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POSSIBILITIES FOR TEACHING SPECIALIZED SUBJECTS TO FUTURE TECHNOLOGY EDUCATION TEACHERS WITH IN A DIGITAL EDUCATIONAL ENVIRONMENT BASED ON AN INTEGRATIVE APPROACH: ALIGNMENT BETWEEN EXPERIENCE AND MODEL

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Abstract:
The article substantiates a pedagogical model for the training of future technology teachers, based on the integration of specialized subjects with digital education. Courses such as "Methodology for Interactive and Competency-Based Teaching of Technology" and "Methodology of Technology Education" serve as the foundation for this model. The goals, objectives, theoretical-methodological underpinnings, and technological aspects of the model are explored. Furthermore, the article analyzes indicators regarding the model's alignment with the educational process, based on the results of preliminary experimental testing.

Keywords: Technology, specialized subjects, digital education, integration, pedagogical model, digital competence, electronic educational resources.

Education in Uzbekistan is going digital and it's a top priority for the government. There are a few plans in place, like the Digital Uzbekistan-2030 strategy [9] and the concept for developing higher education until 2030 [10], that aim to get more technology into classrooms and help teachers improve their digital skills. The Development Strategy of New Uzbekistan for 2022-2026 [6] is also on board with this idea. Future tech teachers are especially important here, since they'll be the ones teaching kids practical skills, how to think technically, and get them ready for their future careers. When students study to become tech-ed specialists, two big problems come up. For one, the classes they take are pretty old-fashioned and often focus more on theory than hands-on practice, mainly because the schools don't have the right equipment [1, 3]. Another issue is that digital tech is taught as its own separate subject, like computer science, and isn't really connected to what they're learning in their main classes [1]. This means that when they graduate, they often struggle to use digital tools in their actual jobs [3].

There are two main issues here. One is that teachers need to be good with digital tools, but they often teach special subjects without using these tools [8]. The other issue is that students are good at using digital tools, but they don't know how to teach others about them in class [1]. This causes a problem because we need a way to teach that combines digital learning with regular subjects. We need a smart way to do this, based on research, so that students can learn how to use digital tools in their own teaching.

In this study, we're talking about digital education as a way of learning that uses digital resources, platforms, and technologies to organize the whole process [3]. Integrative teaching is all about bringing together the content of specialty courses, teaching methods, and digital tools into one system that works well together [1]. At the heart of specialty courses is a set of subjects that help prepare someone to become a technology teacher - this is what we mean by the base of specialty courses.

This study was set up in three parts to see how well a new teaching approach works. First, we looked at how things were before we started, then we tried out the new method, and finally, we checked the results and did some statistics. We had two groups of students: one learned the usual way and the other used our new approach. We based our study on a type of research that compares two groups, one that gets the new treatment and one that doesn't. Our new teaching method was used in two courses: "Methodology of Technology Education" and "Methodology of Interactive and Competency-Based Teaching of Technology." Each course had three main parts: learning the basics, doing practical tasks using digital tools, and learning how to teach technology in a professional way.

We used several methods to get the information we needed: we looked at what other educators and scientists have written, and we checked the rules and

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guidelines [6, 9, 10]. We also compared what students are learning in different classes, watched how teachers teach, and asked students questions. We gave them tests and tasks to complete, and used math and statistics to make sense of the results. To see how well the students were doing, we looked at three main things: what they knew, what they could do, and how motivated they were.

When they first started, the team used a questionnaire to figure out what was going wrong when teaching special courses to future tech teachers. After looking at the answers, they found out that the students who learned through a combination of digital tools and hands-on experience were better prepared to teach than those who didn't. This makes sense with what they thought would happen, and it shows that using a mix of digital and hands-on learning can be really effective. The students who used this approach seemed to have a better grasp of what they needed to know to teach tech classes.

In Uzbekistan, people have looked at how teachers are prepared for vocational and technology education, focusing on how they develop professionally and what skills they need [4]. When students move from studying to actually working, Verbitsky's idea of contextual learning is really helpful [7]. It shows how students can gradually go from learning in a classroom to working in their field, which gives a framework for combining book knowledge, hands-on skills, and teaching skills in technology education.

The European DigCompEdu framework is used to describe what it means for teachers to be digitally competent [2]. This framework was developed by the European Commission's Joint Research Centre and it breaks down into six main areas. These areas include how teachers engage with their profession, how they use digital resources, and how they teach and assess their students. It also looks at how teachers can help their students become more digitally competent. This framework is used for teachers at all levels, from general education to vocational training. Another important guide is the UNESCO ICT Competency Framework for Teachers, which was published in 2018 [5]. This framework serves as a standard that teachers around the world can follow. Many researchers have also reviewed and used the DigCompEdu framework, as well as similar ones, to assess how well teachers are doing when it comes to digital teaching [8].

Research has shown that how well teachers are prepared to use digital tools has a big impact on their ability to do their job [8]. Even after they graduate, many new teachers struggle to use technology in the classroom. A study of teachers in China found that training and having the right technology available are key to helping teachers develop their digital skills. But what if schools don't have the equipment they need? Some studies have found that virtual labs can be a good alternative, especially in fields like engineering and vocational training. These virtual labs can help students learn and get motivated, even if they don't have access to all the tools and materials they need. However, it's worth noting that the excitement of using new technology can wear off, and virtual labs can't replace hands-on experience entirely.

The research in Uzbekistan has looked at how technology teachers develop professionally and what skills they need [4, 1], but international studies only talk about digital skills in general [2, 5]. What's missing is a closer look at how digital education can be incorporated into the courses that train future technology teachers, and testing how well this works [8]. This study aims to fill that gap by creating a teaching model that combines digital education with the specialty courses for future technology teachers and seeing if it's effective. The goals are to understand the theory behind combining these courses, figure out which ones can be easily integrated with digital education, design the building blocks of this new teaching model, and then test it out in a real-world experiment to see how well it works.

We think that if we teach special classes in a way that combines learning with digital tools, and follow a new plan, students will learn more and be better at thinking, doing things, and motivating themselves than they would with the old way of teaching.

The results show that using digital tools as part of special courses, instead of teaching them separately, helps students develop the skills they need to work in their field [1]. This approach seems to work better than teaching digital tools as a standalone subject. It really supports students in getting ready for their future careers [3].

Teaching with technology is still held back by a lack of resources. But research on virtual labs shows that digital tools can help make up for this, at least to some extent. However, we need to look closer at how this applies to teaching teachers about technology. To move forward, we should create step-by-step guides on how to combine different approaches, figure out the key parts of a practical model, and determine the conditions needed to make it work in the classroom [1]. This will help us understand how to best use digital tools to support teacher education.

The problem of teaching tech to future teachers is that there isn't a complete approach to incorporating digital learning into their training. A new model was proposed, which has three main parts: core knowledge, hands-on

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digital tasks, and professional training. This model seemed to work better, as the group that used it showed more readiness to teach tech than the group that didn't. This approach could be useful for teaching tech teachers, but it needs to be tested with more people to make sure it really works.

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