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DEVELOPING STUDENTS' SELF-LEARNING ABILITY IN ENGINEERING THROUGH THE USE OF TECHNOLOGY IN TECHNICAL DRAWING

Abstract

Self-learning plays a vital role in renewing university teaching methods and enhancing educational quality. It fosters independent thinking, creativity, and problem-solving. This article outlines key concepts of self-learning and proposes measures to develop this ability among students.

Keywords:

development; self-learning; self-learning ability; students.

1. Introduction

Self-learning is a vital trend in modern education, shifting learners into active agents of their own development. It improves academic outcomes and teaching quality, fostering independence, creativity, and lifelong learning. Therefore, enhancing students' self-learning ability is an urgent and essential task in today's university education.

2. Some Basic Concepts

2.1. Self-learning

Self-learning has attracted much scholarly attention. According to Nguyen Hien Le (1992), it is a voluntary process of acquiring knowledge without necessarily relying on a teacher. Luu Xuan Moi (2003) emphasizes both in-class and out-of-class learning, regardless of a fixed curriculum. Nguyen Canh Toan et al. (2009) view it as a cognitive and sometimes physical process using intellectual abilities and personal motivation.

In summary, self-learning is a self-directed, purposeful activity requiring awareness, planning, discipline, and skills to acquire and expand knowledge creatively.

2.2. Self-learning Ability

Self-learning ability refers to one's capacity to independently acquire and apply knowledge effectively in new contexts. It encompasses knowledge, skills, experience, and attitudes, serving as a core component of lifelong learning. This ability comprises four main elements: professional, methodological, social, and individual competence.

Key self-learning capacities include problem recognition, information processing, knowledge application, collaboration, self-development, and self-assessment. Evaluation is based on academic outcomes, presentations, self/peer reviews, learning products, and classroom observations.

This article explores how virtual models in technical drawing instruction can nurture these abilities.

3. Practical Research

3.1. Current Situation

The author asserts that Asian students, including Vietnamese, are not inherently lacking in self-learning ability; rather, traditional educational systems have not adequately supported its development. In Vietnam, this ability can be enhanced through the use of technology, which is essential for success in a knowledge-based and globally integrated society. The 2019 Education Law highlights the importance of active, creative, and self-directed learning.

Comparative insights from Dutch higher education show strong emphasis on student initiative, time

management, and independent study. In contrast, Vietnam's higher education remains overly reliant on passive, rote learning, limiting students' confidence and teamwork skills. Though recent reforms promote a student-centered approach, much remains to be done to fully foster self-learning among university students.

3.2. The Development of Technology

The rapid advancement of technology, especially AI and virtual reality, is transforming teaching and learning. These tools offer great potential for enhancing self-learning, but effective use requires clear educational strategies. VR and simulation technologies enrich learning environments, though they may increase complexity.

AI applications—such as automated assessments and personalized learning tools—can support student autonomy, self-regulation, and reflective thinking. When thoughtfully designed, AI can serve as a personal learning assistant without compromising independence. However, to ensure ethical and effective implementation, issues of data privacy, transparency, and pedagogical relevance must be addressed.

4. Example

A student in the engineering field receives a technical drawing of an object, including two views: the front view and the top view. This drawing is illustrated below. The student's task is to self-learn how to draw the third view (side view) and the orthogonal projection of the given object.

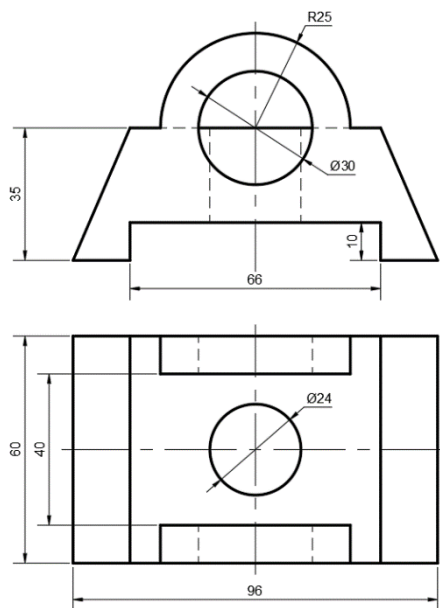


Figure 1

The student's self-learning process to complete the drawing will unfold as follows, utilizing self-learning abilities and the support of technology:

1. Applying Self-learning Abilities (SLA):

In technical drawing, self-learning ability (SLA) manifests through several key competencies. Students first **recognize problems** by analyzing given views and identifying the need to construct the third view. They **gather and process information** on orthogonal projection principles using textbooks and digital resources. Next, they **remember and apply knowledge** by accurately drawing based on learned rules of projection. Through **personal development**, students apply critical thinking and perseverance to manage challenges during the drawing process. Finally, they **evaluate and self-evaluate** by checking their work, identifying and correcting errors to improve drawing quality. This cycle reinforces autonomy and readiness for technology-integrated learning environments.

The final result achieved by the student is illustrated below:

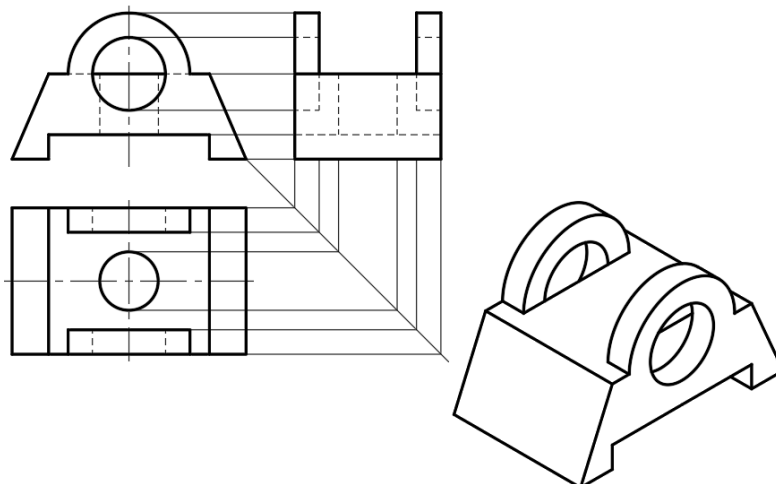


Figure 2

2. Support from Technology

In today's era of rapid technological advancement, integrating technology into teaching—especially in technical fields—offers significant benefits. In technical drawing, technology actively supports students' self-learning by enhancing visualization, access to resources, and feedback mechanisms.

Virtual models and CAD software: Students can utilize CAD software to create 3D virtual models from two given views, aiding in visualizing the object and reasoning the third view accurately. This enhances spatial understanding and supports more effective learning in Technical Drawing.

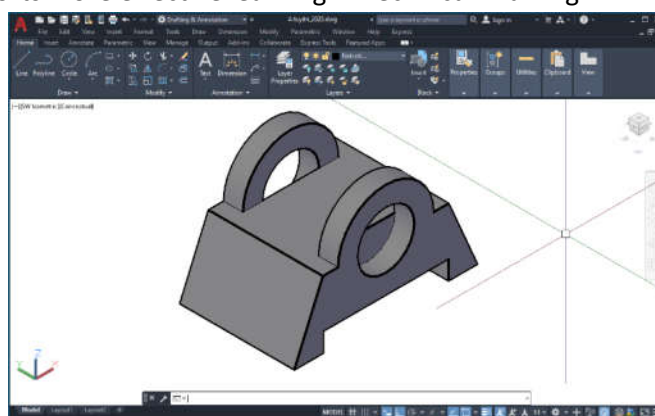


Figure 3

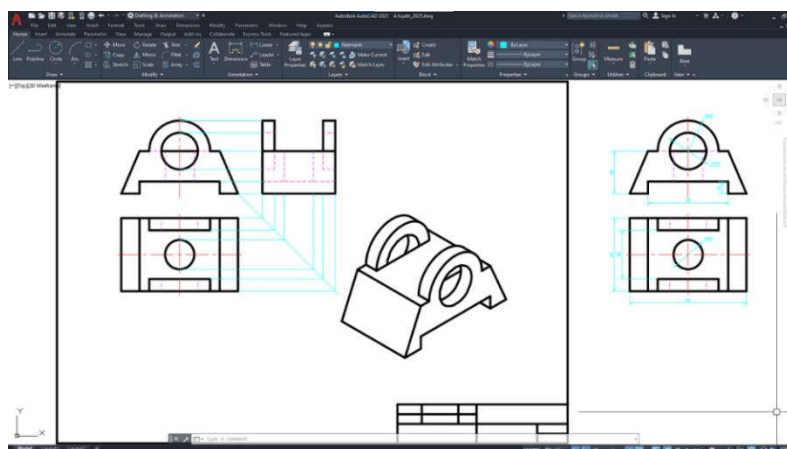


Figure 4

Artificial Intelligence (AI):

AI supports self-learning in technical drawing through intelligent search tools, personalized feedback systems, and learning assistants. These technologies help students access visual resources, identify errors, and track progress while maintaining autonomy.

By combining theoretical knowledge with self-learning skills—analysis, information gathering, application, and self-evaluation—students can effectively use AI and virtual tools to visualize, draw, and refine technical drawings. This enhances learning outcomes and nurtures lifelong self-learning capacity.

4. Conclusion

Self-learning remains a challenge for many university students. Therefore, integrating self-learning methods into training objectives is essential—not only for academic success but also for lifelong societal integration. With strong self-learning skills, students can independently explore and master complex topics, while developing persistence, creativity, and autonomy. Teaching students how to learn should be prioritized to improve the overall quality and effectiveness of university education.

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ПСИХОЛОГИЧЕСКИЕ ПРОБЛЕМЫ ИНФОРМАЦИОННОЙ ТРАНСФОРМАЦИИ ОБРАЗОВАНИЯ**Аннотация**

Актуализированы основные психологические проблемы информационной трансформации образования, последствия и изменения. Определены последствия такая реструктуризации для архитектуры информационного и содержательного обеспечения образования. Обозначены позитивные и негативные психологические последствия трансформации образования в цифровой формат.