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OPPORTUNITIES FOR USING A PROJECT-ORIENTED APPROACH IN TEACHING THE DISCIPLINE "FUNDAMENTALS OF WEB DESIGN" FOR FUTURE COMPUTER SCIENCE TEACHERS AND VOCATIONAL EDUCATION LECTURERS

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The modern educational paradigm, based on a competency-based approach, requires future computer science teachers and vocational education lecturers to possess not only deep subject knowledge but also innovative pedagogical technologies and the ability to effectively foster practical skills in their future pupils and students. In the context of the rapid development of digital technologies and the growing role of the web, the discipline "Fundamentals of Web Design" gains particular importance in the training of such specialists. It not only provides the necessary technical knowledge but also develops creative thinking, logic, and a systematic approach. In this context, the project-oriented approach (POA) acts as a powerful tool that allows future educators not only to master web design at a high practical level but also to deeply understand its teaching methodology and effectively apply the principles of project activity in their own educational practice. This ensures the formation of not only subject-specific but also key pedagogical competencies necessary for successful professional activity.

The relevance of the study is driven by a dual need facing the modern education system. First, there is an urgent need to train highly qualified computer science teachers and vocational education lecturers who not only know the basics of web design but also possess modern competencies in this dynamic field, including the latest trends and

technologies. Second, equally important is the need to develop in them deep pedagogical skills related to applying project activities in their own future educational practice. Traditional, predominantly reproductive, teaching methods often fail to provide the necessary level of methodological training and practical experience in implementing interactive and practice-oriented forms of learning. This creates a gap between theoretical knowledge and the ability to effectively apply and transmit it, which is critically important for effective web design instruction. This forms a strong basis for their future innovative pedagogical activity.

The goal of the study is to theoretically substantiate and experimentally verify the possibilities and effectiveness of applying the project-oriented approach in the educational process of the discipline "Fundamentals of Web Design" for the formation of integrated professional and methodological competencies of future computer science teachers and vocational education lecturers. This study aims not only to confirm the advantages of POA but also to develop specific recommendations for its systematic implementation in curricula, which will contribute to improving the quality of pedagogical staff training capable of meeting the challenges of the digital society.

An analysis of scientific works indicates a growing interest in project-oriented learning in the context of training specialists in various fields, reflecting global trends in education. Researchers such as S. Bell (2010) [1] and P. Blumenfeld et al. (1991) [2] emphasize its significant potential in forming key competencies such as critical thinking, creativity, teamwork, and problem-solving.

The theoretical and methodological foundations of professional training for future computer science teachers, in particular, have been thoroughly examined by O. Korotun (2019) [8] and D. Verbyvskyi (2017) [3], who laid the groundwork for understanding the complex nature of their training. In pedagogical science, POA is widely regarded as an effective means of integrating theoretical knowledge and practical skills, which is especially important for disciplines requiring active practical activity, such as web design. K. Horchynska, A. Pryhodii, and O. Savchenko (2023) [4; 5] extensively discuss the application of project technologies in teaching web design and in the system of professional training for future technology teachers. They convincingly demonstrate that it is through the implementation of practical projects that students gain unique experience in solving real-world problems, which is a fundamental basis for the formation of their professional competence. This includes the full project lifecycle: from initial planning and conceptualization to detailed development, comprehensive testing, and successful presentation of the final product. This approach directly aligns with the requirements for future web designers and, equally important, for the educators who will train these specialists. V. Kovalchuk and A. Shcherbak (2018) [7] and M. Mykhailichenko and A. Vlasenko (2017) [9] separately investigated project activities in the training of future computer science teachers, emphasizing its role in shaping their readiness for innovative pedagogical activity.

Despite a significant body of research on POA, aspects of applying this approach for the simultaneous, integrated formation of subject-specific (web design knowledge) and methodological (web design teaching skills) competencies in future educators

remain insufficiently studied. This research gap determines the necessity of the current study.

To achieve the stated goal, the following objectives and specific features of their implementation were defined:

1. Analyze the theoretical foundations and pedagogical potential of the Project-Oriented Approach (POA**)** in training future teachers and lecturers. The historical development of POA from John Dewey to modern interpretations was explored, and its principles were identified: problem-solving, independence, practical focus, knowledge integration, and flexibility. Particular attention was paid to a comparative analysis of project-based learning models (inquiry-based and problem-based) to adapt them to the specifics of "Fundamentals of Web Design" and the needs of future educators.

2. Identify key professional and methodological competencies required by future computer science teachers and lecturers for effective "Fundamentals of Web Design" instruction. Professional competencies include: knowledge of HTML5/CSS3, JavaScript, proficiency in graphic editors (Figma), and understanding UX/UI principles. Methodological competencies include: developing web design learning projects, organizing group work, effective assessment and feedback, and using digital tools for project management.

3. Develop and test a methodology for implementing POA in the "Fundamentals of Web Design" discipline for pedagogical students. The methodology covers all stages of project activity (initiation, planning, implementation, testing, presentation), clearly defining the roles of the lecturer (facilitator, consultant, expert) and students (developers, testers, presenters). Detailed assessment criteria were developed. For example, students developed interactive websites for a school museum or educational portals, dividing the project into micro-stages: audience research, prototype development, visual layout, coding, testing, and public presentation.

4. Conduct a pedagogical experiment for a comparative analysis of the level of professional and methodological competencies developed in control and experimental groups. The control group followed a traditional methodology, while the experimental group used the developed one. Initial and final testing (theoretical tests and practical tasks) was conducted, along with case assignments for assessing methodological competencies. Statistical analysis of the results confirmed the effectiveness of POA.

5. Assess the impact of POA on the development of creativity, critical thinking, the ability to organize group work, and the development of educational projects in future educators. Qualitative (observation, reflective reports, interviews) and quantitative (questionnaires, peer assessment) methods were used. The originality of design solutions, the justification of technology choices, the effectiveness of role distribution in the team, and the quality of methodological materials developed by students were evaluated.

6. Formulate practical recommendations for integrating POA into the educational programs for training future computer science teachers and vocational education lecturers. Recommendations include revising curricula, implementing new forms of learning (hackathons, design sprints), improving lecturer qualifications, and

developing examples of complex project tasks. Particular attention was paid to interdisciplinary projects.

The scientific novelty of the work lies in substantiating and developing a specific, comprehensive methodology for applying the project-oriented approach, aimed at the simultaneous, integrated formation of two interconnected groups of competencies: subject-specific (deep knowledge and practical skills in web design) and methodological (the ability to effectively teach web design using innovative approaches) in future computer science teachers and vocational education lecturers. This allows overcoming the gap between theoretical training and practical readiness for pedagogical activity in the context of education digitalization.

The practical significance of the study lies in the development of effective, tested pedagogical tools that can be directly used to optimize the educational process and significantly improve the quality of training for computer science teachers and vocational education lecturers. The research results can be implemented in the curricula and programs of pedagogical universities and colleges, as well as used for the development of methodological manuals and professional development courses for current educators. This will contribute to the formation of a new generation of teachers capable of effectively teaching students the digital skills necessary in the 21st century.

The systematic application of the project-oriented approach in the educational process of the "Fundamentals of Web Design" discipline for future computer science teachers and vocational education lecturers is expected to lead to significant positive changes. Specifically, it will contribute to:

1. A significant increase in the level of practical training of future teachers and lecturers in creating functional, aesthetically appealing, and user-oriented web solutions. They will not just know the theory but also be able to apply it in practice, creating real projects.

2. Intensive development of methodological skills for organizing project activities for their pupils and students. Future educators will learn not only to complete projects themselves but also to effectively manage the project work of others, formulate tasks, provide support, and evaluate results.

3. Substantial improvement in teamwork skills, effective communication, and public presentation of projects. This is critically important for the teacher's own professional activity (cooperation with colleagues, parents, administration) and for teaching students the skills necessary in the modern world.

4. A distinct increase in motivation for learning and the formation of a sustained interest in innovative teaching methods. Active participation in projects makes learning more engaging and relevant, increasing student involvement.

5. Formation of a portfolio for future educators, which will contain not only their own high-quality web design projects demonstrating their subject-specific competencies but also educational projects they developed for pupils/students, confirming their methodological skills and readiness for pedagogical activity.

Thus, the project-oriented approach is not merely an effective web design teaching methodology, but a powerful, multifunctional tool for the integrated formation of professional and pedagogical competencies in future computer science teachers and

vocational education lecturers. Its systematic and purposeful implementation will allow the preparation of specialists who not only possess modern knowledge and practical skills in web design but are also capable of effectively transferring this knowledge to their pupils/students, using innovative, practice-oriented, and interactive approaches that meet the requirements of modern education and the labor market.

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