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COMPUTER AIDED DESIGN SYSTEM IN TEACHING FOREIGN LANGUAGE

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Summary. This article examines the pedagogical potential of Computer-Aided Design (CAD) systems in foreign language teaching, emphasizing the role in enhancing professional vocabulary, communicative competence, and learner motivation. The study outlines theoretical foundations, practical applications, and methodological guidelines for integrating CAD into language instruction within CLIL and project-based learning frameworks. The findings demonstrate that CAD-supported tasks can effectively combine linguistic development with digital and design skills, offering a valuable interdisciplinary approach to modern language education.

Key words: Computer-Aided Design (CAD), foreign language teaching, multimodal learning, professional vocabulary, CLIL methodology, project-based learning, digital literacy.

Formulation of the problem. The rapid expansion of digital technologies in education has redefined the pedagogical landscape, requiring language instructors and learners to acquire new competencies that integrate both linguistic and technological skills. Among these technologies, Computer-Aided Design (CAD) systems – traditionally associated with engineering, architecture, and technical modeling – have recently begun to attract scholarly attention as a potential tool for interdisciplinary learning, including the teaching of foreign languages. While CAD systems were not originally conceptualized for language pedagogy, their advanced

visualization features, design-based tasks, and opportunities for authentic problem-solving create new conditions for communicative learning and multimodal literacy.

Foreign language education increasingly emphasizes task-based learning, project work, and content-and-language integrated learning (CLIL). In this context, CAD systems can serve not only as tools for technical drawing but also as platforms for communicative interaction, vocabulary acquisition, and collaborative project development in a target language. However, the theoretical justification and methodological guidelines for such integration remain insufficiently developed. The problem therefore lies in determining how CAD systems can be adapted and pedagogically framed to enhance foreign language learning rather than distract from it.

Another challenge relates to the cognitive load imposed by technical software. CAD environments require learners to navigate complex interfaces, understand design logic, and creatively manipulate objects in a 3D or schematic space. While these challenges may stimulate higher-order thinking and promote meaningful learning, they may also hinder language acquisition if not managed properly. Thus, research must clarify the pedagogical benefits and limitations of adopting CAD technology in language classrooms.

Finally, the increasing demand for interdisciplinary skills in global educational systems necessitates a precise understanding of how CAD systems can support learning outcomes not only in engineering disciplines but also in communicative competence, intercultural competence, professional vocabulary, and digital literacy. These issues form the basis for the present exploration of CAD as an innovative tool in foreign language teaching.

Formulation of the problem. The integration of CAD systems into foreign language teaching can be grounded in several theoretical frameworks. First, constructivist pedagogy supports the idea that learners

build knowledge through active engagement with meaningful tasks. CAD design activities – such as creating models, diagrams, and architectural layouts – promote experiential learning, which can be enriched by requiring learners to articulate decisions, describe processes, and collaborate using the target language.

Second, multimodal learning theory emphasizes the combination of visual, linguistic, and kinesthetic modalities. CAD environments naturally involve the interpretation and manipulation of visual information, which can scaffold language learning by anchoring abstract vocabulary in concrete visual representations. For instance, students learning English for engineering purposes may remember terminology more effectively when linking words to 3D models or design actions performed within CAD software [1].

Third, CLIL (Content and Language Integrated Learning) frameworks support integrating subject-matter content with language objectives. CAD tasks provide authentic professional contexts that encourage learners to use subject-specific vocabulary, follow technical instructions, and engage in professional communication in the target language.

Basic research materials. CAD systems offer an abundance of real-world, field-specific content. Language learners can acquire terminology related to geometry, dimensions, spatial relationships, architecture, mechanics, and design operations. Instead of learning vocabulary in isolation, students interact with objects and processes directly, reinforcing both comprehension and retention.

Collaborative design tasks require students to negotiate, describe changes, justify design choices, and plan projects in the target language. For example, students may work in pairs to design a building floor plan and then present it. Such assignments develop speaking, listening, writing, and reading skills within meaningful communication.

The creative nature of CAD tasks increases student motivation. Visual design, personalization of projects, and the possibility of producing a

tangible final product (e.g., a rendered model) provide psychological satisfaction. Working in CAD environments involves problem-solving, algorithmic thinking, and data interpretation. In foreign language contexts, students must also interpret instructions in the target language, evaluate solutions, and discuss results, thereby fostering complex cognitive skills alongside linguistic competence.

There are some practical applications of CAD-based methods in language instruction. Language for Specific Purposes (LSP) courses can integrate CAD systems to simulate professional scenarios. For example:

- Engineering students can design parts and describe the functions in English.
- Architecture students can model spaces and write technical specifications.
- Interior design learners can create layouts and present them in a foreign language.

These tasks promote meaningful use of specialized vocabulary and professional genres of communication.

CAD systems provide excellent opportunities for project-based learning (PBL). Students can be assigned multi-stage projects that require planning, designing, documenting, and presenting – all in the target language. Such projects might include:

- Designing a sustainable house.
- Reconstructing a historical monument.
- Creating a model for a community space.
- Simulating an engineering mechanism.

Each stage involves linguistic interaction: brainstorming, reporting progress, writing instructions, or preparing a final presentation.

Assessing language learning in CAD-supported environments requires both linguistic and design criteria. Instructors may evaluate:

- correct use of technical vocabulary;
- clarity and coherence of oral or written explanations;

- accuracy of design descriptions;
- collaborative communication effectiveness.

Digital screenshots, exported models, or screen recordings can be used as evidence of performance. Peer assessment is also effective, encouraging students to critique designs and communicate feedback in the target language.

Despite its pedagogical potential, integrating CAD systems into foreign language teaching presents several challenges:

1. *Technical complexity*: CAD software may be difficult for beginners, requiring substantial training and support.
2. *Cognitive overload*: balancing design tasks with language tasks may overwhelm learners if not properly scaffolded.
3. *Access to technology*: not all institutions have sufficient hardware or software licenses.
4. *Instructor readiness*: language teachers may lack expertise in CAD tools, necessitating professional development.
5. *Curriculum alignment*: integrating CAD requires adapting syllabi and ensuring that language aims remain central.

Addressing these issues involves selecting user-friendly CAD platforms, simplifying tasks for beginners, and designing learning activities where language use is clearly defined [2].

For effective use of CAD systems in language classrooms, educators should begin with basic tasks, provide glossaries, and model phrases for design-related communication, use CAD activities as part of larger integrated projects rather than isolated tasks, offer technical support during early stages, ensure that language objectives remain the primary focus.

When implemented thoughtfully, CAD becomes a multimodal platform that enriches foreign language learning through creativity, interaction, and professional relevance.

Conclusions. CAD systems represent an innovative and promising direction in foreign language education, particularly within professional and

technical contexts. The integration supports interdisciplinary learning by combining linguistic development with design thinking, digital competence, and collaborative problem-solving. As shown in this study, CAD-based activities can enhance vocabulary acquisition, communicative competence, motivation, and engagement. They also allow the creation of meaningful, real-world tasks aligned with CLIL and project-based methodologies.

However, successful implementation requires careful planning, methodological support, and awareness of potential challenges. Educators must ensure that CAD tasks remain pedagogically grounded, manageable in complexity, and clearly connected to language learning objectives. Institutions should provide technological infrastructure, teacher training, and curriculum frameworks that support interdisciplinary innovation.

In conclusion, the use of Computer-Aided Design systems in teaching foreign languages offers valuable opportunities for modern education, enabling learners to acquire linguistic and professional skills simultaneously. With proper methodological design, CAD-based approaches can become a powerful component of contemporary language pedagogy, preparing students for communicative competence in technologically advanced professional environments.

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