Study (LS), reseach dialogue, micro-teaching, notes of a "critical friend", reflective diary	
Evaluation component			
Tools for determining the motives of creative growth of teachers (R. H Shakurov);			
- questionnaire for determinig the motives of creative growth of teachers (R. H. Shakurov); - proforma definition of the level of development of research competencies	- adapted method of self-assessment of the reserch skills of a teacher (S. I. Bryzgalova); - proforma definition of the level of development of research competencies	- questionnaire for determining the level of development of reflexivity (A. V. Karpov); - proforma definition of the level of development of research competencies	
The scale of formation of research competencies of a teacher of a secondary school			
low	average	above average	high
Levels of formation of research competencies of a teacher of a secondary school			
reproductive	basic	heuristic	creative
MV: low TC: low OA: low	MV: average TC: average OA: average	MV: above average TC: above average OA: above average	MV: high TC: high OA: high

Source: Author's design.

The following conditions have been highlighted for the creation, dynamics, and transformation of the Model: current requests from participants in the educational process for teacher research competencies; requests and requirements of the educational process organization (required research competencies for effective teaching); teachers' social and personal attitudes; regulatory framework in the field of education (including requirements for teachers' qualifications); and the state of the school's educational environment. Moreover, when developing the content of the modules, the process features of qualitative research were considered, such as a preference for fieldwork (action research).

The following are accepted as basic internal requirements: 1) the relationship between the established requirements for the successive stages of teacher research competency formation, both during the academic year and during the transition from one year to the next: from module M1.1 to module M1.4 of the first year of study, and further from module M1.4 of the first year of study to module M2.1 of the second year of study, etc.; 2) the relationship between the established requirements for the sequential stages of research competency formation and the availability of resources to achieve these requirements (time, material, and technical, etc.); 3) the relationship between the "output" requirements of one module and the "input" requirements of another module; 4) the opportunity for early transition of the teacher to a module corresponding to the level of their research competencies in case of compliance with the established requirements of the next module.

The purpose of the M1 module is to build organizational and pedagogical conditions for the formation of research competencies of a secondary school teacher in the context of updating the content of secondary education. This involves developing a list of teacher research competencies. The next stage is the immediate beginning of studying pedagogical reality. Module (M2): Identification of problems in teaching practice. This stage represents the beginning of the practical application of research skills and knowledge. The stage of actions and accommodation of pedagogical situations (module M3) is when the teacher's professional self-expression and the manifestation of their personal qualities occur. Planning, teaching a lesson, evaluating students' academic achievements, reflecting on students' activities and stages of their own activities are studied from the value-semantic position of each of the participants in the educational process. The flexibility of the teacher's mental activity, openness to changes and critical comments, and readiness to correct their professional activities and personal priorities are manifested. At the stage (module M4), the activity of pedagogical communities is activated, which is a logical continuation of the previous stage and the final stage of one cycle of research competency formation, as well as a preparatory stage for the cycle of the next academic year. At this stage, the teacher, based on the reflection of their own activity, seeks to find new motives and goals for their pedagogical activity, to rethink the nature of professional and educational interaction with colleagues, students, and their parents.

The model adheres to the principles of continuity and consistency in organizing the educational process for research competency formation, which are based on the current system of general secondary and higher education, in particular, the requirements applied to undergraduate students in the aspect of research activities and Kazakhstan's normative

legal acts, specifically, the current *Rules for the Certification* (2016) of secondary school pedagogical staff.

Research competencies of the model

We identified three components and fifteen research competencies and conducted a classification in three areas.

Motivational-value

- orientation in the system of universal values;
- understanding the social significance of the teaching profession, the value orientations of teachers and students for their personal growth and development;
- ability to critically assess one's strengths and weaknesses, rethink accumulated experience, outline ways and choose means of self-development;
- ability to contribute to personal growth and increase the effectiveness of other participants in the educational process;
- desire for continuous self-development, improving personal skills, and mastery.

Theoretical-cognitive

- acquaintance with modern methodological principles and teaching methods of pedagogical research;
- possession of cognitive-discursive skills aimed at the perception and generation of coherent monological and dialogical texts in oral and written forms;
- ability to use modern information and communication technologies while working with texts, information from various sources, and research results;
- ability to independently acquire and use new knowledge and skills in research and practice;
- ability to increase knowledge and introduce advanced world experience in their pedagogical research activities to solve learning problems.

Organizational-activity

- ability to apply modern technologies for the collection, processing, and interpretation of experimental data;
- ability to independently identify and define an actual problem;
- ability to compile analytical reports, forecasts, models of research activities, and knowledge of the methods for compiling and preparing educational and research bibliographies and references;
- ability to improve and develop one's intellectual potential and the level of research culture;
- ability to perform a variety of professional tasks using personal knowledge and skills in practice in various changing and non-standard conditions.

Modules of the model

This model allows teachers to choose their path of professional development and self-expression, offering them a leadership position in self-realization and achievement of their own acme. It will provide active and effective pedagogical activity; fill the portfolio of a teacher applying for the next qualification category with real content; systematize the process of certifying pedagogical staff in secondary schools.

The procedural plan offers four stages for forming teacher research competencies: 1) realizing the need for their own research activities, analyzing and summarizing their experience, colleagues' experience, identifying didactic difficulties, seeking solutions, and defining problems (teacher-moderator); 2) revising traditional forms of their methodological work, drawing analogies and comparisons of active forms and methods of organizing lessons and teaching technologies, and apperceiving their own pedagogical activity (teacher-expert); 3) focusing the teacher's work on reflecting on their own professional activity by studying and summarizing changes in school practice, research results, participating in professional pedagogical communities, developing school curricula, and preparing scientific articles (teacher-researcher); 4) analyzing their pedagogical experience, developing author's programs and educational-methodical complexes for them, creating new teaching methods, and writing a monograph (teacher-master).

Brief preliminary results

(Block 2). The level of formation of research competencies generally reflects positive dynamics in line with the goals. The indicator "level of mastering of the basic concepts of research activity" (the cognitive-theoretical component) showed positive dynamics: the low level was reduced to zero, while initially, it was 21%; 47.6% of teachers demonstrated an average level of knowledge, as opposed to 39.6% at the beginning; above average (20.4%) and 18.7%, respectively; high (32%) and (21.7%), respectively.

Additionally, the analysis of the essay on the topic "Teacher as a researcher" revealed that only 72% of respondents believe that the research work of teachers is essential for improving the learning process, while 28% still understand its essence in selecting and achieving high technical performance of active forms and methods of teaching. The emerging need to study the theory and practice of pedagogical research was demonstrated by 57.2% and 31.6% (before and after the first stage of the experiment, respectively), while 60.2% and 17% expressed interest in research, respectively.

A survey to determine the motives of creative growth (motivational-valuable component) showed teachers the dominance of internal motivation in relation to their professional activities. More than 53% of respondents noted "the habit of working in good faith" as a factor stimulating their creative attitude to their work, while 51.6% noticed "the desire to grow a personality from students." Despite this, 73% of teachers find external motivation, recognition of their efforts and merits by the administration and colleagues to be important.

Regarding the block of emotional awareness or realization and understanding of their emotions, 46.9% of respondents have a low indicator, which means that almost half

of the teachers who took part in the survey don't pay attention to their internal mental state. 35.5% and 44.9% of respondents, respectively, have high and medium levels of coping with their emotions, which means that more than 80% of the teachers surveyed have inherent emotional dexterity, emotional flexibility, which is a factor of stability and performance of teacher groups on lesson research. More than a third of teachers (35.7%) have a low level of self-motivation, which may be caused by a fear of mistakes (external negative motivation) due to low knowledge of the basics of research knowledge (36.6%). More than 70.1% of respondents showed an average level of reflexivity development, 24.7% have a low level, and 5.2% have above-average reflexivity development (according to Karpov's questionnaire).

The focus is on reflection aimed at one's pedagogical activity, as it contributes to the formation of the motivational-valuable component of research competencies and creates real prerequisites for their development from a reproductive to a creative level. Understanding reflection as a person's ability to self-development, the motivational-valuable component determines the development of all components of research competencies: the constant accumulation of knowledge, mastery of scientific research methods (cognitive); the ability to think and generalize based on an insufficient number of signs and create new combinations (organizational and activity).

The data obtained led to the conclusion that the intrinsic motivation to reflect on one's practice is a long, cyclical process, which determines the nature of the formation of the components of the teacher's research competencies as a long process (for two to three years). The transformation of external negative motivation into internal motivation in the majority of teachers takes time, and as the studies have shown, it also requires methods of hermeneutic phenomenology as the most effective approach in developing the modern Kazakhstani school.

The use of methods of hermeneutic phenomenology is considered as one of the approaches to the formation of the research competencies of a secondary school teacher. To continue the experiment, amendments were made to the developed Model by incorporating the methods of hermeneutic phenomenology in the process of forming the research competencies of secondary school teachers. This work will be continued.

To provide evidence of the reliability of the selection of the list of research competencies, an example of the motivational-value (MV) component (Block 1) was analyzed: statistical hypotheses were formulated

- hypothesis about the absence of differences in mean values (null hypothesis – H0);

- hypothesis about the significance of differences in mean values (alternative hypothesis – H1).

The Student's single-selection criterion t was used as a parametric criterion to test the hypothesis that the mean values of the aggregates from which the compared independent samples are extracted differ from each other (hypothesis H1).

Experts (n=32) ranked the resulting list of 15 research competencies (RC) in order of priority. The most significant judgment, which is more consistent with the research competencies of the teacher in the conditions of updating the content of education, is assigned the value 1, then the number 2 is assigned to the second most important judgment, etc., the last, lagging judgment is assigned the number 15.

The lower the average value obtained during the ranking of each individual IC, the more important it is for inclusion in the list of research competencies of a secondary school teacher. In this case, values less than the median of 15 (the number of RC) are of interest, so the number 7 is entered as the checked value when calculating.

The degree of freedom df = n-1, the significance level a = 0.05, i.e., the reliability of the differences is 0.95 or 95%. The lowest average value out of 15 has research competencies (IC) under ordinal numbers 1, 3, 6, 8, 9, which are also characterized by the smallest standard deviation and standard errors of the mean value.

As a result, it was found that the significance levels of p for the selected research competencies are significantly less than the significance level ($p = 0 < a = 0.05$), and the value of the t-criterion in each of the selected competencies (MV1 = -3.99, p=0.00; MV3 = -5.65, p=0.000; MV6 = -9.88, p=0.000; MV8 = -16.36, p =0.000; MV9 = 4.67, p=0.000) has a negative value, which allows us to conclude that the average values obtained are reliable, and their values are the smallest of the considered parameters RC1– RC15. Similarly, the statistical reliability of determining the list of research competencies for the theoretical-cognitive and organizational-activity components is proved.

Conclusion

The proposed research competency formation model, the developed research competencies, forms, and methods of their formation make up a systematic and scientifically based tool to increase the research competency efficiency of educators and the implementation of action research methodology in schools.

The developed model can be used to formulate and improve the research competencies of school teachers in the course of its development because it involves the diversification of content depending on the teacher's readiness for research activities, an asynchronous training system, changes in the duration of the development of research competencies, and cyclicity during the school year and years of study.

At the same time, changes and amendments to the modules of the Model are required, including elements of hermeneutic phenomenology as a factor in the success of the development of internal motivation of teachers to research (motivational-valuable), and a corresponding increase in the effectiveness of the development of theoretical-cognitive and organizational-activity components.

The offered model can be used as a technology to systematize the preparation and certification of teachers along with the formation and development of research

competencies of teachers, as well as be the basis for the development of acmeograms of secondary school teachers.

In addition, the study did not take into account the age of teachers, teaching experience, gender issues. It was believed that the ongoing changes in the education system of Kazakhstani schools, the introduction of updated educational content are quite new for all teachers, as if zeroing out the starting point. In the future, this question will certainly arise as relevant, and will be a logical continuation of the research. The results of the study are used only as an auxiliary tool for monitoring the teacher's improvement since the list of qualification requirements for a research teacher and a master teacher has not yet been agreed upon in schools with the requirements for the research competencies of bachelor's and master's graduates.

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