ANNOTATION

for the dissertations on the topic «Teaching method of future computer science teachers computer networks on the base of simulation» for the degree of Doctor of Philosophy (PhD) in the specialty 8B015 - Teacher Training in Natural Sciences (6D011100 - Informatics) by Zhabayev Yermakhan Huryshevish

Research topic: Teaching method of future computer science teachers computer networks on the base of simulation.

Learning purpose: to develop a methodology for teaching computer networks based on network simulation by future computer science teachers.

Research goals:

– to analyze the scientific and pedagogical and educational literature on the problems of teaching computer networks in the preparation of future computer science teachers;

– to show the possibilities, to determine the need for training computer networks based on modeling networks of future computer science teachers;

– to clarify the structure and content of teaching computer networks to future computer science teachers based on network modeling;

– development of computer network training tools for future computer science teachers based on network modeling;

– development of a methodology for teaching computer networks based on modeling networks of future computer science teachers;

– experimental experimental verification of the effectiveness of computer network teaching methods based on network modeling by future computer science teachers.

Research methods: analysis, generalization, generalization of philosophical, pedagogical, psychological and scientific-methodical literature, educational standards, curricula, teaching aids on the topic of research; methods of observation, interviewing, questioning, testing of students; conducting experimental experimental work and summing up; method of statistical processing.

Basic principles of protection (proven scientific hypotheses and other concepts that are new knowledge):

The methodology for teaching future computer science teachers computer networks based on modeling networks using software environments and augmented reality, as well as the content and tools for teaching future computer science teachers computer networks based on modeling networks using software environments and augmented reality, the possibilities of teaching future computer science teachers computer networks based on Cisco Packet Tracer, NetEmul environments and augmented reality were demonstrated and the need was identified.

The main results of the research:

– the possibilities are demonstrated and the necessity of training future computer science teachers in computer networks based on network modeling using software environments and augmented reality is determined;

– the structure and content of training computer networks of future computer science teachers on the basis of network modeling using software environments and augmented reality has been clarified;

– based on network modeling using Cisco Packet Tracer, NetEmul and augmented reality environments, computer network training tools for future computer science teachers have been developed;

– a methodology for teaching computer networks to future computer science teachers based on network modeling using software environments and augmented reality has been developed.

Novelty and significance of the results obtained:

The significance of the scientific research lies in the further development of the field of theory and methodology of teaching computer science pedagogical science based on the simulation of computer network learning (software environment technology and augmented reality).

The first scientific result is new, since for the first time the possibilities have been demonstrated and the need for training future computer science teachers in computer networks based on network modeling using software environments and augmented reality has been determined. The possibilities of augmented reality and a software environment that visualizes a dynamic image of the main components of a computer network and the processes of their installation and functioning on a computer screen are demonstrated, literature analysis is carried out, the inability to provide a full practical orientation of computer network training in educational institutions is noted. It was caused by difficulties in using real devices, a lack of computer hardware capabilities when using virtual machines, these difficulties could be avoided with the help of network modeling. Network modeling refers to the dynamic image of the main components of a computer network, visualization and display on the computer screen of the conditions of their installation and operation. It follows from the above that it is necessary to use software environments and augmented reality that simulate the structure and functioning of networks.

The second scientific result is new, since for the first time the structure and content of teaching computer networks to future computer science teachers based on network modeling using software environments and augmented reality has been clarified. The content of teaching elective discipline «computer networks and web technologies» on the basis of network modeling is clarified. Network modeling software environments and augmented reality allow solving professional tasks of future computer science teachers in designing, configuring, maintaining and managing computer networks and fully providing them with high-quality training in this field.

The third scientific result is new, since for the first time computer network training tools based on network modeling have been developed for future computer science teachers using Cisco Packet Tracer, NetEmul and augmented reality environments. Learning tools contribute to the development of students' ideological

abilities, develop their thinking, contribute to the independent search and assimilation of new knowledge. Cisco Packet Tracer, NetEmul and augmented reality environments were used as training tools for future computer science teachers based on network modeling. In addition, on the basis of network modeling for future computer science teachers, an electronic manual for teaching computer networks and an educational and methodological manual for laboratory work have been developed.

The fourth scientific result is new, since for the first time a methodology has been developed for teaching future computer science teachers computer networks based on network modeling using software environments and augmented reality. The developed methodology allows the use of software environments and augmented reality modeling networks, develops students' creative thinking and problem-solving skills. Active methods and a demonstration method are offered as the main methods of teaching a computer network. At the same time, the results of the experiment showed the high efficiency of the methodology of teaching computer networks based on network modeling by future computer science teachers.

Compliance with the directions of science development or state programs:

Message of the President of the Republic of Kazakhstan N.Nazarbayev to the people of Kazakhstan «New opportunities for development in the conditions of the fourth industrial revolution» (January 10, 2018); State mandatory standards of higher and postgraduate education (July 20, 2022, №2); State mandatory standards of preschool education and training, primary, basic secondary and general secondary, technical and vocational, post-secondary education (August 3, 2022, № 348); President Kassym-Jomart Tokayev's State of the Nation Address «A just state. One nation. A prosperous society» (September 1, 2022); The concept of development of the information and communication technologies and digital sphere industry (December 30, 2021, №961).

The contribution of the doctoral student to the preparation of each publication (the share of the author of the dissertation, measured as a percentage of the total volume of the publication, is indicated):

1. Evaluation of the efficiency of teaching future informatics teachers in computer networks based on modeling of networks //Cypriot Journal of Educational Sciences. –2021. –Vol. 16, Iss.5. – P. 2769-2780. (Co-authored by: Bidaibekov Y., Shekerbekova Sh., Arynova G., Sharmukhanbet Sh., 50%);
2. The effectiveness of training future computer science teachers in computer networks based on network modelling // Journal of Theoretical and Applied Information Technology. –2022. –Vol. 100. Iss.4. – P. 938-947. (Co-authored by: Bidaibekov Y., Khenner E., Shekerbekova Sh., Zhanbyrbayev A., 60%);
3. Болашақ информатика мұғалімдерін желілерді модельдеу негізінде компьютерлік желілерге оқытудың қажеттілігі туралы //Абай атындағы ҚазҰПУ Хабаршы, «Физика-математика ғылымдары» сериясы. – Алматы. – 2019. №2(66). – Б. 301-306. (Қосалқы авторлар: Шекербекова Ш.Т., Жанбырбаев А.Б., 70%);

4. Использование NetEmul для моделирования и симуляции компьютерных сетей // Вестник КазНПУ им. Абая, серия «Физико-математические науки». – Алматы. – 2020. №2(70). – С. 203-209. (100%);

5. К вопросу обучения будущих учителей информатики компьютерным сетям на основе моделирования сетей // Вестник КазНПУ им. Абая, серия «Физико-математические науки». – Алматы. – 2020. №4(72). – С. 154-159. (В соавторстве: Бидайбеков Е.Ы., Хеннер Е.К., Шекербекова Ш.Т, 60%);

6. Болашақ информатика мұғалімдерін желіні модельдеу негізінде компьютерлік желілерге оқытудың тиімділігін эксперименттік тексеру // Абай атындағы ҚазҰПУ Хабаршы, «Физика-математика ғылымдары» сериясы. – Алматы. – 2021. №4(76). – Б. 143-149. (Қосалқы авторлар: Е.Ы.Бидайбеков, Ш.Т. Шекербекова, 60%);

7. Болашақ информатика мұғалімдерін компьютерлік желілерді оқытуда желілерді модельдеуге арналған программалық орталардың мүмкіндіктеріне талдау // «Педагогикалық білім берудің заманауи трендтері» VII Халықаралық ғылыми-практикалық конференция еңбектері. – Тараз. – 2019. – Б.18-21. (Қосалқы авторлар: Е.Ы.Бидайбеков, Жанбырбаев А.Б., Шекербекова Ш.Т., 60%);

8. Желіні модельдеуге арналған программалық орталарды пайдаланудың педагогикалық мақсаттары // Математикалық модельдеу мен ақпараттық технологиялар білімде және ғылымда: IX Халықаралық ғылыми-әдістемелік конференция материалдары. – Алматы. – 2020. – Б. 263-265. (100%);

9. Желілерді модельдеу негізінде компьютерлік желілерге оқытудың құрылымы мен мазмұны жайлы // «Оқу процесіндегі цифрлық трансформация және қолданбалы бағдарламалауды қамтамасыз ету» халықаралық ғылыми-тәжірибелік конференция материалдары. – Қызылорда. 2022. – Б. 372-377. (100%);

10. К вопросу подготовки будущих учителей информатики в области сетевых технологий // Сборник материалов XI Международной научно-практической конференции «Инфо-Стратегия 2019». – Самара. – 2019. – С. 313-318. (В соавторстве: Е.Ы.Бидайбеков, Жанбырбаев А.Б., 70%);

11. «Компьютерлік желілер және web-технологиялар» пәні бойынша зертханалық практикум // Оқу құралы. – Алматы: Абай атындағы ҚазҰПУ, 2022. – 92 бет. ISBN 978-601-298-997-7 (Қосалқы авторлар: Е.Ы.Бидайбеков, Шекербекова Ш.Т., 50%).