Vital Annex: International Journal of Novel Research in Advanced Sciences
ISSN: 2751-756X
Volume 04 Number 01 (2025)
https://innosci.org/IJNRAS

Article

Systematic Analysis of Research Work on The Process of Preparing Future Teachers of Computer Science and Information Technologies for Professional and Pedagogical Activity

Sohibov Dilshod Beknazarovich*[1]

1. Bukhara Pedagogical Institute, Doctoral student
* Correspondence: imronbekdilshod@gmail.com

Abstract: The article analyzes the quality and effectiveness of pedagogical activities, ways to achieve success in pedagogical activities, the role of training future teachers of informatics and information technologies for pedagogical activities in educational processes, and the issues of developing the professional potential of future teachers in the formation of an educational environment. The content of the scientific research works carried out and their systematic analysis are also presented.

Keywords: Computer Science, Information Technology, Digital Technology, Artificial Intelligence, Automation, Digitalization, Information Technology in Education, Information and Communications

Citation: Beknazarovich, S. D. Systematic Analysis of Research Work on The Process of Preparing Future Teachers of Computer Science and Information Technologies for Professional and Pedagogical Activity. Vital Annex: International Journal of Novel Research in Advanced Sciences 2025, 4(1), 4-11.

Received: 10th Jan 2025
Revised: 11th Jan 2025
Accepted: 24th Jan 2025
Published: 31th Jan 2025

1. Introduction

Due to the rapid development of globalization, automation and digitalization processes in the world community, the training of future teachers of informatics and information technologies as comprehensively qualified teachers is of great importance. In preparing future teachers for pedagogical work, the widespread use of the achievements of science and innovation plays an important role in the consistent and sustainable development of all spheres of society and state life. This process ensures the training of highly qualified, competitive personnel as an important factor in building a worthy future for the country [1]. The widespread introduction of information technologies in education, the widespread use of modern, interactive and creative methods in teaching contribute to the development of the abilities of future teachers of informatics and information technologies to conduct scientific research based on such indicators as motivational, cognitive, practical, reflexive and self-assessment. It also indicates the need to organize teaching processes in higher education institutions in an innovative way, constantly align curricula with modern requirements, create a system that increases students' interest in subjects, organize education through modern approaches, form the interest of future teachers of computer science and information technology in innovative knowledge, study and systematize the methodology of preparing them for pedagogical activity [2].

In our country, improving the quality of higher education educational processes, improving the knowledge and skills of future teaching staff in accordance with international standards, fully digitizing the higher education system, and, in addition, at a time when the modern world is increasingly globalizing and information exchange is accelerating, directing young people to the correct use of information technologies, improving the professional skills of future teachers of computer science and information

technology, and improving teaching methodologies are considered one of the urgent issues of the higher education system to provide them with high-level knowledge [3].

The training of future teachers of informatics and information technologies for pedagogical activity occupies a special place in the teaching methodology of the continuing education system developing in our Republic, which is being improved following the social requirements. In solving the problems arising in this process, the introduction of digital technologies into the teaching processes in the form of full-time education, the use of modern pedagogical methods and the improvement of the necessary information infrastructure are of great importance. It is also necessary to develop the knowledge and skills of future teachers in such areas as programming, network technologies, data analysis, and enrich them with interactive teaching methodologies aimed at increasing the digital literacy of students [4].

On April 14, 2022, at a meeting chaired by President Shavkat Mirziyoyev to discuss the activities of the Ministry of Information Technologies and its plans for 2022, important tasks were set, such as "Turning the digital economy into a driving sector in the Development Strategy, increasing information technology services by 2.5 times and bringing exports to $500 million" [1]. The relevance of the information technology sector and the great amount of work that needs to be done in this regard were highlighted, and at the same time, if this sector does not develop, the development of other sectors will be difficult, information technologies will be used in every aspect and create convenience for people, which indicates that this will make a significant contribution to the overall development of society.

The main object of the professional activity of students of the "Mathematics and Informatics" educational direction studying in pedagogical higher educational institutions is general secondary schools, where they are future teachers of the subject "Informatics and Information Technologies" in their curriculum. Informatics and Information Technologies is a teaching and educational process aimed at developing the information culture, digital literacy, scientific and mathematical knowledge of future teachers through in-depth study of modern technologies, effective management and proper use of information, which ensures the integration of pedagogical technologies, the creation of information systems and the increase in the effectiveness of education through them [5]. This discipline also includes the development of information technology tools, the application of innovative technologies in practice, the development of pedagogical skills, as well as such features that ensure professional activity as social adaptability, competitiveness and personal development. The main goal of the subject of computer science and information technologies is to teach students the possibilities of creating modern information systems, their effective use and integration into their pedagogical activities. In the educational system, this subject serves to strengthen the educational and methodological preparation of students, develop their skills in mastering innovative pedagogical approaches and the effective use of information technologies [6].

Literature review: Scientists of our republic have also conducted extensive research on the preparation of future teachers of "Informatics and Information Technologies" for pedagogical activity. They paid great attention to the development of innovative methods and technologies that meet modern educational standards, as well as the creation of new programs and methodologies aimed at preparing future teachers of informatics and information technologies for pedagogical activity. Significant results on the pedagogical and psychological foundations of the use of programmed educational tools in higher educational institutions, the theory, methodology and practice of informatization were reflected in the works of S.S. Gulyomov, U.Yu. Yuldashev, N.I. Taylakov, A. Abdukodirov, M.M. Aripov, M.H. Lutfillaev, U.Sh. Begimkulov, J.A. Khamidov, O.Kh. Turakulov, S.Q. Tursunov, S.J. Turaev and others [7].

In particular, in the study by Sh.U.Usmankulov entitled “Development of professional and pedagogical competence of future informatics teachers based on an integrative approach”, the content and components of the professional and pedagogical competence of future teachers were optimized within the courses. Based on an integrative approach, the stages of development of this competence were improved through the differential provision of adaptive didactic tasks in a blended learning environment through social-fundamental, special-specialization and methodological-technological stages. Methods for developing professional and pedagogical competence were developed through the use of teaching tasks in pedagogical programs at a productive-design level in students' academic activities, and criteria for assessing the level of development of competence through an integrative approach were developed through the clarification of pragmatic exercises aimed at professional editing of information in an individual-reflective environment in an operational-prognostic environment [2].

In the research work of researcher F. Sh. Shirinov entitled “Methodology for developing the competence of future computer science teachers in creating electronic methodological support (on the example of the subject “Computer Graphics”)”, the methodological and didactic support system for the use of electronic educational resources was improved to develop the competence of future computer science teachers in creating electronic methodological support. This process is based on the principles of competency, methodological and creative approaches, design, consistency, demonstrativeness, awareness and activity in education, and the methodological and didactic, pedagogical and psychological and technical and constructive skills of teachers are improved, and the principles of continuity, systematicity and innovation are given priority through the methods of “Case study”, “Blended learning”, “Classic couple strategy”. The criteria for assessing the process were improved through strategic forecasting and systematization based on developing parameters and indicators [3].

In the research work of M.T. Mambetniyazov entitled “Methodology for Improving the Professional Training of Future Teachers Based on Web Technologies”, the methodology for developing the professional training of future teachers based on Web technologies was aimed at improving it by comparing the effects of age characteristics and didactic goals and adapting visual information, animations and Web resources to students with special needs. The model for developing the professional training of future teachers was improved by motivating students to learn online platforms, teleconferencing, blog technologies and step-by-step learning of integrative tasks. The stages of professional training were improved based on creative thinking processes by directing students to independent search and creative activities, creating websites and developing Web resources. Also, the flexibility of educational content and technological situations through Web technologies have been developed through diagnostic modeling [4].

In the research work of researcher N.N. Zaripov entitled “Improving the methodology of using the programming environment in teaching computer science and information technologies (on the example of general secondary schools)”, pedagogical conditions such as motivation, collaborative learning, integration and development of teacher-student relations in the formation of skills in working with the programming environment in students of general secondary schools were identified through logical thinking and program development. The educational and organizational structure of lessons when teaching students the Delphi programming environment was improved by exporting and importing data from the Delphi application to applications such as Access, Excel, Word, Adobe Reader. The model and competencies of teaching the Delphi programming environment were improved by optimizing game programs, simulators, demonstration and multimedia tools, and creating applications in the programming environment. To improve the effectiveness of students' use of the Delphi programming environment and the assessment of learning outcomes, a set of exercises based on

electronic resources such as “Technology of working with components” and “Virtual electronic development of independent complex programs” has been developed [5]..

2. Materials and Methods

Today, new reforms are being implemented in the educational process of our Republic. In particular, laws on the education system, especially resolutions and decrees and concepts on the higher education system, are being adopted. In recent years, practical work has been carried out in the Republic to support scientific and innovative activities [8]. In addition, practical initiatives are being implemented to increase the competitiveness of universities and institutes in the education system, commercialize scientific developments and innovations, as well as train talented personnel for the corporate sector. Such fundamental reforms in the field of education will certainly make a significant contribution to the future development of our country and its international position in the fields of education and science [9], [10], [11].

3. Results and Discussion

In the process of implementing this research work, to know the number of dissertations that have been completed and defended in our Republic with positive results and to understand their content, when the Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) dissertations and abstracts completed in 2003-2024 were systematically analyzed by downloading them from the ziyonet.uz information and educational platform, their total number was one thousand seven hundred and eighty-one (1781), of which the total number of Doctor of Philosophy (PhD) dissertations in Pedagogical Sciences was one thousand six hundred and twenty-three (1623), and the total number of Doctor of Pedagogical Sciences (DSc) dissertations was one hundred and fifty-eight (158), and the total number of Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) dissertations completed in the specialty 13.00.02 - Theory and Methodology of Education and Training (by field) of the pedagogy field was one thousand six hundred and twenty-three (1623) and one hundred and fifty-eight (158). The total number of Doctor of Philosophy (DSc) theses is six hundred and forty-six (646), of which the total number of Doctor of Philosophy (PhD) theses in pedagogical sciences is five hundred and eighty-six (586) and the total number of Doctor of Pedagogical Sciences (DSc) theses is sixty (60) (see Table 1) [12], [13], [14], [15].

Table 1. Total number of Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) dissertations in pedagogical sciences and 13.00.02 - Theory and methodology of education and upbringing (by field) completed in 2003-2024

Total number of Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) theses in pedagogical sciences completed in 2003-2004		**Total number of dissertations for Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in pedagogical sciences completed in 2003-2004 13.00.02 - Theory and methodology of education and upbringing (by field)**	
1781		**646**	
Of these, the total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences	Of these, the total number of Doctor of Educational Sciences (DSc) dissertations	From this, philosophy of pedagogical sciences, with a specialization in 13.00.02 - Theory and methodology of education and upbringing (by field) total number of doctoral (PhD) theses	Of these, the total number of dissertations for the degree of Doctor of Pedagogical Sciences (DSc) in the specialty 13.00.02 - Theory and Methodology of Education and Training (by field)
1623	**158**	**586**	**60**

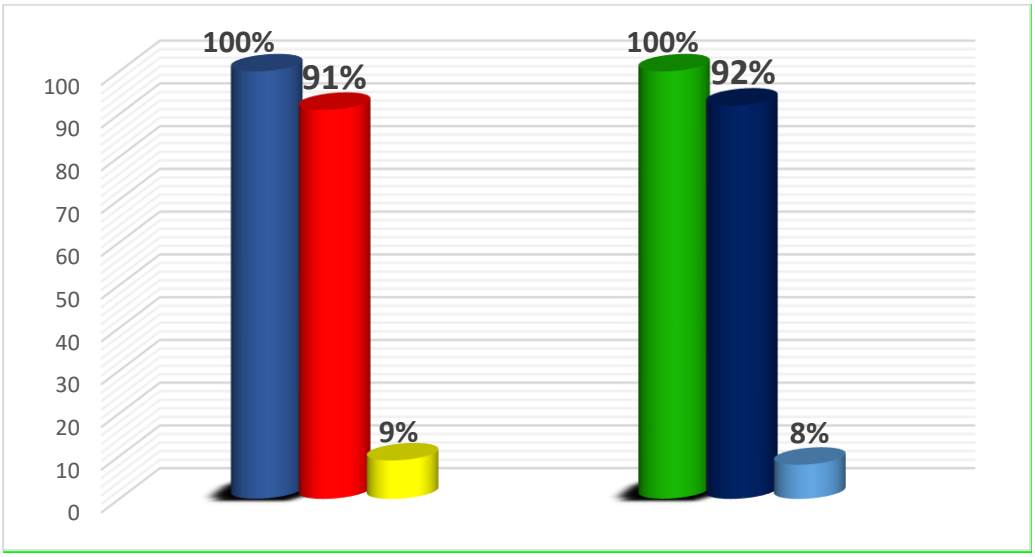

Figure 1. Percentage of Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in Pedagogical Sciences and dissertations in 13.00.02 - Theory and Methodology of Education and Training (by field) completed in 2003-2024.

The above analyses are also explained in diagram form, see Figure 1.

Total number of Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) dissertations in pedagogical sciences completed in 2003-2024[13]

Total number of dissertations for Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in pedagogical sciences completed in 2003-2024 in the field of 13.00.02–Theory and Methodology of Education and Training (by field)[14]

Of these, the total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences

Of these, the total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences in the specialty 13.00.02 - Theory and methodology of education and upbringing (by field)[15]

Of these, the total number of Doctor of Educational Sciences (DSc) dissertations

Of which, the total number of dissertations for the degree of Doctor of Pedagogical Sciences (DSc) in the specialty 13.00.02 – Theory and Methodology of Education and Training (by field)

The relevance of this selected topic can be seen from the fact that the total number of dissertations completed in the specialty 13.00.02 - Theory and Methodology of Education and Training (Informatics) is ninety-seven (97), and the total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences is ninety-three (93) and the total number of Doctor of Pedagogical Sciences (DSc) dissertations is four (4). The total number of dissertations completed on teaching methodology is three (21), and it is precisely

because no dissertation research for Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) dissertations has been carried out in the specialty 13.00.02 - Theory and Methodology of Education and Training (Informatics), See Table 2.

Table 2. The total number of dissertations for the degree of Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in pedagogical sciences completed in 2003-2024 in the specialty 13.00.02 - Theory and Methodology of Education and Training (Informatics) and dissertations on the topic of improving the methodology for preparing future teachers of informatics and information technologies for pedagogical activity.

Total number of dissertations for Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in the specialty 13.00.02 – Theory and Methodology of Education and Training (Informatics) completed in 2003-2024		**Total number of dissertations on improving the methodology for preparing future teachers of computer science and information technology for pedagogical activity from (PhD) and (DSc) dissertations completed in 2003-2024**	
97		**21**	
Of these, the total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences from the specialty 13.00.02 - Theory and methodology of education and upbringing (informatics)	Of these, the total number of dissertations for the degree of Doctor of Pedagogical Sciences (DSc) in the specialty 13.00.02 – Theory and Methodology of Education and Training (Technological Education)	The total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences aimed at improving the methodology for preparing future teachers of computer science and information technology for pedagogical activity	Total number of Doctor of Pedagogical Sciences (DSc) dissertations on improving the methodology for preparing future teachers of computer science and information technology for pedagogical work
93	**4**	**21**	**0**

The subset specifically focused on improving the methodology for preparing future teachers of computer science and information technologies for pedagogical activities shown by Figure 2.

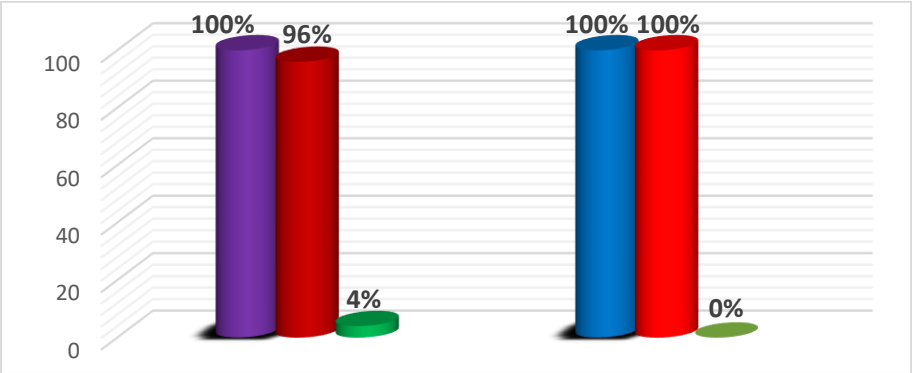

Figure 2. Percentage of dissertations for Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in 2003-2024 in the specialty 13.00.02 - Theory and Methodology of Education and Training (Informatics) and dissertations on the topic of improving the methodology for preparing future teachers of informatics and information technologies for pedagogical activity.

Total number of dissertations for Doctor of Philosophy (PhD) and Doctor of Pedagogical Sciences (DSc) in the specialty 13.00.02 – Theory and Methodology of Education and Training (Informatics) completed in 2003-2024

Total number of dissertations on improving the methodology for preparing future teachers of computer science and information technology for pedagogical activity from (PhD) and (DSc) dissertations completed in 2003-2024

Of these, the total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences from the specialty 13.00.02 - Theory and methodology of education and upbringing (informatics)

The total number of Doctor of Philosophy (PhD) dissertations in pedagogical sciences aimed at improving the methodology for preparing future teachers of computer science and information technology for pedagogical activity

Of which, the total number of dissertations for the degree of Doctor of Pedagogical Sciences (DSc) in the specialty 13.00.02 – Theory and Methodology of Education and Training (Informatics)

Total number of Doctor of Pedagogical Sciences (DSc) dissertations on improving the methodology for preparing future teachers of computer science and information technology for pedagogical activity

4. Conclusion

The above analysis completed in our Republic in 2003-2024 shows that the fact that there has been almost no research work on pedagogical sciences in the content of preparing future teachers of informatics for pedagogical activity has become a methodological basis for considering the topic of this dissertation as “Improving the methodology for preparing future teachers of informatics and information technologies for pedagogical activity.

REFERENCES

[1] Sh. M. Mirziyoyev, "Axborot texnologiyalari vazirligining faoliti va 2022 yildagi rejalari muhokamasiga bag'ishlangan yig'ilish nutqi," 14 Apr. 2022.

[2] Sh. U. Usmonqulov, "Integrativ yondashuv asosida bo‘lajak informatika o‘qituvchilarining kasbiy-pedagogik kompetentligini rivojlantirish," *Pedagogika fanlari bo‘yicha falsofa doktori (PhD) dissertatsiyasi avtoreferati*, Chirchiq, 2023, 52 p.

[3] F. Sh. Shirinov, "Bo‘lajak informatika o‘qituvchilarining elektron metodik ta’minot yaratish kompetentligini rivojlantirish metodikasi (‘Kompyuter grafikasi’ fani misolida)," *Pedagogika fanlari bo‘yicha falsofa doktori (PhD) dissertatsiyasi avtoreferati*, Toshkent, 2023, 52 p.

[4] M. T. Mambetniyazov, "Web-texnologiyalar asosida bo‘lajak o‘qituvchilarning kasbiy tayyorgarligini takomillashtirish metodikasi," *Pedagogika fanlari bo‘yicha falsofa doktori (PhD) dissertatsiyasi avtoreferati*, Toshkent, 2023, 43 p.

[5] N. N. Zaripov, "Informatika va axborot texnologiyalari fanini o‘qitishda dasturlash muhitidan foydalanish metodikasini takomillashtirish (umumiy o‘rta ta’lim maktablari misolida)," *Pedagogika fanlari bo‘yicha falsofa doktori (PhD) dissertatsiyasi avtoreferati*, Buxoro, 2022, 56 p.

[6] D. B. Sohibov, "Bo'lajak informatika o'qituvchilarini pedgogik faoliyatga tayyorlashdagi muammolar va yechimlar," *Ilm sarchashmalari ilmiy-nazariy, metodik jurnal*, ISSN 2010-6246, Urganch, vol. 12, no. 1, 2024.

[7] D. B. Sohibov, "The role of digital technologies in preparing students for pedagogical activity," *American Journal of Applied Science and Technology*, vol. 22–27, Apr. 11, 2024.

[8] A. R. Jo'rayev, "Pedagogik akmeologiya," *Oliy ta’lim muassasalarida o‘quv jarayonlarini elektron ta’lim resurslardan foydalanib tashkil etish imkoniyatlari*, pp. 240–246, 2022.

[9] D. B. Sohibov, "Informatika va axborot texnologiyalari fanini axborotlashgan jamiyatdagi o‘rni," *Ta’lim va innovatsion tadqiqotlar xalqaro ilmiy metodik jurnal*, 2024.

[10] A. R. Jo'rayev, "Pedagogik mahorat," *Bo‘lajak Texnologiya fani o‘qituvchilarini kasbiy kompetensiyalarini shakllantirishda dasturiy ta’lim vositalaridan foydalanish*, pp. 58–61, Jan. 2019.
[11] A. R. Jo'rayev, "Psixologiya," *Bo‘lajak Texnologiya fani o‘qituvchilarini kasbiy tayyorlashda dasturiy ta’lim vositalaridan foydalanishning pedagogik va psixologik asoslari*, pp. 30–32, Mar. 15, 2018.
[12] A. R. Jo'rayev, "Academy," *Problema kompyuterizatsii uchebnix protsessov*, pp. 28–31, Nov. 2020.
[13] D. B. Sohibov, "Innovations in Technology and Science Education," *O kvadratichnom stoxasticheskom operatore s nepodvijnoy*, pp. 747–752, Feb. 2023.
[14] D. B. Sohibov, "Sistemniy analiz soderjaniya nauchno-issledovatelskix rabot," in *International Conference on Artificial Intelligence and the Future of Inclusive Education*, ISBN 978-81-977564-4-3, 2025.
[15] D. B. Sohibov, "Metodika prepodavaniya predmeta monotonnie," *Pedagogik mahorat ilmiy-nazariy va metodik jurnal*, ISSN 2181-6883, no. 6, 2024.