APPLICATION OF ONLINE PLATFORMS IN TRAINING FOR THE DEVELOPMENT OF PROFESSIONAL DIGITAL COMPETENCES

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ABSTRACT

In the conditions of a global economy and an explosion of digital and online technologies, educational institutions must respond adequately by producing well-trained professionals with both professional and digital competencies. The digital competences of each person are an indicator of his successful realization in the professional sphere. The report provides an overview of training at the Forestry University in Sofia, Bulgaria. To assess the extent to which second-year Engineering Design (Interior and Furniture Design) students possess the necessary skills and digital professional competencies when working with unfamiliar online software, they were given the task of creating a 3D design of an apartment consisting of a living room with kitchenette and bathroom using Roomstyler's 3D planning tool. In the process of work, the student's digital knowledge and skills are evaluated. Participants in the assignment were also asked to complete an anonymous online survey to examine their satisfaction and attitude to work with novel software.

Key words: information technologies, digital competences, professional competences, educatioin.

INTRODUCTION

Information technology (IT) and related digital skills and competencies are the fastest growing areas of modern society. Digital transformation has changed society and the economy and is increasingly impacting everyday life and the way professional skills are developed and improved in all professions. This process requires the creation and maintenance of higher levels of digital capacity of education and training systems and institutions (https://education.ec.europa.eu/focus-topics/digital-education/action-plan).

Digital skills for work and life are high on the agenda of European policies related to building a competitive European digital economy (https://data.europa.eu/doi/10.2760/115376). The European Union (EU) Digital Skills Strategy and related policy initiatives aim to improve citizens' digital skills and competencies for digital transformation.

During the COVID pandemic, educational institutions have had to make a sudden shift to the use of online applications and distance learning platforms. Online technologies such as e-readable textbooks and books, various virtual applications, etc. make it imperative to master and develop digital competencies.

An EU initiative (https://education.ec.europa.eu/focus-topics/digital-education/action-plan) from 1 July 2020 supports digital skills for all, including through the "Digital Education Action Plan", which aims to: *1) improve digital skills and competencies for digital transformation*, while *2) fostering the development of a highly effective digital education system*. The Digital Competences and Action Plan of the European Pillar of Social Rights sets out the ambitious policy goals of reaching a minimum of 80% of the population with basic digital skills and having 20

million information and communication technology (ICT) professionals by 2030.

The National Development Program BULGARIA 2030 (https://www.minfin.bg/en/1394) is based on the vision, goals and priorities for the socio-economic development of Bulgaria in the period 2021-2030, approved by a Decision of the Council of Ministers no. 33 of 20.01.2020. The document describes in detail the strategic national priorities and the areas of impact that will be the subject of targeted interventions until 2030, arranged by priorities and sub-priorities and accompanied by result indicators related to the development goals of the UN. In the context of achieving the upgrading of students' digital competences, **Priority 1** ***Education and skills***, and in particular sub-priorities: *1.3 Quality of education*, *1.4 Lifelong learning*, *1.5 Digitalization and innovations in education*, are of particular importance (Table 1).

Table 1: Priority 1 Education and skills (source: https://www.minfin.bg/en/1394)

Sub-priority	Area of influence	Relevant UN Sustainable Development Goals
1.3. Quality of education	**1.3.a.** Key competences	**Goal 4** Quality education
	1.3.b. Applicability of education to achieve professional realization	**Goal 4** Quality education **Goal 8** Secure work and economic growth
1.4. Lifelong learning	**1.4.a.** Expanding opportunities for lifelong learning	**Goal 4** Quality education **Goal 8** Secure work and economic growth
	1.4.b. Quality and applicability of ongoing forms of lifelong learning	
1.5. Digitization and innovations in education	**1.5.a.** Digitization	**Goal 4** Quality education
	1.5.b. Educational innovations	
	1.5.c. System management	

The mission of the University of Forestry in Sofia, as a state higher education institution, is to implement the state policy for the development of higher education and science in the Republic of Bulgaria in a uniquely combined complex of specialties and the creation, dissemination and use of knowledge and skills for the benefit of society (https://ltu.bg/bg/universityet/presentation-of-the-university/mission-and-vision). As a national and international educational and scientific center, the University of Forestry strives to educate socially responsible individuals, showing entrepreneurship, adaptability and creative abilities for successful professional realization, who have adopted the European values of lifelong learning and contribute to the prosperity of Bulgaria and the transformation of the EU into a "knowledge-based economy".

The report overviews the training at the University of Forestry by module of IT-related disciplines that contribute to the development of the digital competences of students (of all majors, full-time Bachelor). The relationship of these competencies with the formation of professional ones through the use of online technologies and platforms in the educational process is examined. An experimental study on working with an unfamiliar online platform was conducted with Engineering Design (Interior and design of furniture) students to determine the degree of acquired digital competencies.

DIGITAL COMPETENCES

The process of creating the Digital Competence Framework, also known as DigComp, was initiated at the end of 2010 (https://data.europa.eu/doi/10.2760/115376). Created in 2013, DigComp 1.0 defines digital

competence as a combination of 21 competences grouped into 5 main areas – information, communication and collaboration, digital content creation, safety (security) and problem solving. An upgrade to the conceptual model known as DigComp 2.0 took place in 2016 when the five areas were updated. In 2018, the European Commission released a new version DigComp 2.1, a supplement to DigComp 2.0 with 8 proficiency levels and examples of use. The latest update of the Framework published by the European Commission is from 2022, with the addition of new examples of competences areas, skills and attitudes.

The Digital Education Action Plan (2021–2027) is a renewed EU policy initiative that sets out a common vision for high-quality, inclusive and accessible digital education in Europe and aims to support the adaptation of Member States' education systems to the digital age (https://education.ec.europa.eu/focus-topics/digital-education/action-plan). The Action Plan, adopted on 30 September 2020, is a call for greater cooperation at the European level in the field of digital education to address the challenges and opportunities of the COVID-19 pandemic and to present community funds focused on education, teachers, students, politicians, academics and researchers at national, European and international level. The Digital Education Plan sets out two strategic priorities and activities to support them:

- *Priority 1:* Promoting the development of a highly effective ecosystem for digital education which includes: infrastructure, connectivity and digital equipment; effective planning and development of digital capacity; competent and digitally confident teachers, educators and trainers; high-quality learning content, easy-to-use tools and secure platforms.
- *Priority 2:* Improving digital skills and competences for digital transformation with activities: basic digital skills and competences from an early age; digital literacy, including dealing with misinformation; computer education; good knowledge and understanding of data-intensive technologies such as artificial intelligence; advanced digital skills that benefit more digital professionals; guarantees that girls and young women are equally represented in learning and working in digital technologies.

The goal of the Digital Education Plan is that by 2030, less than 15% of eighth-graders in the EU have a low success rate in computer and information literacy (https://education.ec.europa.eu/focus-topics/digital-education/action-plan). To achieve this goal and to encourage mutual learning and the exchange of information and best practices between Member States, financial programs have been developed to enable the financing of digital and physical infrastructure and support the development of skills and innovative pedagogies. Also created:

- working groups in preschool, school and higher education that support EU Member States to make the European Education Area a reality in line with the Digital Education Action Plan, the European Skills Agenda and other flagship EU education policies, training and skills;
- a recovery and resilience mechanism to support Member States in meeting their digital education needs after the COVID-19 pandemic;
- a program with a focus on improving advanced digital skills;
- a free tool for students and teachers SELFIE (Self-reflection on Effective

Learning by Fostering the use of Innovative Educational Technologies), designed to help schools implement digital technologies in teaching, learning and assessment (https://education.ec.europa.eu/selfie/about-selfie).

IT TRAINING AT THE UNIVERSITY OF FORESTRY AND DIGITAL COMPETENCIES

The training in computer disciplines at the University of Forestry, Sofia, strives to meet the main modern trends for the acquisition of digital competences and their upgrading through training in higher education, in accordance with the national and European guidelines. The curricula of the disciplines related to the development of professional digital competences at the University of Forestry meet with the requirements of the Bulgarian National Qualification Framework (https://europa.eu/europass/system/files/2020-05/EQF%20Brochure-BG.pdf) and correspond to the criteria and goals set out in the qualification profiles of the specialties at the University of Forestry.

The adoption of the Bulgarian National Qualification Framework (NQF) is in fulfillment of Bulgaria's commitment according to the Recommendation of the European Parliament and of the Council to create a European Qualification Framework (EQF) for lifelong learning (https://www.strategy.bg/StrategicDocuments/View.aspx?lang=bg-BG&Id=719). The EQF is a common European Reference Framework created with the aim of providing a common European basis (point of reference) for comparing individual qualification levels from national qualification systems. The EQF contributes to improving the transparency and comprehensibility of qualifications in Europe, supports the mobility of learners and workers and the recognition of qualifications, stimulates the quality assurance of training, the validation and recognition of non-formal and independent learning, as well as the development of national qualifications frameworks. The NQF of the Republic of Bulgaria covers the entire educational system and all qualifications within it.

The EQF was established in 2008 and revised in 2017 with the aim of further development to make it more effective, which will facilitate the understanding of national, international and third country qualifications by employers, workers and learners (https://europa.eu/europass/en/europass-tools/european-qualifications-framework). The EQF and NQF that have been linked to it follow an approach that is based on learning outcomes and covers all types and levels of qualifications. Using these learning outcomes clearly shows what a person knows, understands and can do. Levels are determined depending on the level of mastery of a given skill or knowledge. Level 1 is the lowest and level 8 is the highest. The goal is to meet the requirements of the NQF at level 6B with the training in computer disciplines of the Bachelor students at the University of Forestry.

At the University of Forestry, a module of IT-related disciplines is studied, which are different for the different majors. After updating the curricula at the University of Forestry at the beginning of the 2021/2022 academic year, for the majority of the disciplines related to IT, the lecture hours were reduced to 15 hours, and the seminar hours were increased to 45 hours for a semester. This change aims to:

a) reduce the lecture material;

b) increase the degree of self-training of students related to theoretical issues, in a time and format convenient for them;

c) extend practical hours for learning and developing digital skills and competencies.

The IT discipline is compulsory for first-year students in 6 majors (Bachelor): Forestry, Engineering Design, Technology of Wood and Furniture, Ecology and Environmental Protection, Agronomy, Plant Protection (https://ltu.bg/bg/обучение/информация-за-специалностите).

The students of the majors Engineering Design and Technology of Wood and Furniture study *Computer Graphics* and *Computer Systems for Design* to upgrade the basic IT knowledge acquired in the first year of their education.

Students of the Alternative Tourism major study the compulsory subject *Computer Systems* in the first year, *Databases in Management* in the second year, and the elective subjects *Electronic Business and Trade in Tourism* and *Geographic Information Systems (GIS)* in the fourth year.

For the new major for the University, Computer Technologies in Furniture Industry, in the first year, students study the discipline *Fundamentals of CAD design* with a 30/75 hour schedule. The digital skills acquired in the first year are upgraded in the following years by studying the disciplines *Computer Animation and Virtual reality*, *Online commerce* and *Cloud technologies*.

Characteristics of IT training at the University of Forestry

Learning objectives – to build the competence base of the students for their further development as specialists in their professional field by mastering the theoretical and practical foundations of modern information technologies. To support students' training in the other disciplines of their majors because nowadays all learning is inextricably linked to the use of ICT, work and communication in a digital environment.

Technical provision of the educational process – equipped computer rooms with a whiteboard, multimedia projector and individual computer workstation for each student with access to the Internet.

Didactic training tools – lectures, presentations for self-study, laboratory exercises in computer rooms, tests, group discussions, practical assignments. The exercises are structured in such a way that students upgrade their knowledge on the topic and create a final product. For the application and sustainability of the acquired knowledge, students must solve independent and practical tasks.

E-learning tools used in the lessons of the module of information technology disciplines – Blackboard, Microsoft Teams.

Blackboard is a web-based virtual learning environment and learning management system developed by Blackboard Inc (https://www.blackboard.com). The software provides convenient course management features, a customizable open architecture, and a design that enables integration with student information systems and authentication protocols. It can be installed on local servers, on mobile devices or used as software, as a service.

The *Blackboard* platform was purchased and implemented in the University of Forestry education in 2013, being widely used in other disciplines as well.

Microsoft Teams (https://support.microsoft.com/en-us/teams) is an online platform for mobile and desktop devices with Windows, Mac, iOS and Android operating systems. Implements chat and video calls with advanced features, group calls, voicemail and call transfer. It also allows access to shared content at any time by easily finding, sharing and editing files in real-time

with online-based Word, Power Point and Excel by all group participants.

During the COVID-19 pandemic and the imposed distance learning for two academic years, the *Microsoft Teams* and *Blackboard* platforms supported the successful implementation of the entire educational process at the University of Forestry.

Assessment methods – tests, coursework, discussion participation and Wiki content development are hosted on the *Blackboard* platform and are part of the students' final assessment. The semester exam is practical, requiring students to apply their acquired knowledge and skills to solve specific tasks.

In order to achieve maximum results, the students taking IT courses should rely not only on the presented materials, but also on their presence and participation in appropriate group discussions and class presentations, as well as skills for independent learning.

PROFESSIONAL COMPETENCES AND IT TRAINING AT THE UNIVERSITY OF FORESTRY

According to the Law on professional education and training, professional competence is a proven ability to use professional knowledge, professional skills and personal qualities necessary for practicing a profession in accordance with the NQF (https://www.navet.government.bg/bg/media/37_0.pdf).

Professional skills enable an individual to apply their knowledge and skills in the context of a work environment and make employees more valued in their industry (Evans, 2021).

Basic competencies are all the knowledge that enables a person to access a certain type of training or work. This is the "minimum" that a person must possess in terms of certain knowledge in order to apply for training or employment. Examples of basic competences are: knowledge of using ICT, knowledge of a certain foreign language, etc.

The professional competencies included in the NQF, sub-level 6B (Bachelor) are (https://www.navet.government.bg/bg/media/NQF_bg.pdf):

- Collecting, classifying, evaluating and interpreting data from the field in order to solve specific tasks;
- Application of acquired knowledge and skills in new or unfamiliar situations;
- Demonstrate an ability to analyze in a broad or interdisciplinary context;
- Forming and expressing one's own opinion on social or ethical problems arising in the work process.

The IT training at the University of Forestry aims to enrich this list. From the review and summary of the qualification characteristics for all majors of University of Forestry (https://ltu.bg/bg/обучение/информация-за-специалностите), upon completion of higher education, students must possess the following digital professional competencies:

- Collect, classify, evaluate and interpret data from the field of furniture production in order to solve specific tasks related to use of modern computer systems for design, construction of furniture and management; automated technological design and programming of machines with Computer Numerical Control (CNC).
- Apply the acquired knowledge and skills in new settings and in a broader or interdisciplinary context.
- Use of new strategic approaches and express their own opinion on social and ethical issues arising in the work process.

- Work and communicate in a digital environment, create, format, protect and distribute template electronic documents.
- Enter, process, analyze and graphically present experimental data.
- Create and manage data models.
- Work with web-based registries, information systems and electronic administrative services.
- Prepare reports, studies, analyze the results of the studies.
- Demonstrate ability to adhere to a work schedule, be flexible and adaptable to changes in work assignments.
- Demonstrate consistency in preparing schedules for the execution of projects and customer orders.
- Quickly adapt to changes.

APPLICATION OF ONLINE PLATFORMS IN EDUCATION

Online technologies are readily available and therefore have spread widely in education and business during the pandemic period. The application of online platforms and their combination with different learning approaches makes the learning process innovative, diverse, dynamic and easily accessible.

Mihova's article is dedicated to parameters and methods for evaluating online platforms on which modern education is based in a distance form (Mihova, 2018). It provides basic guidelines for the development of distance learning and shows the differences in distance learning from traditional.

Research of Janelli demonstrates the importance of theory, practice and research (Janelli, 2018). The aim is to show how e-learning is similar to and different from traditional learning models. The author describes an example of an e-learning organization with a Massive Open Online Course (MOOC) developed by the American Museum of Natural History and the platform *Coursera* (https://www.coursera.org/).

Fomina studies the pedagogical activity of a university teacher, the development of methods, the preparation of content, the choice of technologies (Fomina, 2016). Examines the means and practice of composing online tasks, the use of active and interactive learning methods, analyzes the information and communication learning environment. It also compares the results of a study of students enrolled in blended and online learning models and gives recommendations for the implementation of methods, content formation and selection of modern technologies in the organization of online learning at the university.

The aim of study of Al Assadi is to improve students' writing skills when writing in the English language by using online platforms remotely (Al Asadi, Asadi, Al-Issa, 2022). Through the platforms, the researchers relied on stimulus, such as images, icons, and short titles to allow for deeper and more accurate participations.

Other studies related to online platforms in educaton: examination the effectiveness of online learning platforms *Zoom* (https://zoom.us) and *Moodle* (https://moodle.org) and their effect on the academic performance of Covenant University, Ota, Nigeria, students studying practical-related courses during COVID-19 (Adeyeye, Ojih, etc., 2022); analyze the factors that mediate the success of the use of online learning support platforms, based on the perceptions of a focus group of university professors, with a qualitative methodological approach (Rueda-Gómez, Rodríguez-Muñiz, Muñiz-Rodríguez 2023); development of 3D dynamic fashion garments with changeable styles, colors and textile patterns, especially using a 3D virtual simulation system, and to

examine their potential possibilities in online fashion platforms (Choi, 2022); research of students perception toward distance education during Covid19 Pandemic with online collaborative platforms in Indonesia (Rukmi, 2021); investigation of the academic staff's motivation for online teaching in Nigerian universities (Itasanmi, Oni, Ekpenyong, ect. 2022) and ect.

Purpose of the study. To check to what extent the students possess the necessary skills and digital professional competences when working with unfamiliar online software, an experiment was conducted. When selecting this online software product, we used the following criteria:

- be free;
- online based (no installation);
- there is no need to register for its use;
- to have a rich set of tools for 2D and 3D home and garden design;
- to have a function for quick visualization of the result and the possibility of sending by e-mail.

Among the many existing online applications meeting these criteria, the software product *Roomstyler* (https://roomstyler.com) was randomly selected to meet these conditions.

Research methodology. The experiment was conducted in the month of March 2023 during the Computer Systems for Design exercise classes with Bachelor students from Engineering Design, second year for the academic year 2022/2023. All 44 students took part in the experiment (100% participation).

The students' task is to create a 3D design of an apartment consisting of a living room with a kitchenette and a bathroom using the 3D planner tool of *Roomstyler* (https://roomstyler.com/3dplanner) for 2 class hours. The finished project is sent to the teacher, and in the process of work, the student's digital knowledge and skills are evaluated.

Results analysis. At the end of the assignment, an anonymous online survey, consisting of 4 questions, related to the assignment was conducted with the students.

To the question "Did you quickly navigate the interface for working with the online application", 73% of students answered "Yes, completely" (Figure 1), which indicates an ability to apply the acquired digital knowledge and skills in new settings.

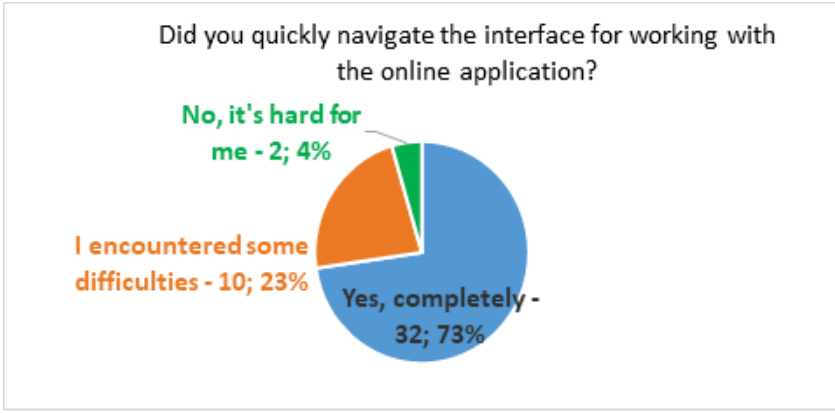


Figure 1: Answers to the question „Did you quickly navigate the interface for working with the online application?"

To the question "Will you use this application or similar to it in the future?" the evasive and negative answers are given by 36% of the participants (Figure 2). This speaks more about the qualities of the chosen application than about a reluctance to work with similar applications in general. More than half of the participants (64%) are ready to work in a digital and online environment.

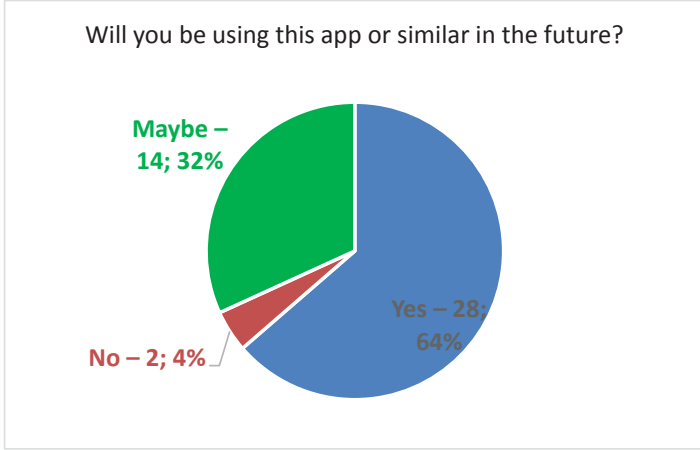


Figure 2: Student responses to their readiness to use this app or similar in the future?

The students' answers to the next two questions are of interest because they reveal the extent of their knowledge of design technology in general, as well as their ability to evaluate and think critically. Figure 3 shows the positive responses of 71% of students to the question "Does this application solve tasks related to design and furniture design?", and Figure 4 reflects the positive attitude of 84% of students who consider that working with online applications and platforms enriches their digital professional competencies.

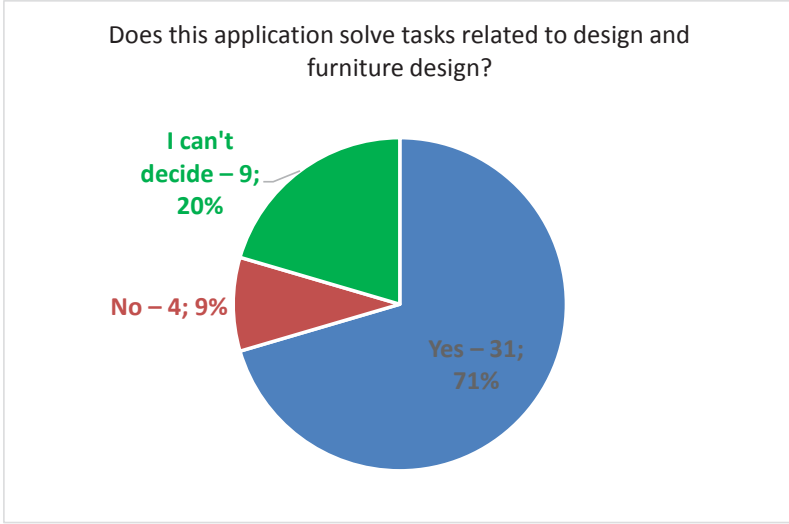


Figure 3: Student opinions on the suitability of this application to solve tasks related to design and furniture design

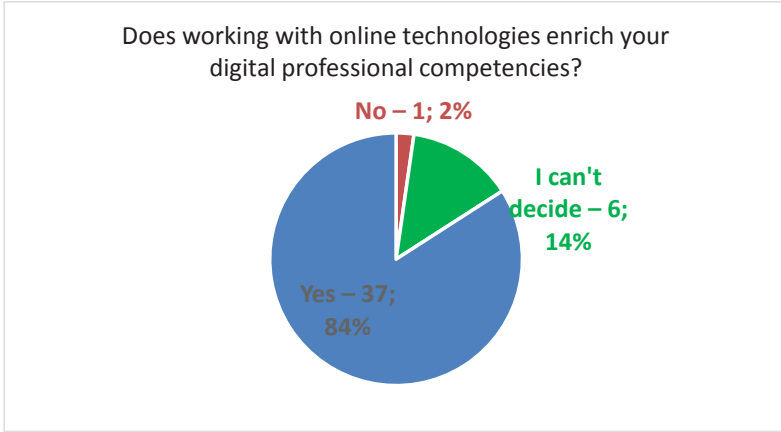
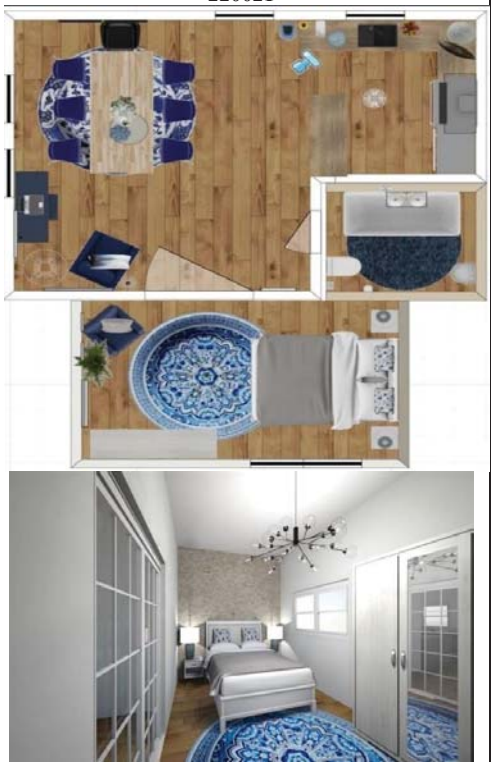


Figure 4: Answers to the question „Does working with online technologies enrich your digital professional competencies?“

Figure 5 shows some of the projects implemented with the *Roomstyler* platform by the students of Engineering Design, second year in the academic year 2022/2023.

a) Design by Simona Georgieva, Faculty № 220021



b) Design by Ralitsa Stoyanova, Faculty №220042

Figure 5: A selection of the 3D projects of students from Engineering Design, second year for the academic year 2022/2023 [a)] Author Simona Georgieva, Faculty № 220021; [b)] Author Ralitsa Stoyanova, Faculty №220042

CONCLUSION

The conducted experimental study on working with a novel online platform with the second-year students majoring in Engineering Design and the results of online survey shows that they are able to:

- Collect, evaluate and interpret data from the field of design in order to solve specific tasks;
- Apply the acquired knowledge and skills in new or unfamiliar conditions;
- Demonstrate the ability to analyze;
- Form and express their own opinion related to the desire and readiness to work in a digital and online environment;
- Quickly navigate the interface for working with the online application;
- Working with online applications and platforms enriches their digital professional competencies.

The study proves that the University of Forestry creates and develops the professional digital competences of students throughout the entire learning process by applying a variety of methods, technologies and approaches in learning.

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UNIVERSITY OF FORESTRY
FACULTY OF FOREST INDUSTRY

INNOVATION IN WOODWORKING INDUSTRY AND ENGINEERING DESIGN

1/2023

INNO vol. XII Sofia

ISSN 1314-6149
e-ISSN 2367-6663

Indexed with and included in CABI

INNOVATION IN WOODWORKING INDUSTRY AND ENGINEERING DESIGN

Science Journal
Vol. 12/ p. 1–80
Sofia 1/2023

ISSN 1314-6149
e-ISSN 2367-6663

Edition of
FACULTY OF FOREST INDUSTRY – UNIVERSITY OF FORESTRY – SOFIA

The Scientific Journal is indexed with and included in CABI.

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Cover Design: DESISLAVA ANGELOVA

Printed by: INTEL ENTRANCE
Publisher address: UNIVERSITY OF FORESTRY – FACULTY OF FOREST INDUSTRY
Kliment Ohridski Bul., 10, Sofia, 1797, BULGARIA
http://inno.ltu.bg
http://www.scjournal-inno.com/

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