DESIGN THINKING AS PEDAGOGICAL INNOVATION IN FOREIGN LANGUAGE EDUCATION

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Abstract

Design thinking in education transforms learners from passive receivers into active problem solvers. Teaching experiences in German as a foreign language reveal that this approach improves the students' vocabulary and grammar in creative, real-life tasks. Artificial intelligence technologies further assist these processes by allowing collaboration and personalisation. However, there are also drawbacks to this approach: one could be the adoption of incorrect language patterns, and another could be the increased burden on teachers' preparation. Aside from these setbacks, design thinking has great potential to enhance students' motivation, creativity, and critical thinking during learning.

Keywords: design thinking, foreign language education, artificial intelligence, innovation, problem solving

JEL: I21, I20

Rethinking Foreign Language Learning: The Design Thinking Approach

Design thinking has only a brief history in language teaching, yet it holds considerable potential. The aim of this paper is to outline its methodological strengths and weaknesses, substantiated both theoretically and through practical implementation in educational contexts. While the discussion focuses on examples from the teaching and learning of German as a foreign language in secondary schools, the methodological conclusions may inductively point to broader pedagogical patterns.

To trace the theoretical foundations and methodological implications of design thinking in foreign language education, this paper pursues three objectives: 1) to conceptualize the notion of "design thinking" in relation to its significance in educational environments; 2) to identify its advantages and limitations with reference to key developments in the field; and 3) to propose strategies for integrating design thinking into more effective and engaging educational practices.

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The Concept of "Design Thinking"

In everyday speech, the term design is most often associated with appearances, as in "interior design" or "ergonomic design". Such expressions typically reflect subjective perceptions or aesthetic evaluations of an object. This usage, however, does not capture the essence of the concept, which becomes clearer when we consider its use in English not only as a noun but also as a verb: *to design*. In this sense, design implies creating, projecting, or envisioning a future outcome, and, as Herbert Simon (1996, p. 123) observes, a designer is "*anyone who transforms an existing situation into a better one*" with respect to the needs of a given target group. Accordingly, design thinking refers to a deliberate, creative process of problem-solving – one that can be practised individually or collaboratively and that seeks to transform a given situation into a desired one. It is often interdisciplinary, since creative solutions typically require unconventional approaches and draw upon a wide range of prior experiences and knowledge across subject areas. In business, design thinking has been described as "*the process of conceiving and developing innovations*" (Kamova, 2019), whereas in education it can be used as an instructional approach to improve learning effectiveness, foster interdisciplinary connections, and generate new perspectives on cognitive challenges.

When applied in education, design thinking should not be understood within the strict confines of professional design practice but rather as an adapted framework that borrows and reshapes design methods for pedagogical purposes. Its central goal is to support teachers and other educational practitioners in "*creating, leading, and generating new educational opportunities*" (Lock & Scott, 2021, p. 152), thereby addressing shortcomings and outdated practices in contemporary schooling. The growing popularity of design thinking in education is also linked to its association with the maker movement (Blakemore, 2018, p. 6), which emphasises learning by doing, experimentation with ideas, and the production of tangible outcomes.

As Becker (2021, p. 15) adds, design thinking is inherently nonlinear because human-centred problems are complex. The different stages may be done sequentially, but they can be reiterated, skipped, or reordered until a satisfactory solution is achieved. Many theorists in the field distinguish between two broad domains: the problem space and the solution space. The first involves observing, analysing, and framing the problem – processes that include "*evaluating, interpreting, and weighing the 'discoveries' we have gathered*" (Lewrick, Link, and Leifer, 2020, p. 22). A thorough understanding of the problem then enables the generation of ideas, the development of prototypes as concrete representations of those ideas, and finally, the stage of testing, in which one "gets answers, learns from them, and continues to develop one's idea" (Müller-Roterberg, 2020, p. 25).

This complex structure reflects the accumulated theoretical contributions of leading scholars in design thinking. It requires careful, critical engagement to more adequately assess the approach's potential and limitations in educational contexts.

Significant Developments in the Field of Design Thinking

One of the first scholars to provide a theoretical foundation for design thinking was Nobel Prize-winning economist Herbert Simon. For Simon, everything created by humans differs from natural phenomena and belongs to the realm of *the artificial*. In *The Sciences of the Artificial*, he established a conceptual framework for studying human-made systems, outlining several key characteristics of artifacts: (1) they are created by humans, sometimes without prior planning or reflection; (2) they may imitate natural phenomena in appearance, though they do not always share their reality; (3) they can be described in terms of functions, goals, and adaptation; and (4) they are often discussed in imperative or descriptive terms, particularly during their design (Simon, 1996, p. 5). Artefacts thus emerge at the intersection of the *external* givens of the natural environment and their *internal* human interpretation.

Simon's analysis (1996, p. 110) provided the groundwork for treating design as an object of scientific inquiry, giving it academic legitimacy and framing it as "*the very prototype of the artificial*". From this perspective, design is not an inexplicable creative act but a systematic process of problem-solving, in which problems are represented in ways that make solutions transparent (Simon, 1996, p. 132). On this basis, Simon argued for the existence of a science of design, conceived as partly analytical and partly empirical, with the design process itself as its central subject. His model has been influential in many areas, including educational design.

However, Simon's approach is not without limitations. Researchers have questioned its applicability when "the goal continues to be elusive" (Koh et al., 2015, p. 19), as in ill-structured problems that depend on multiple factors, which are common in educational contexts. Critics further argue that a strictly scientific conception of design may constrain creativity by imposing rigid frameworks, leading to uniform and predictable results (Koh et al., 2015, p. 21). A major step beyond Simon's framework was taken by Donald Schön, who addressed the problem of not clearly defined tasks by examining "situations of uncertainty, instability, uniqueness, and value conflict" (Schön, 1983, p. 49). His notion of reflection-in-action points to the designer's ability to adapt and adjust in the process of creation. It is through such situational reflection that designers develop a deeper understanding of the problem and build up informal, intuitive expertise, much of which takes the form of tacit knowledge, skills, and insights that come

from years of practice and cannot be articulated as strict rules. This view emphasises both the experiential and adaptive aspects of design thinking.

Schön's model also creates some problems. Because reflection is context-specific, generalisation outside of individual cases is difficult. In teaching, of course, each situation is somewhat unique and thus generalisation becomes even more difficult. In fact, unless reflection-in-action can be reduced to some transferable principles for a beginning practitioner, its advantages are likely to remain largely available only to those teachers who have developed extensive repertoires of past situations on which to draw. Critics have noted that for Schön, design knowledge develops not through generalizable principles but through the accumulation of thematic experiences that can be recalled in future projects (Tracey & Baaki, 2014, p. 12). The reliance on subjective, tacit knowledge may therefore be a limitation in fields- such as education - where measurable outcomes are often emphasised.

Nigel Cross (2023, p. 28) builds on and extends the work of both Simon and Schön, resolving some of the tensions between their views. He establishes design as a distinct academic discipline and articulates the notion of specific ways of knowing, thinking, and acting as central to design ability. These are marked by a readiness to engage with not clearly defined problems, a focus on generating solutions, constructive modes of thinking, and the transformation of abstract requirements into concrete outcomes (Zenke, 2014, p. 252). With this, Cross positions design as a legitimate field of inquiry on par with science and art.

A distinctive contribution of Cross is his emphasis on the abductive nature of design thinking. Abductive reasoning produces plausible rather than certain conclusions, based on a given set of observations or a problem situation (Cross, 2023, p. 177). For instance, in a thought experiment on designing a telephone for elderly users, one might assume that clarity and simplicity are valued, leading to the proposal of a smooth, silver body with distinct black buttons (Cross, 2023, p. 27). While this may be a viable solution, nothing guarantees that it will satisfy all users in the target group. As Cross observes, "abduction implies that something may be" (2023, p. 26). The designer's task is not to generate all possible solutions but to arrive at one that works.

Applied to foreign language learning, abduction offers considerable heuristic potential, particularly at the initial stages when learners lack a complete command of grammar and vocabulary. Rather than deducing rules from explicit instruction or inducing them solely from examples, learners may make tentative hypotheses about meaning and usage from incomplete observations and test those hypotheses in practice. Such inductive learning may support engagement and curiosity. It is nonetheless fraught with risks: poor hypotheses can become consolidated; premature generalisation may limit the extent of exploration; and reliance on

implicit knowledge disadvantages the less experienced learner. More advanced learners will, in this sense, be more likely to benefit from abductive procedures than beginners.

Although Simon, Schön, and Cross do not discuss foreign language education as such, there are a number of implications for language pedagogy to be drawn from their theories:

- **Learner-centred orientation:** Design thinking emphasises learners' needs and positions them as active participants in solving their own cognitive challenges, rather than passive recipients of instruction.
- **Transversal Competence Development:** The solution of linguistically challenging problems will develop, in learners, problem-solving abilities, critical thinking, and social competencies in view of dialogue, collaboration, and teamwork.
- **Role of the teacher**: Effective application of design thinking requires deliberate planning and sound methodological competence from teachers who need to choose appropriate tasks and design assessments congruent with the intended learning outcomes.
- **Risks for language learning**: Overemphasis on problem-solving and discovery may neglect the systematic acquisition of grammar and vocabulary, potentially leading to strong communicative competence but weaker linguistic accuracy.

Integrating Design Thinking in Foreign Language Classes

The characteristics of design thinking outlined above suggest that it can serve as an innovative approach in foreign language education. As in other fields, educational innovations may be understood as "an intention for something new, as actual change in theory and/or actual change in practice" (Smith & Giesler, 2023, p. 10). In language teaching, theoretical and practical changes are typically inseparable, since both are required for an effective learning process.

Having discussed the theoretical foundations of design thinking in education, this section turns to its practical application, focusing on two central aspects of language learning: vocabulary and grammar. Some of the examples presented here are drawn from my own teaching experience in secondary education during the past academic year. In planning and conducting design thinking-based lessons, I also made use of artificial intelligence (AI)[2].

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[2] The concept "artificial intelligence" itself represents an oxymoron. Intelligence is that trait of ours with which we associate the human species itself (homo sapiens). As S. Gerdzhikov points out (2025, p. 22), there are different types of "natural, biological" intelligence such as: "linguistic, logical-mathematical, musical, bodily-kinesthetic, spatial", while the author

Of course, artificial intelligence is not the only way to implement the approach in education. However, it is worth being examined because it possesses three essential advantages over any other type of resource: dynamism, adaptability, and multimodality. Design thinking emphasises precisely the active process of searching for, testing, and improving solutions, and in this regard, AI offers an optimal environment for its implementation. The possibility of immediate verification of language skills, receiving feedback, repetition, and improvement - particularly important in the productive activities of writing and speaking – reveals AI's "ability" to adapt to the individual style and needs of learners, delineating their individual learning "path".

In foreign language classes, AI provides the opportunity to create authentic linguistic artefacts – texts, presentations, videos, podcasts, audio – as opposed to completing separate, disconnected exercises or "one-directional" interactive tasks that cannot adapt the manner of execution or the feedback received. AI can simulate an enormous variety of communicative contexts and role-play scenarios, including accounting for cultural specificities, while also providing detailed information on grammar, pronunciation, lexical richness, punctuation (in texts), and pragmatics of utterances. Such detailed feedback is nearly impossible for a teacher to provide, especially in a class with many learners. While design thinking encourages experimentation and learning from mistakes, AI creates a safe environment in which everyone can communicate without being judged and without fear of embarrassment before others – a disadvantage from which traditional interactive methods are not entirely free.

For educational purposes, not only can large, cloud-based platforms such as ChatGPT be used, but also local tools. The existence of small or even micro language models, which are self-hosted and can be used on one or a limited number of devices, even offline, implies much greater predictability of results when interacting with the model, greater personalisation, protection of learners' personal data, and substantially lower energy consumption. The advantages of small language models (SLMs) in education are already the subject of scholarly research. Significant contributions have been made by Konstantinos Katharakis (2025), who develops the concept of the advantages of SLMs as tutors for students, and Erfan Al-Hossami (2024), who succeeds in substantiating the thesis that small models can be equally productive and fast as large ones. SLMs are already being used for foreign language learning, and not recently. As an example, one may cite

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does not even address psychological theories. The "intelligence" of artificial intelligence differs from all this and can be characterized as an "algorithm for deep learning that uses huge amounts of parameters and data [...] to understand and predict text" (McDonough, 2025).

the application FluentU, created as early as 2011 by Alan Park, which relies on videos and films in the target language to spark learners' interest.

The effects of AI in the educational environment are already a subject of scientific consideration. Of particular interest is the study by Toscu (2025), which analyses the results of empirical studies on the use of AI in English as a Foreign Language (EFL) teaching, conducted between 2020 and 2024. The author highlights five groups of advantages that AI provides in the learning process, namely: 1) beneficial influence on the development of productive and receptive language skills, 2) improvement of speaking skills and reduction of speaking anxiety, 3) promotion of autonomous learning and increased motivation of learners, 4) immediate feedback and support in learning, 5) development of critical thinking skills when analyzing the answers given by AI and modifying the commands to it (Toscu, 2025, pp. 156-160). There are also researchers who raise the alarm about the problems caused by AI in education. The conclusions of Doğruer and Tuğlu (2024) regarding AI-supported foreign language teaching in Turkey are noteworthy. The two authors identify a wide range of potential difficulties such as a lack of technological infrastructure and limited access to quality AI-based resources, which increases educational inequalities, to more concerning problems such as limited social interactions, reduced interactivity in the classroom, and the development of a superficial approach to learning, where learners almost entirely rely on the technology (Doğruer & Tuğlu, 2024, pp. 87-88). Despite the conclusions about the disadvantages of AI, all three mentioned authors recommend the development of strategies to ensure a balanced and effective use of AI-based technologies (Doğruer & Tuğlu, 2024, p. 89) and the professional development of teachers, who should be encouraged to use AI in various contexts to maximise its benefits (Toscu, 2025, p. 170). AI could be a linguistically engaging tool; its classroom use, however, must consider ethical principles and current technological limitations[3].

In vocabulary-focused lessons, AI can support students in contextualising new words, identifying associative links, and practising repetition. For example, in a ninth-grade class, my students worked in groups to create thematic mini-dictionaries for applications (jobs, universities, internships). These took the form of digital flashcards with at least twenty key words and phrases. Each entry included a synonym, a definition or usage note in German, and a suggestion for appropriate contexts, alongside a visual element. In the problem-definition stage, groups brainstormed ideas and used ChatGPT to analyse videos of job interviews and sample application documents provided by the teacher. The AI helped extract fre-

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[3] S. Gerdzhikov (2025, p. 158) describes in this connection so-called "fictions", which represent "non-existent data and facts" to fill gaps in information, and "hallucinations", where AI generates data and images that do not exist in objective reality.

quently used vocabulary and typical question-answer structures, which the students adapted, expanded, and enriched with their own research. The completed dictionaries were presented in class, with many of the groups incorporating AI-generated images to enhance the design.

Other options for vocabulary development could be the creation of phrase-books on frequently occurring communicative situations, such as at the airport, in a restaurant, or in a hospital, thematic vocabulary interactive maps, professional lexicons on desired careers, board or digital vocabulary games design, the invention of a product and an advertising campaign, menu or recipe development, virtual guidebook creation, planning individual strategies for words to be learned, or preparation of a "mission" situation for immersion into the target country.

Even though explicit grammar instruction often recedes in favour of communicative competence, grammatical structures are necessary for producing utterances that are both accurate and meaningful. Design thinking can also provide creative strategies for grammar learning. For example, in my own teaching, students engaged in role-play activities structured around a "grammatical mission". Drawing on recurring errors in their written work, students collaboratively identified problematic grammar points and, with the support of AI, generated scenarios in which those structures could be practised – such as telephone reservations, television interviews, hotel complaints, or classroom debates. In pairs, they then wrote dialogues incorporating at least five of the identified grammatical structures, rehearsed, and performed them while their peers noted instances of correct and incorrect usage. Selected groups also recorded their dialogues and submitted them to AI platforms for personalised feedback.

Additional activities for grammar learning might include: creating a "grammar street", where each building represents a grammatical category, designing comics in which a protagonist overcomes challenges through mastering grammatical rules, developing interactive or board games for tense practice, producing posters of common learner errors and strategies for correction, designing infographics of rules to be compiled into a shared digital resource or constructing a "grammar escape room", where puzzles and riddles must be solved through correct application of grammar.

Conclusion

This paper has traced the development of design thinking in foreign language teaching, from its early foundations in the work of Simon, Schön, and Cross to its contemporary applications in educational practice. Analysis suggests that the potential of design thinking actually to transform language learning is also counterbalanced by new challenges that this pedagogy brings into focus, which require critical reflection.

A central strength of the approach indeed lies in its learner-centred orientation: instead of receiving explanations passively, students are invited to experiment, test ideas, learn from mistakes, and develop problem-solving skills along with social competencies through collaboration. Such experiential learning may provoke stronger motivation and illustrate better the practical value of language study, especially for contexts where learners lack direct contact with the target culture or authentic linguistic environments. At the same time, significant challenges remain. The abductive reasoning described by Cross can sometimes produce incomplete or misleading representations of language, which are difficult to correct later. Design thinking also demands considerable commitment from teachers, who must not only understand the concept theoretically but also adapt it to the cognitive and linguistic needs of their students. Preparation and lesson planning take time and creativity; with AI tools like Claude and ChatGPT, the generation of materials and ideas can be supported. These, however, come with limitations and ethical considerations that are important both for the teacher and the learner to recognise.

These findings together point to the need for further research. There is, therefore, a requirement for more explicit criteria through which to judge the outcomes of design-based language learning and practical resources that can support teachers in its implementation.

Empirical studies comparing the effectiveness of design thinking with more traditional methods – across age groups and levels of proficiency – would be particularly valuable. Future work should also elaborate and test some of the pedagogical applications outlined here, moving from conceptual potential to evidence-based practice.

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