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Model of the methodological system for the formation of communicative competence of future teachers of informatics

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Abstract

Relevance. The formation of communicative competence in future teachers of informatics is crucial in a rapidly evolving society where knowledge quickly becomes outdated, and skills like critical thinking, teamwork, and the use of modern information technologies are highly valued.

Purpose. The study aims to comprehensively verify the impact of a methodological system on the development of communicative competence in future computer science teachers. The purpose of the experimental work is a comprehensive verification of the influence of the methodology on the formation of communicative competence of future computer science teachers.

Methodology. The research involved a three-stage process consisting of an ascertaining experiment, a formative experiment, and a control experiment, along with a thorough literature analysis.

Results. The analysis revealed a substantial improvement in the communicative skills of future computer science teachers following the implementation of the methodological system model. Participants exhibited enhanced abilities in verbal and non-verbal communication, empathy, and collaborative problem-solving. Furthermore, the integration of role-playing games and interactive teaching methods proved particularly effective in fostering communicative competence.

Conclusions. The findings underscore the efficacy of the methodological system in equipping future informatics teachers with essential communication skills. The incorporation of innovative pedagogical approaches and diagnostic methods, such as role-playing games and interviews, enhances the effectiveness of communicative competence training programs. Consequently, the developed model offers a valuable framework for educators to cultivate effective communicators capable of thriving in dynamic educational environments.

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Keywords: pedagogical process; training program; diagnostic methods; role-playing games; interview.

Introduction

In the conditions of intensive integration processes in the new millennium, the modern world faces a complex of problems and tasks related to forming a professional pedagogical elite with a multidimensional intercultural consciousness. This elite should have an independent professional personal approach to the global issues of modern civilization and be capable of appreciating the diversity of cultural space.

To help learners cope successfully with these challenges, organizations such as the Organization for Economic Co-operation and Development (OECD), the World Economic Forum, and the Program for International Student Assessment (PISA) have developed sets of lifelong skills and competencies to prepare learners for their role in the global workplace. They are often referred to as 21st century skills. They require “educational systems to equip young people with new skills and competencies that enable them to benefit from emerging new forms of socialization and actively contribute to economic development within a knowledge-based system” [1].

Among these, communication plays an important role [2]. Communication and problem-solving skills are of utmost importance in today's society and professional life. The same applies to teacher education [3]. Communication is a competency that can be thought of as the ability to interact adequately and effectively with others [4]. It is a vital skill for all professions and underpins the work of an educator in terms of a teacher-student relationship [5].

This reveals the relevance of the formation of communicative competence of future teachers. The study showed that their education is a dynamic, open, and continuous process. Competence is the basis for the professional development of teachers in all periods of their professional activity. The competence and professionalism of teachers are currently hot topics that deserve attention from all elements of society and the state [6].

The communicative activity of the future teacher can be classified as follows:

- according to the content of the activity: informational (cognitive), regulatory, perceptual;
- according to the form of communicative activity: conventional, manipulation, presentation;
- according to the results: organization of joint activities, partnership, cooperation, interaction, achievement of mutual understanding, developing (new knowledge, meanings, values).

Communicative activity performs an integrative function that ensures the integrity of the pedagogical process and is a mechanism for integrating all components of pedagogical activity into a standard system. The future teacher reaches a mental disorder due to implementing various activities. The interactive side of communication reflects these people's relationship, the goal associated with the organization of their joint activities, and the need for such. A specialist needs to understand the problems of activity theory investigated by V.V. Davydov [7].

The first problem is related to the meaning of the activity transformation (the relation of transformation and change). The second problem relates to the “attitude towards collective and individual activity” [8]. The third

problem is with the definition of the structure of the activity.

Moreover, the fourth relates to the concepts of actions and relationships. Therefore, the concepts of actions and relations cannot be considered against each other. Elements of this system: communicative intention, communicative strategy, communicative goal, communicative tasks, text message (information), channels for transmitting and receiving information, communicative actions (acts), and feedback as a diagnostic basis for the development process.

The communicative intention is the source of early identification of the communicative situation and the formation of the communicative competence of the future computer science teacher. The communicative goal gives a program of action for communication and a predictable result of communication. The implementation of the action program will be carried out by solving targeted specific communication tasks. For each task, there are specific actions and acts (creating a message text, activating channels for receiving and processing information, reducing the impact of communication noise, etc.).

Feedback is a mechanism for monitoring such intentions, goals, objectives, and performance results. The content of the feedback allows you to determine the correctness of the choice of strategy and the correctness of setting goals, objectives, and methods for their implementation.

An indicator of the implementation of a communicative intention, the quality of feedback as the basis for diagnosing development depends on the quality of the implementation of each element of communication, the level of interaction of all elements of the intended complex, and the choice of methods for analyzing the results of communicative activity. Therefore, in forming the communicative competence of future teachers, it is necessary to prioritize acquiring knowledge and skills to promote the acquisition of relevant skills. The purpose of the experimental work is a comprehensive verification of the influence of the methodology on the formation of communicative competence of future computer science teachers.

Materials and Methods

An analysis of the scientific literature on the formation of the communicative competence of future informatics teachers made it possible to identify several pedagogical approaches and conditions aimed at improving the effectiveness of this problem. They were developed in the course of practical work based on the data obtained from experimental studies and made it possible to determine the general logic of the research work:

- determination of the level of communicative competence of future informatics teachers at various stages of education;
- definition and substantiation of criteria and indicators for the formation of communicative competence of future teachers of informatics;
- development of a methodology for experimental pedagogical research on the implementation of a

pedagogical program in order to form the communicative competence of future teachers of computer science;

– systematization, analysis, and generalization of experimental research data, substantiating the implementation of the formation of communicative competence of future computer science teachers.

As part of the research work carried out at Khoja Akhmet Yassawi International Kazakh-Turkish University, Mukhtar Auezov South Kazakhstan University in 2017-2020 carried out experimental and pedagogical work prepared based on preliminary theoretical studies. Experimental and pedagogical work was focused on forming future computer science teachers' communicative competence, experimenting with the authors' methodological approaches, and testing their practical use. In total, 146 students from the control and experimental groups took part in the practice. The conducted research work includes three stages: ascertaining experiment, forming experiment, and control experiment.

The progress of each stage was under constant control; the results were fixed, and the necessary indicators were taken. Comparison, analysis, and generalization of the obtained results led to the change in the level of formation of the communicative competence of the future computer science teacher. Authors used diagnostics of communicative organizational tendencies B.A. Fedorishin [9]; diagnostics of the role position in interpersonal communication E. Bern [10]; diagnostics of communicative control M. Schneider [11]; A. Buss and A. Durke [12] aggressiveness questionnaire. Moreover, questionnaire A. Karelin [13] to determine the level of sociability. They were again applied at the control stage of the pilot study.

The stage of the ascertaining experiment was carried out in the 2017-2018 academic years. The diagnostic goal for the identification stage was to study the problems of the level of communicative competence and its formation in future computer science teachers in general education schools. During the experiment, the authors studied their attitude to preparedness in modern universities. Teachers showed an insufficient understanding of the basics of organizing communicative activities and a low level of practical implementation of communicative competencies. Eliminating the identified shortcomings and their correction is a guideline for the formative experiment of this study.

In the course of the ascertaining experiment, the proportion of the content of educational programs for the training of future informatics teachers was studied, and the possibilities for improvement were analyzed and considered. Designing a methodology for forming the communicative competence of future informatics teachers is associated with developing educational programs, as mentioned above. As part of the ascertaining experiment, the following works were performed:

1. The logical structure of training programs for elective disciplines in the formation of communicative competence of future computer science teachers. The educational training program is systematized and summarized based on taking into account numerous important information (European Qualifications Framework, National Qualifications Framework, requirements for a specialist position, program,

employers' requirements). In particular, external and internal regulatory documents. Through them, it is possible to achieve their generalization and generalization in determining the components of communicative competence.

2. Establishment of interdisciplinary connections in the teaching of professional and elective disciplines in order to form the communicative competence of future teachers of computer science. In order to form such training, professional terminology, and modeling of communicative situations that may arise in the course of professional activity, depending on the specifics of the profession, should be widely used.

Results

Mastering the skills of 21st century students contributes to the formation of a successful person in the modern labor market [14]. In a rapidly changing world driven by technological change and globalization, higher education students face a range of challenges: social, economic, and environmental [15].

According to the authors, the most critical aspect of preparing teachers for communication is going through several stages in mastering traditional skills, such as overcoming one situation in the formation of communicative competence, the ability to use it while waiting independently. At the stage of formation of the studied competence, the following specific characteristics are determined:

– the ability to transfer (transfer) knowledge and skills are known to students in new conditions, solutions, a way of communication, and change by their characteristics in a particular situation;

– the ability to find solutions in a combination (combination) of the student's previously known thoughts, knowledge, skills, and techniques in the new communicative situation;

– the ability to apply new methods and approaches to solving specific communicative situations.

The basis for the formation of the necessary skills is communicative abilities, features characterized by the subjective condition for the successful development of the communicative skills of the individual. Among them, the leading positions are occupied by communicative qualities. Such qualities are formed, developed, and improved over a long period. This is a more specific characteristic, “tied” to the situation, while abilities are generalized psychological characteristics that are less dependent on the situation and integrate communicative qualities. For example, “the ability to convince” – communicative qualities, the ability to influence people – the ability to communicate.

Among such qualities: are communicative activity, communication skills, communication skills, fluency in a speech during communication, warm greeting, willingness to support others, empathy, authenticity, openness, initiative, the ability to create a positive emotional effect, culture of speech, flexibility, sincere interest in others, etc. The first component of communicative qualities as part of the communicative ability of future teachers is perceptual.

This contributes to the understanding by future teachers of the psychology of the participants in the pedagogical process, their psychological state in the actual state, and the

correct understanding of the general situation of the group participating in the communication. The authors define the next component of the communicative qualities of future teachers as readiness for empathy [16].

Empathy is one of the essential communicative qualities of a future teacher in the process of learning about a student's personality. It plays a vital role in the structure of the teacher's personality, contributing to the implementation and continuation of relationships and orientation activities. Moreover, the third component of the communicative qualities of future specialists is a highly developed need for social interaction in communicating with students, capable of manifesting itself in the transfer of knowledge and the conscious organization of communication.

According to A.R. Fuentes et al. [17], there is a need to specifically train students in communication skills, for

example, by adding a specific module designed to alert students to the importance of their role as communicators and to develop or improve their communication skills and strategies. Undoubtedly, this training must be largely practical as people learn to communicate through communication.

Role play in a university context, with interchangeable roles based on different areas of communication, should be the basis for developing students' communication skills [18]. Based on the above, the authors formed a methodological system model for communicative competence for future specialists (Figure 1). In the content of the elective course, the forms and methods of teaching lectures and practical exercises in each module and the actions of the teacher and student in the learning process are defined and designed.

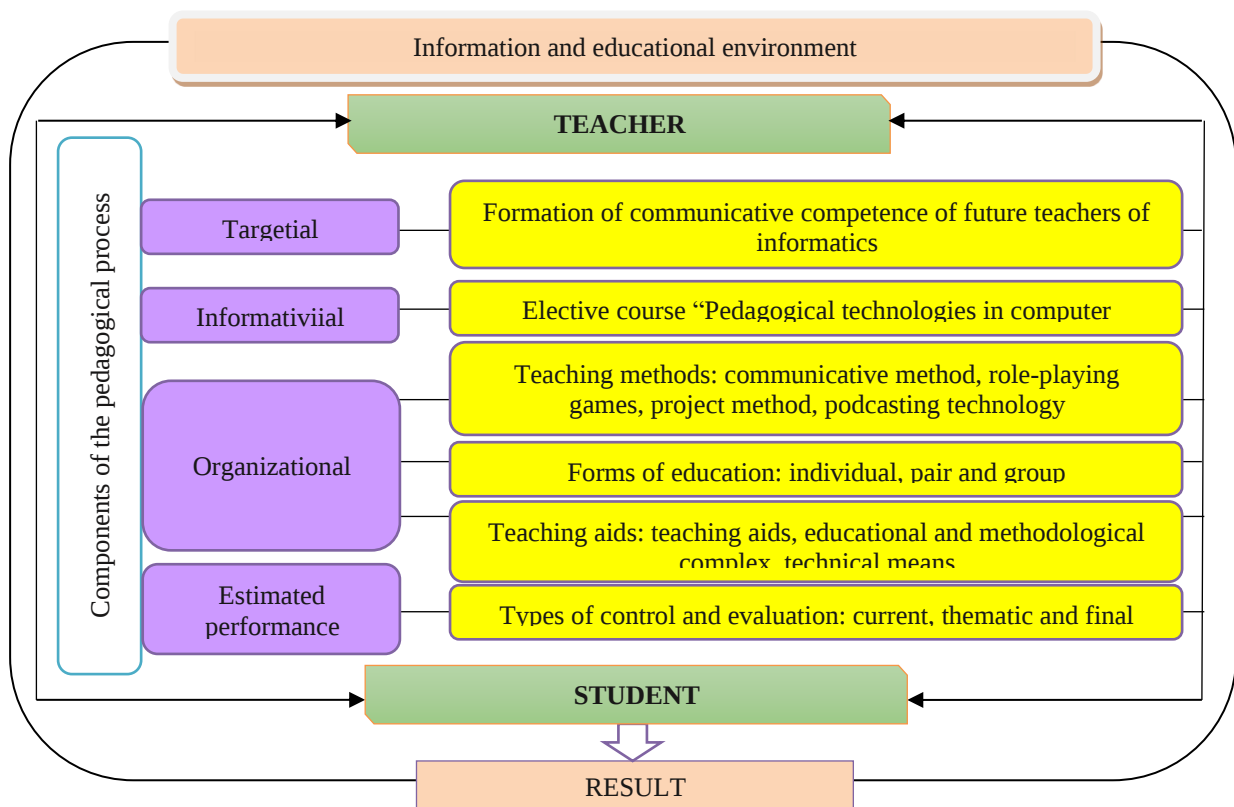


Figure 1. Model of the methodological system for the formation of communicative competence of future teachers of informatics

Particular attention was paid to the use of a communicative approach in teaching the elective course "Pedagogical Technologies in Informatics". During this period, the tasks characteristic of this stage were identified: improving the knowledge of future informatics teachers in the theory of communication, improving communication skills, and implementing the formation of communicative competence.

According to O. Luchaninova et al. [19], adequate pedagogical conditions for forming students' communicative competence are creating situations of success, increasing educational motivation, using interesting group forms of work in the classroom, and stimulating students' reflection on themselves. The choice of teaching methods to form the communicative

competence of future informatics teachers is focused on learning, communicative orientation, creative activity, and independence. The communicative method, role-playing games, project method, and podcasting technology were chosen as the main ones [20]. Communicative method. Communication-oriented learning was also carried out using tasks of the "information gap" type. Tasks of this type were also in unconventional form.:

- picture gap (most students can have the same images without seeing the partner's photo, it is given to determine the difference between the images (matching tasks));
- ext gap (students may have an analog of the text or image of one student, and some of its parts may be missing, according to the assignment, the student must complete less information – jig-saw reading);

- knowledge gap (the information available to one student should not be in another in order to replenish his complete-the-table tasks);

- belief gap (students' opinions are different, but they must be generalized and the same thoughts formulated);

- reasoning gap (must be compared with various evidence).

The exercise for forming communicative competence is called "Two accidents". It is necessary to take any dictionary, then open one page and randomly choose one word on each page. It is necessary to pay attention to the fact that the chosen two words either connect or form an event line that connects them. This task trains the brain and develops communicative, creative abilities.

An interview is a particular form of communication that allows you to create a common informational, spiritual space, which leads to the emergence of new knowledge, and relationships based on the equal activity of students. The interview can be successful only in the implementation of several conditions: compliance with the level of students and their independence; development of skills and opportunities for communication of the future computer science teacher; the presence of positive relationships among students; equal participation of all participants; formation of a favorable psychological microclimate in the group. The students were given the following tasks:

- read the interview and identify its participants;

- add your opinion;

- compose an interview using the provided phrases;

- compose an interview depending on the given situation, etc.

In completing tasks related to the construction of interviews, students learned not only to form communicative competencies but also to show tolerance for a partner's opinions, mistakes, and pace. They also mastered the technique of active listening and professional communication. Role-playing games are the next method-role-playing game for forming communicative competence in future computer science teachers. Its use contributes to the optimal activation of the communicative activity of students, increasing their readiness for conversation, and response, ensuring student independence, freedom of language creativity, and personal responsibility for the effectiveness of training.

The role-playing game in the form of simulation modeling of everyday life conditions expanded and developed students' communication skills and knowledge. The use of role-playing games served as the basis for the activity of students in time and purposeful activity. It was presented in the educational material and students' creative work, personal speech behavior, the definition of their initiatives, interests, and needs.

Game associations. The teacher gives students various collections of pictures (schematic drawings of a computer network, information signs, information models, and computer devices). Students take turns receiving a photo from the collection and ask the neighbor on the right any questions related to the picture or name who answers this question. It is allowed to give vague answers to funny questions. The rest of the participants determine the incompatibility of the question. The winner of the game is not determined; it is only aimed at improving the skills to ask questions.

The Six Thinking Hats method allows students to use thinking models as an effective tool for creative activity in the communication process; get rid of excessive emotionality; see the problems in various ways, and be tolerant and flexible in communication. It was proposed by E. De Bono [21] and helped to increase the structure and effectiveness of any mental activity (individual or group). Beneath the Six Thinking Hats method lies the idea of parallel thinking. Traditional thinking is based on a discussion clash of thoughts.

However, this approach wins the decision in a more successful move, not the correct decision in the discussion. Parallel thinking is constructive thinking that complements each other without clashing different views and techniques. This method is a simple and optimal way to overcome difficulties by dividing the thought process into six modes, indicated by hats of different colors. With the help of it, the problems and conditions of interpersonal communications were discussed. The given idea considered the students' performance in the corresponding role. When changing hats, a change in thinking was implemented. This method contributed to the visual and simple mastering of the thinking technology in solving a problem and ensuring a conflict-free discussion.

Project method. The purpose of project-based learning based on the generalization of various proposed approaches to the use of projects in the educational process largely depends on how students independently acquire insufficient knowledge from various sources of information. It can use the acquired knowledge to solve cognitive and practical problems, form communicative competence through work in various groups. Additionally, it considers creating conditions for the development of their research skills (problem definition, information collection, control, experimentation, analysis, forecasting, generalization).

The project method uses problematic, research, and creative search methods focused on a specific practical result. The main requirements for its use were: the presence in the research plan of essential problems, tasks requiring integrated knowledge, and research search. Moreover, it necessitates practical and theoretical significance of the proposed results, as well as independent activity of students in the classroom and after school hours. Other aspects involve structuring the content of the project, use of research methods, definition of research objectives arising from the further problem, formulating forecasts for their solution. Finally, it entails discussion of research methods, registration of final results, analysis, generalization of the obtained data, as well as correction and conclusions ("brainstorming", "round table" during joint research, creative reports, project defense).

The authors conducted group, pair, and individual projects. For example, creative projects: "Pedagogical communication", "No boundaries in communication". Additionally, information projects: "Journey to the virtual world", "Cybersocialization", "Netiquette", "Media culture", "Internet communication".

Podcasting technology. Video is not one of the most used educational resources in teaching, although it is valuable. In most cases, there are restrictions on the part of teachers for the presentation of videos for viewing by students at the end of classes. In this case, no work is

carried out to enrich the communicative training of students; only passive viewing is carried out. Moreover, video films as a means of listening contribute to improving the level of formation of students' communicative competence and developing speech skills. Currently, several teaching methods are successfully used to form future students' communicative competence through video information.

Split View method (differentiated vision method). The study group was divided into two groups. The students were the first to listen to the skit in its entirety; the second group was the opposite. The exercise is based on the principle of information gap (inaccessibility of information). For example, students of one group can be called "Witnesses", and the second group – "Journalists", receive interviews from "Witnesses". The latter are invited to pay attention to the interview in the film and share their impressions. Depending on students' level of communication skills, scenarios of varying complexity have to be chosen for this method. From short scenes to full films.

Video on/Sound off (watch the video without sound). The students saw the whole scenario in the event of a mute. Then they predicted the script's content, wrote it independently, and read it scene by scene. The students were only asked to watch the scene in a sound state. The group that proposed the most attractive or close-to-the-truth scenario was determined. It is especially beneficial to present scenes in which there are heated discussions among people.

The authors propose to stop at the stage of monitoring the content of watching a video film, where special attention is paid to the communicative competence of future computer science teachers. A single viewing may be sufficient if the video is used only for listening training. Students answered questions about the content of the video "History of Computers" the teacher asked students about the technical condition of the devices in the classroom. The forecasts about the future development of computers were discussed. In case you need to get only selected information, the movie was shown only once here.

After watching the video once, the students were instructed to complete the missing words and phrases in the dialogue between the buyer and seller of the computer. The completed task was read aloud by the students. Moreover, after the second viewing of the story, it was proposed to play the role of a buyer and a seller to organize an interview. Thus, the use of video films in forming the communicative competence of future computer science teachers through the purposeful and varied performance of exercises has increased their interest in the subject and the level of assimilation. At the end of the study, the authors again implemented diagnostic methods, determined exceptional measuring quantities, and used mathematical and statistical transformations in determining organizational and methodological knowledge and skills (Figure 2).

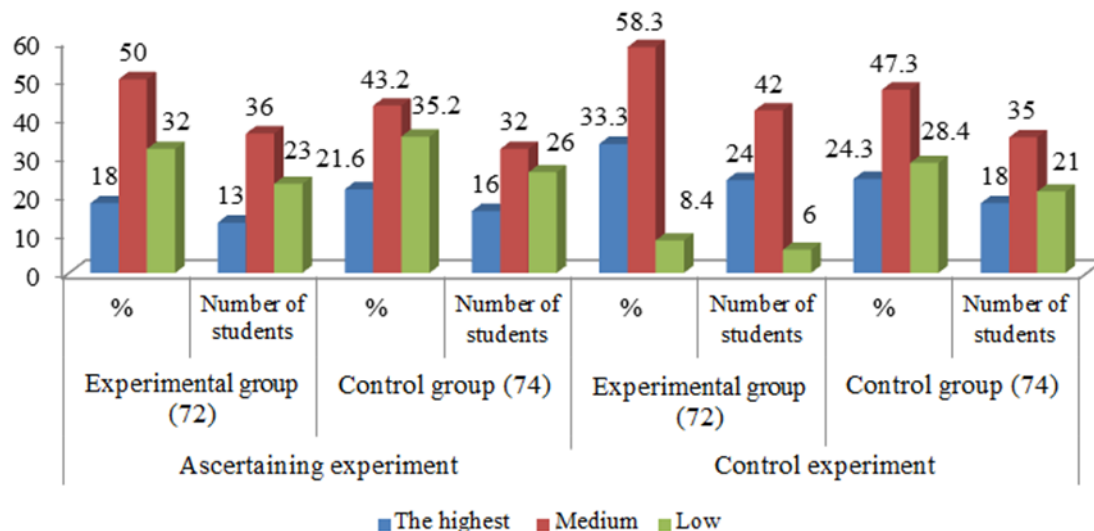


Figure 2. Indicators of the formed communicative expectation expect informatics before and after the experiment.

As seen in Figure 2, at the end of the experiment, the high level reached 33.3%, while the low level decreased by 8.4%. While in the top control group, the rate was 24.3%, the decrease of the significant increase was 28.4%. The results show that the constant use of communicative knowledge, skills, and abilities in the educational process gives the future teacher a communicative experience, which underlies the teacher's work in terms of the relationship between the teacher and the student.

Discussion

Considered in the course of the work, the study of the formation of information and communication competence

of future specialists by the scientist B. Kerimbaeva et al. [22] proved that communicative competence is the readiness and ability of students to communicate effectively in the professional field in all types of speech activity includes linguistic, sociolinguistic, verbal, cognitive, subject, professional, discursive competences, as well as pedagogical conditions that ensure the effective formation of communicative competence based on communicative-cognitive competence and an active approach.

The study revealed that the implementation of pedagogical conditions is achieved by activating the cognitive activity of students using the following methods:

- developmental programs,
- didactic material presented in structured modules,
- the use of technologies for the formation of communicative competence,
- including interactive and problem-modular technologies,
- the use of active methods and forms of training (case studies, business games, discussions, etc.).

The methodology proposed by the authors for forming communicative competence, including interactive and problem-modular learning technology. It allows the development of communication skills to increase the competitiveness of future specialists in the professional field.

Scientific and practical research continues, and at the initial stage of this study, the authors came to a conclusion about the importance and relevance of the issue of introducing and applying a competency-based approach in the educational process. When designing the pedagogical process, it is necessary to consider the variety of methodological approaches that change the student's worldview, outlook, and consciousness and affect his practical activities and professionalism.

Touching upon the topic of the discussion about gaps in skills and the next opportunity for students to realize themselves professionally, the authors of the study on the cultural aspects of communication in professions, M. Hora et al. [23], found that previous research did not address communication skills from a pedagogical perspective. To some extent, the reason for this state of affairs is the ignorance of disciplinary traditions in the course of these discussions.

Declared disciplinary traditions usually reveal the concepts of a practical approach and also carry tools for viewing communication from the point of view of social action. The reviewed research indicates that communication specialists in various disciplines have come to a consensus and have defined oral communication as a way of combining form and meaning through the interpretive experience of the listener, his identity, and worldview. Comparing the above information with the study results, it can be seen a similarity in interpreting the influence of the development of communicative competence on how the listener will perceive the information.

In his study, S. Ahmed [24] considers strategic competence integral to compensatory strategies. This point of view allows us to look at communication not only as a verbal process but in a broader sense of the concept. In his theoretical study of the development of communicative competence to communicative competence, compensatory strategies play a crucial role in communication and not only help teachers convey meaning in the teaching process but also allow building interaction between all participants in communication, regardless of the context. The communication strategies considered by the author include body language, paraphrasing, asking to repeat or clarify, and others.

Regarding fluency and automatism, the researcher uses these terms to describe the qualitative components of speech: speaking, listening, writing, and reading at automatic and fluent levels. In addition, the author considers automatism from the point of view of a

component of a broader concept of fluency. The discussion of the terms fluency and automatism led to the conclusion that these concepts are at the origin of the acquisition of any skills, including knowledge from the field of computer science. Fluency has been defined as “fluid, quick and easy use of language in context”. The author also considered it an “automatic procedural skill”; that is, the skill of automatically using basic language knowledge. Thus, the skills of fluency and automatism in the use of language in oral and written form are an essential part of the communicative competence of future computer science teachers [25; 26].

The book by M. Miletic and M. Djordjevic [27], dedicated to the communicative competence of teachers, considers communicative competence as one of the most essential skills in modern educational and pedagogical work. This is not about the absolute predisposition of a person but about a set of variables that can be improved through training to the level necessary for the implementation of a particular social role. The authors identified groups of individually determined variables through which the degree of communicative competence of the individual is transmitted: cognitive and interactive variables.

According to the materials of the book, pedagogical communication is most effective if it is implemented by professional and communicatively competent teachers, individualized learning, and/or indirect interpersonal communication with the coding of communicative messages, the reception of which, in pedagogical terms, that is, in terms of cognitive effects and value consequences, will be unequivocal, which again emphasizes the rationality of the approach used in the course of the study and indicates the importance of developing a model of a methodological system for the formation of the communicative competence of future computer science teachers as a way to improve the quality of teacher training [28-30].

A study of the communication skills of teachers working on a full-time and contract basis by B. Amin and M. Javeed [31] conducted in the Lahore district (Pakistan) showed that there is a significant average difference between some factors in the communication skills of full-time and contract teachers, for examples, such as structured sentence formation, non-verbal behavior, and conversational skills. At the same time, the difference in the level of other communication skills was insignificant, which means that tenured and contract teachers were equally similar in terms of skills.

Low professional qualifications, uncertainty about future employment, lack of pre-service training and mandatory advanced training, interest, and increased responsibility are significant factors that scientists have identified hindering communication skills development for both full-time and contract teachers. This study emphasizes that communicative competencies are mandatory for teachers in the process of teaching and learning, which is consistent with the findings of the study.

According to S. Ahmed [32], communicative competence means “the ability to communicate” and can be oral, written, or even non-verbal. It is an all-encompassing term that refers to language proficiency as well as the ability to use language in real-life situations to

meet communication needs [33]. According to the researcher, language is a means of communication and includes four basic skills: listening, speaking, reading, and writing. To acquire these language skills, one must not only learn the grammar rules but also practice these skills. Whenever a student acquires language skills and can use them effectively and appropriately in the context in which he is involved, it can be argued that he has reached the required level of communicative competence, which also confirms the relevance of the study and the prospects for applying the developed model in professional training of future computer science teachers.

Thus, ensuring a continuous educational process directly depends on the communicative competence of the teacher because, with its help, the teacher can establish effective communication with students and guarantee its timeliness and relevance. Even though usually theories of communicative competence are based on how the knowledge and skills of an individual allow the practice of communication, the author of the reviewed study, N. Abdulrahman [34], considers communication as part of practical interaction, which is also called interactional competence.

Linguists called interactional competence in different scientific periods in different ways. Previously used names include collaborative construction, interactive practice, or discursive practice. The essence of these terms is reduced to the practices of social interaction between people that have cultural and social significance for the community of speakers. In this regard, participants in the course of practice often tend to rely on a particular form of verbal or non-verbal (for example, body language) communication that their communication partners will use in the course of communication, which contributes to the development of perception of various communicative ones [35-37]. The development of this skill in future teachers is presented in the study using the Video on / Sound off method (watch the video without sound).

According to a study by K. Dikilitas [38] on teaching and learning sociolinguistic competence, a teacher can help students develop communicative competence, which can be divided into three main components. One of them is the need to learn the context, highlighting the need to develop communication skills. Teachers' ideas about developing communication skills imply that students should be in a natural environment where they can interact without imposing summative assessment methods.

Another component is based on the fact that an essential factor in the development of communicative competence is the need to pay special attention to the explicit teaching of the essential elements of communicative competence in a formal context [39]. The last component includes the need to improve the skills of teachers in order to facilitate the teaching of communicative competence. This process involves a critique of the own competence of computer science teachers.

Considering the results of this study through the prism of the conducted experimental work, it can be noted that the developed model includes the development of two of the three components of communicative competence proposed by K. Dikilitas [38]. The last component (increasing the qualifications of teachers) was not considered in the course of this work because the purpose

of the study was to develop a methodology for developing the communicative competence of students and not practicing teachers.

A study of teachers' perception of the concept of communicative competence by A. Nazari [40] revealed that the concept of communicative competence is often not fully understood by some senior computer science teachers and, moreover, teachers cannot always distinguish between the broad and narrow characteristics of this concept. Observing teachers and their behavior during computer science lessons, the author found that in the understanding of teachers, the meaning of communicative competence is a combination of several approaches.

However, in practice, teachers use only one of them: a narrow understanding of the concept of communicative competence based solely on verbal communication [41; 42]. According to the author, the reasons for this state of affairs may be the lack of understanding among teachers of the differences between different concepts of communicative competence or the institutional limitations of the working environment, which also indicates the importance of expanding the methodology presented in the course of the study to improve the skills of practicing computer science teachers.

A. Okoli [43], in his work on the relationship of communicative competence with the effectiveness of teaching, states that effective communication is one of the skills recognized as the professional skills of qualified teachers. Teachers must effectively use oral speech, gestures, symbols, signs, questions, and other methods to share information with students and improve their understanding of the subject. They must be able to convey information effectively to students, accurately understand student expressions and feelings, and have excellent writing and speaking skills, making influential communication experts. Methods for developing all these skills in students-future computer science teachers are presented in work, indicating that the developed methodology has affected all elements of communicative competence.

Conclusions

The study is a developed model of the methodological system for forming communicative competence of future informatics teachers based on the studied data on the methods of developing communicative competence and further experimental work, in which 146 students from control and experimental groups took part. The purpose of the study was a comprehensive test of the influence of the methodology on the formation of communicative competence of future computer science teachers. In the course of the work, it was determined that the methodological work proposed above makes it possible to effectively organize the formation of the communicative competence of future computer science teachers.

In addition, the study showed that with the help of an especially proposed methodology, it is possible to improve the level of formation of the communicative competence of students in the process of professional training. It contributes to an increase in the level of personnel graduating from pedagogical universities and, as a result, can lead to an improvement in the quality of school education in the field of informatics.

The authors of the study consider the prospects for introducing the presented methodology for forming the communicative competence of future informatics teachers into practice not only through the prism of the formation of the studied competencies but also as a way of developing the teacher's communicative personality.

The results of experimental and pedagogical work prove the effectiveness of the author's direction, as indicated by the increase in the level of formation of the communicative competence of future computer science teachers. The indicators of the experimental group compared with the control group indicate the influence of the methodology used in the course of the study on students' communicative competence.

The number of students who, at the first stage of the experiment, were assigned to a group with a low level of communicative competence, after using the methodology and repeated testing, decreased from 23 to 6 people (23.6% of the sample). At the same time, the number of students in groups with medium and high levels of communicative

competence increased by 6 (8.3% of the sample) and 11 (15.3% of the sample) people, respectively.

The authors recommend that further research focus on adapting the model of the methodological system developed in this study for forming the communicative competence of future teachers of informatics to the needs of practicing teachers of informatics. This adaptation will improve the qualifications of teachers and standardize the requirements for professional training, ensuring the quality of the educational process in all educational institutions.

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Conflict of Interest

None.

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Модель методологічної системи для формування комунікативної компетентності майбутніх вчителів інформатики

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Анотація

Актуальність. Формування комунікативної компетентності у майбутніх вчителів інформатики є важливим у швидкодіючому суспільстві, де знання швидко застарівають, а навички критичного мислення, роботи в команді та використання сучасних інформаційних технологій дуже цінуються.

Мета. Дослідження спрямоване на комплексну перевірку впливу методологічної системи на розвиток комунікативної компетентності майбутніх вчителів інформатики. Метою експериментальної роботи є всебічна перевірка впливу методології на формування комунікативної компетентності майбутніх вчителів інформатики.

Методологія. Дослідження включало трьохетапний процес, що складався з констатуючого експерименту, формувального експерименту та контрольного експерименту, а також ретельного аналізу літератури.

Результати. Аналіз показав значне покращення комунікативних навичок майбутніх вчителів інформатики після впровадження моделі методологічної системи. Учасники проявили покращені здібності у вербальній та невербальній комунікації, емпатії та колективного вирішення проблем. Крім того, інтеграція ролевих ігор та інтерактивних методів навчання виявилася особливо ефективною у сприянні формуванню комунікативної компетентності.

Висновки. Отримані дані підкреслюють ефективність методологічної системи в оснащенні майбутніх вчителів інформатики необхідними комунікативними навичками. Впровадження інноваційних педагогічних підходів та діагностичних методів, таких як рольові ігри та інтерв'ю, підвищує ефективність програм навчання комунікативної компетентності. Отже, розроблена модель пропонує цінну рамку для педагогів у вихованні ефективних комунікаторів, здатних успішно функціонувати в динамічних освітніх середовищах.

Ключові слова: педагогічний процес; навчальна програма; діагностичні методи; рольові ігри; інтерв'ю.