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VARIOUS ADVANTAGES OF IMPLEMENTING ONLINE COURSES IN TECHNICAL DRAWING CURRICULUM

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Abstract *– The paper provides the description of different e-courses for additional learning and self-study for students.*

Key words *– E-courses, technical drawing, self-study, online learning.*

Problem statement. Traditional methods of teaching technical drawing often lack accessibility and flexibility, limiting students' access to resources and learning opportunities. The absence of visual and multimedia learning tools hinders students' understanding and application of complex technical drawing concepts and techniques. Limited opportunities for practice and timely feedback impede students' ability to refine their technical drawing skills and address areas of improvement effectively. The lack of collaboration and peer learning in traditional classroom settings restricts students' exposure to diverse perspectives and industry-relevant projects. The absence of remote access to software and industry-specific tools prevents students from gaining hands-on experience and proficiency in technical drawing applications, limiting their readiness for real-world scenarios. The topic is highly important for Ukraine, especially due to the ongoing Russian war, as most universities have been working remotely for three years up to now.

The state of theme research. The field of online learning in technical drawing education is rapidly evolving, with a growing body of research focusing on the benefits and effectiveness of online learning platforms for teaching technical drawing. Different studies have explored the impact of online learning on student engagement, performance, and satisfaction in technical drawing courses, highlighting the potential advantages of online platforms in enhancing learning outcomes. They have also examined the effectiveness of multimedia and interactive elements in online courses for facilitating visual understanding and practical application of technical drawing concepts. Overall, the research on the opportunities of teaching technical drawing online is ongoing and has shown promising results in terms of accessibility, engagement, and skill development.

Task statement. Explore the diverse opportunities and advantages offered by teaching technical drawing online using suitable available e-courses.

The main material. One of the sectors profoundly affected by the COVID-19 pandemic was education. Educational institutions were forced to close their doors to ensure the safety of students, teachers, and staff. As a result, traditional classroom-based education came to a halt, and the education system had to rapidly adapt to new ways of teaching and learning. The impact of the pandemic on the education system was significant and multi-faceted. Some of the key effects include technological challenges, adaptation, learning disruptions, social and emotional impact [1].

During the pandemic, teachers had to transform their usual practices into a complete online mode, and in case of Ukraine, this created a foundation for an opportunity to support a sustainable learning process during the Russian full-scale invasion. The challenges of the pandemic conditions intensified further when the invasion started, and new challenges emerged. Studying during war presents challenges related to disrupted infrastructure, regular power outages, safety concerns, displacement, emotional impact, lack of resources, disrupted teacher-student relationships, limited funding, and uncertain future opportunities. Overcoming these challenges requires significant support from the international community, governments, and educational organizations to ensure that students in war-affected areas have access to high-quality education and the necessary support to thrive in difficult circumstances.

In the current situation, the use of online-learning opportunities is highly prevalent. Teachers can record lectures and distribute them to students, allowing them to study at a suitable time. Frequently, there are situations when teachers and students reside in different parts of the country or abroad, making it impossible to be online at the same scheduled time due to power outages.

As more than half of the overall study time is dedicated to self-study, the use of additional e-learning courses is extremely beneficial. Especially in the field of technical drawing, where explanation, visualization, and feedback from the teacher are highly necessary.

When it comes to learning technical drawing, there are several free online courses available that can help students acquire the necessary skills and knowledge, going beyond the formal education. Whether there is a beginner looking to understand the fundamentals or an experienced professional seeking to enhance their expertise, these courses offer valuable resources and instructions.

Here are a few free online courses that cover technical drawing:

1. Autodesk Design Academy: Autodesk, the company behind AutoCAD, offers a variety of free online courses through their Design Academy. They have courses on technical drawing fundamentals, 2D drafting, and 3D modeling [2].

2. Alison - Technical Drawing Courses: Alison is a platform that offers free online courses, including several on technical drawing. They have courses on topics such as technical drawing basics, engineering drawing, and architectural drawing [3].

3. edX - Engineering Drawing and CAD Technology: This course, offered by Tsinghua University, provides an introduction to engineering drawing and CAD technology. It covers topics such as geometric construction, orthographic projection, and dimensioning [4].

4. MIT OpenCourseWare - Engineering Drawing and CAD: MIT OpenCourseWare offers free access to course materials from their engineering programs. The "Engineering Drawing and CAD" course provides lectures, assignments, and resources on technical drawing principles and CAD tools [5].

5. Udemy - AutoCAD: The Complete 2D Drafting Tutorial: Though Udemy primarily offers paid courses, they also have some free options. "AutoCAD: The Complete 2D Drafting Tutorial" is a popular course that covers the basics of technical drawing in AutoCAD [6].

6. Numerous YouTube channels dedicated to this field [7]. YouTube can be a valuable and accessible resource for individuals interested in acquiring or improving their skills in this field. YouTube offers a wide range of video tutorials, demonstrations, and instructional content created by knowledgeable individuals, industry professionals, and educators. However, it is important to note that not all content on YouTube is created by experts or follows established educational standards. Therefore, learners should have critical thinking skills and carefully choose reputable channels and creators who provide accurate and reliable information.

Here are some benefits of learning technical drawing through different e-sources:

- Visual Learning: different online resources provide a visual platform where learners can watch step-by-step demonstrations and real-life examples of technical drawing techniques. Visual learning can be highly effective for understanding complex concepts and visualizing the process of creating technical drawings.
- Wide Variety of Content: e-learning courses host a vast array of technical drawing channels and videos covering different aspects of the subject. This variety allows learners to explore various approaches, styles, and techniques to find the content that best suits their learning preferences and goals.
- Accessibility and Flexibility: e-learning courses are accessible to anyone with an internet connection and can be accessed at any time, providing flexibility in learning. Learners can pause, rewind, or replay videos as needed, allowing them to learn at their own pace and revisit specific topics when necessary.
- Community Interaction: e-learning courses offer the opportunity for learners to engage with the creators and other enrolled participants through comments and discussions. This fosters a sense of community, where learners can ask questions, share their work, and receive feedback and support from both instructors and fellow learners.
- Up-to-Date and Relevant Content: content creators often strive to provide up-to-date information and keep pace with industry trends and advancements in technical drawing. Learners can benefit from accessing the latest

techniques, software tutorials, and industry-specific knowledge through e-learning courses dedicated to technical drawing.

• Cost-Effective Learning: learning technical drawing through online resources is generally free of charge. Even thoough some content creators may offer premium courses or additional resources for a fee, there is a vast amount of high-quality educational content available for free, making it a cost-effective learning option.

• Supplement to Formal Education: such courses can serve as a valuable supplement to formal education in technical drawing. It can provide additional practice exercises, alternative explanations, and different perspectives that can complement and enhance the learning experience in a formal educational setting.

Conclusions. Online courses offer valuable content and resources to help students develop their technical drawing skills. It is important to review the course details, including any prerequisites or recommended software, to ensure a good fit for students' needs. As practical experience is essential in mastering technical drawing, it is also important to dedicate time and effort to practice and apply all the theoretical information that students have learnt. Such an opportunity can be a good addition to basic formal study, and students can benefit greatly from utilizing them.

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