O'ZBEKISTON RESPUBLIKASI OLIY TA'LIM,
FAN VA INNOVATSIYALAR VAZIRLIGI

ABDULLA QODIRIY NOMIDAGI JIZZAX DAVLAT
PEDAGOGIKA UNIVERSITETI

«RAQAMLI TEXNOLOGIYALARNI O'QUV JARAYONIGA JORIY ETISHNING ZAMONAVIY HOLATI VA ISTIQBOLLARI»

xalqaro ilmiy-amaliy anjuman materiallari

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СОВРЕМЕННОЕ СОСТОЯНИЕ И ПЕРСПЕКТИВЫ ВНЕДРЕНИЯ ЦИФРОВЫХ ТЕХНОЛОГИЙ В ОБРАЗОВАТЕЛЬНЫЙ ПРОЦЕСС

Материалы международной научно-практической конференции
(14 ноября 2023 г.)

CURRENT STATE AND PROSPECTS FOR THE IMPLEMENTATION OF DIGITAL TECHNOLOGIES IN THE EDUCATIONAL PROCESS

Materials of the international scientific and practical conference
(November 14, 2023)

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OVERCOMING CHALLENGES FOR NOVICE PROGRAMMERS: INNOVATIONS IN TEACHING ARRAY HANDLING IN EDUCATIONAL PROGRAMS

Abstract: This study introduces a methodology for teaching programming to beginners, focusing on visualization, interactive video tutorials, and VR/AR technologies. The methodology is designed to enhance students' motivation, deepen their understanding of concepts, and promote independent learning. The integration of VR and AR enriches the learning experience, making it more engaging and applicable in practice.

Keywords: Beginners, Independent learning, In-depth understanding, Integration, Interactive video tutorials, Learning enrichment, Methodology, Practical learning, Programming, Teaching, Visualization, VR/AR technologies

In the modern world of information technology and digital literacy, understanding programming is becoming an integral part of education and professional growth. It is especially important that novice programmers, whether they are students or individuals striving to independently master this skill, have the opportunity to acquire fundamental skills, such as working with arrays.

Arrays are a universal tool in programming and are widely used for storing, processing, and managing data. However, learning arrays can be a challenge for programming beginners, and this is where innovative pedagogical technologies come into play.

In this article, we will explore the importance of exceptional array learning methods and present innovative approaches designed to meet the needs of beginners. Our goal is to review the current state of learning to work with arrays, justify the need for innovation, and determine which methods effectively help novice programmers overcome the difficulties they may encounter.

Before proceeding with the description of specific steps and methods, let's introduce you to the essence of our methodology. Our approach to learning how to work with arrays in programming is based on the use of innovative pedagogical

technologies that are specially designed to facilitate the process of mastering this important topic for programming beginners.

We place special importance on interactivity, visualization, and the practical applicability of educational materials. Our methods not only explain the theoretical aspects of working with arrays but also provide students with the opportunity to immediately apply their knowledge in practice. The entire learning process is structured and adapted for programming beginners to make it as clear and exciting as possible.

Now, let's take a closer look at the stages of our methodology:

Selection of training materials: In order to develop our methodology, we have meticulously selected training materials that cater to the needs of programming beginners. These materials comprise interactive online courses, textbooks with clear examples, video tutorials, and web applications offering practical tasks to reinforce knowledge.

Lesson Structure: We have developed a lesson structure that begins with simple concepts and gradually progresses to more complex tasks. The training material is divided into blocks, each of which focuses on specific aspects of working with arrays, including creation, element access, sorting, and filtering.

Using Visualization and Interactivity: In our methodology, we place special emphasis on the visual and interactive aspects. For instance, when studying the concept of arrays, students are provided with the opportunity to explore three-dimensional models of arrays in virtual reality (VR). They can literally pick up virtual arrays, move elements, change their values, and observe immediate results. This fosters a profound and visual comprehension of the principles behind working with arrays (Fig. 1).

Figure 1. Application of VR technologies on the topic "Working with arrays"

Furthermore, we have incorporated AR technologies into our educational materials. For example, students can employ smartphones or AR glasses to scan physical objects and transform them into virtual arrays. This enhances the interactive and practical nature of the learning process [1].

To reinforce the knowledge and practice of working with arrays, we offer interactive exercises, including puzzles and quests, through which students can solve problems using VR and AR capabilities [4].

Interactive video tutorials represent one of the cornerstone components of our instructional approach. These video tutorials are designed to enhance the learning process, making it more engaging and effective for students.

• **Visual Explanation of Concepts:** Video tutorials provide an opportunity to visually explain complex concepts related to working with arrays. Through visualization and real-time demonstrations, students can gain a better understanding of the abstract and technical aspects of this topic.

• **Demonstration of Practical Skills:** Our interactive video tutorials not only elucidate the theory but also demonstrate how to apply the knowledge in practice. Students can witness real code and processes related to the creation, modification, and management of arrays.

• **Interactive Exercises:** Video tutorials incorporate interactive elements that allow students to actively participate. They can answer questions, solve problems, and perform practical exercises while watching the tutorials [2].

• **Support for Self-Study:** Video tutorials are accessible at any convenient time, enabling students to study independently and enhance their skills in working with arrays.

• **Increased Motivation:** We present information and tasks in the form of gamified elements, puzzles, and quests, which engage students and boost their motivation.

• **Interactive Feedback:** While watching video tutorials, students receive instant feedback on their answers and actions, which assists them in improving their skills.

The integration of interactive video tutorials into our methodology makes learning to work with arrays even more accessible and effective, allowing students to achieve a deeper understanding and application of this vital topic.

Application of Game Elements: To make learning more engaging and enjoyable, we have incorporated game elements such as puzzles, quests, and simulations. Students can solve problems, compete with each other, and achieve goals, all of which helps enhance motivation and engagement [6].

Student Support: We offer support to students through online communication with experienced teachers and forums where they can ask questions and share their experiences with other students. This allows students to seek assistance and address any emerging difficulties.

Our methodology provides a comprehensive and in-depth understanding of working with arrays, taking into consideration the needs of programming beginners. We believe that innovative pedagogical technologies contribute to the successful development of this crucial topic.

The utilization of innovative pedagogical technologies, such as interactive video tutorials, VR, and AR technologies, when teaching the concept of working with arrays in programming, gives rise to several important aspects and challenges [3]. Let's delve into them in greater detail:

• *Enhanced Student Motivation:* Interactive video tutorials and gamified elements in learning can significantly boost student motivation. This approach makes

learning more engaging, fostering increased activity and interest on the part of students.

• *Deeper Understanding:* Visualization and interactivity assist students in gaining a deeper comprehension of complex concepts related to arrays. Interactive exercises and three-dimensional models enable students to observe and experience these aspects in real time.

• *Self-paced Learning:* Interactive video tutorials offer students the opportunity to study independently at their convenience, whether they are seeking to master programming during their free time from their studies or work.

• *Interactive Feedback:* The ability to receive immediate feedback on their responses and actions helps students enhance their skills and rectify mistakes in the early stages of learning.

• *Integration of VR and AR Technologies:* The incorporation of virtual and augmented reality technologies expands the boundaries of learning. Students can literally immerse themselves in the world of arrays and observe them in three-dimensional space. This not only makes learning more captivating but also facilitates an understanding of how arrays can be applied in real-world applications [5].

These aspects affirm that the use of innovative pedagogical technologies in teaching array manipulation contributes to more effective and engaging training for programming beginners.

In conclusion, our methodology is an effective way of teaching, which can make the process of mastering the topic of arrays in programming more interesting and accessible to all students. The use of visualization, interactivity and virtual and augmented reality technologies contributes to a deeper and more practical understanding of this topic, which in turn contributes to better learning outcomes.

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FIZIKADAN LABORATORIYA ISHLARI BO'LAJAK O'QITUVCHILARDA O'QUV-BILISH KOMPETENTLIKNI RIVOJLANTIRISH OMILI

Annotatsiya. *Ushbu maqolada bo'lajak fizika o'qituvchilarining o'quv bilish kompetentligini rivojlantirishda laboratoriya ishlarining muhim omil ekanligi ta'kidlangan. Oliy ta'lim tashkilotlarida fizikadan laboratoriya mashg'ulotlarini tashkil etish va o'tkazish metodikasida uchraydigan ba'zi kamchiliklar haqida fikr yuritilgan. Shuningdek, laboratoriya ishlarini bir qancha belgilar asosida tasniflash bo'yicha ma'lumotlar berilgan.*

Tayanch so'zlar: *bo'lajak o'qituvchi, kompetentlik, laboratoriya ishlari, tayyorgarlik bosqichlari, kondensator va kondensatorlar batareyasi, kuzatishlar va tajribalar.*

Аннотация. *В данной статье описывается, что лабораторная работа является важным фактором развития учебно-поновательной компетентности будущих учителей физики. Приведены некоторые недостатки методики организации и проведения лабораторных занятий по физике в организациях высшего образования. Также приведены сведения о классификации лабораторных работ по нескольким признакам.*

Ключевые слова: *будущий учитель, компетентность, лабораторная работа, подготовительные этапы, конденсатор и конденсаторная батарея, наблюдения и эксперименты.*

Abstract. *This article describes that laboratory work is an important factor in the development of educational competence of future physics teachers. Some disadvantages of the methodology for organizing and conducting laboratory classes in physics in higher education organizations are given. Information on the classification of laboratory work according to several criteria is also provided.*

Key words: *future teacher, competence, laboratory work, preparatory stages, capacitor and capacitor battery, observations and experiments.*

Zamonaviy o'qitish tizimi zimmasidagi asosiy vazifalardan biri ta'lim sifatini yangi bosqichga olib chiqish, ya'ni ijtimoiy-siyosiy hayotda faol mavqeini egallaydigan, erkin tafakkur va mustaqil dunyoqarashga ega bo'lgan, jamiyat va davlat oldida javobgarlikni his etadigan, atrofda ro'y berayotgan voqea-hodisalarga

4-sho'ba. Pedagog xodimlarning malakasini oshirish va qayta tayyorlash tizimlarida raqamli texnologiyalarni joriy etish mavjud holati tahlili va istiqbollari