**Categoría: Education, Teaching, Learning and Assessment**

**ORIGINAL**

# Strategies for developing hard skills in higher education students through innovative pedagogical technologies in realistic professional environments

## Estrategias para desarrollar competencias duras en estudiantes de enseñanza superior mediante tecnologías pedagógicas innovadoras en entornos profesionales realistas

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**ABSTRACT**

**Introduction:** the global emphasis on developing hard skills, essential for professional competence in digital optimization, has led to a focus on practical skills like foreign language proficiency, programming, and data analysis. These skills, acquired through education or experience, are crucial across various professions, especially in the digital era, where innovative pedagogical methods are key.
**Objectives:** this study aims to analyze the impact of innovative pedagogical technologies on developing hard skills, particularly foreign language competence, in higher education students, simulating real-world professional environments.
**Method:** the study employs a range of general scientific methods, including analysis, synthesis, induction, deduction, formalization, and generalization. These methods help identify and describe the development of hard skills and digital competence, focusing on innovative pedagogical strategies.
**Results:** the findings highlight a structural-functional model for professional training in the digital labor market, emphasizing interdisciplinary integration, professional training alignment with market needs, and the use of innovative technologies. Key skills identified include financial management, software development, and foreign language proficiency, essential for making informed managerial decisions in a globalized world.
**Conclusions:** the integration of innovative pedagogical methods, such as incidental learning and argumentation, enhances the development of hard skills, particularly English language competence. The study underscores the importance of creating learning environments that closely mirror professional conditions, thereby improving the quality of education and preparing students for the demands of the modern labor market. Future research should focus on refining digital tools and methodologies to further enhance language skills and overall hard skill development.

**Keywords:** Innovative Educational Tools; Integration Processes; Hard Skills; Digitalisation; Professional Competence; Pedagogical Technologies.

**RESUMEN**

**Introducción:** el desarrollo global de habilidades duras, esenciales para la competencia profesional en la

optimización digital, se centra en habilidades prácticas como el dominio de idiomas extranjeros, programación y análisis de datos. Estas habilidades, adquiridas a través de la educación o la experiencia, son cruciales en diversas profesiones en la era digital, donde los métodos pedagógicos innovadores son fundamentales.

**Objetivos:** este estudio analiza el impacto de tecnologías pedagógicas innovadoras en el desarrollo de habilidades duras, especialmente en la competencia en idiomas extranjeros, en estudiantes de educación superior, simulando entornos profesionales reales.

**Método:** se emplean métodos científicos generales como análisis, síntesis, inducción, deducción, formalización y generalización para identificar y describir el desarrollo de habilidades duras y competencia digital, enfocándose en estrategias pedagógicas innovadoras.

**Resultados:** los resultados destacan un modelo estructural-funcional para la formación profesional en el mercado laboral digital, enfatizando la integración interdisciplinaria, la alineación con las necesidades del mercado y el uso de tecnologías innovadoras. Las habilidades clave incluyen gestión financiera, desarrollo de software y dominio de idiomas extranjeros, esenciales para decisiones gerenciales informadas en un mundo globalizado.

**Conclusiones:** la integración de métodos pedagógicos innovadores, como el aprendizaje incidental y la argumentación, mejora el desarrollo de habilidades duras, especialmente en inglés. El estudio destaca la importancia de crear entornos de aprendizaje que reflejen fielmente las condiciones profesionales, mejorando la calidad educativa y preparando a los estudiantes para las demandas del mercado laboral moderno. Futuras investigaciones deberían centrarse en perfeccionar herramientas y metodologías digitales para mejorar las habilidades lingüísticas y el desarrollo de habilidades duras.

**Palabras clave:** Herramientas Educativas Innovadoras; Procesos de Integración; Habilidades Duras; Digitalización; Competencia Profesional; Tecnologías Pedagógicas.

## INTRODUCTION

Currently, the global community focuses on developing hard skills, which form the foundation of professional competence in digital optimisation. Hard or technical skills are acquired through education or practical experience. These are specific, measurable abilities, often job-specific. The level of hard skills can be demonstrated through relevant certificates, portfolios, skill assessment tests, and completed work. Different professions require different qualification criteria. For some professions, such as lawyers and doctors, academic degrees and rigorous testing are necessary to verify skills. For other professions, such as web developers or copywriters, skills can be self-taught or acquired on the job and verified through a portfolio of work. While specific hard skills will be essential for many jobs, other hard skills may be subject to discussion.

Hard skills include foreign language proficiency, experience with Adobe Creative Suite, programming languages, website or content development, coding, copywriting and editing, budgeting, statistical data analysis, user interface design, and experience with specific platforms or software. This list includes only a few examples of hard skills, as a wide range of skills is relevant to different fields and job functions. However, the prioritisation of hard skills today is shaped by innovative digital capabilities, including pedagogical technologies. Specifically, implementing innovative methods for teaching English is viewed from the perspective of enhancing the effectiveness of students' learning and acquiring practical communication skills. Foreign language competence is now considered an essential hard skill for any professional orientation. Various innovative methods for teaching English, such as incidental learning, argumentation, learning by doing science, crossover learning, and others, contribute to developing practical skills for applying English knowledge. This issue is relevant due to the need for an in-depth study of the potential of modern innovative pedagogical technologies in forming students' critical hard skills, mainly foreign language competence, as a priority hard skill.

Implementing innovative methods for teaching English in educational programs in the current digital era is reflected in the results of the scientific work of several researchers. Specifically, Lista et al.[1] and Susanty et al.[2] explore the variability of innovative tools in forming essential hard skills. For instance, Bratianu, Hadad, and Bejinaru,[3] Nurtanto, Fawaid, and Sofyan[4] analyse problem-oriented learning in Industry 4.0 in the context of improving the quality of education through symbol-based literacy and career skills. The issue of developing hard skills is addressed by researchers such as Pate,[5] Bauman and Lucy,[6] Kennedy and Sundberg,[7] and Lamri and Lubart.[8]

Zhao and Liang[9] propose an innovative model for teaching foreign languages at universities using an extensive data corpus. Fatima, Zahid, and Ullah[10] investigate the possibilities of discussion methods for mastering foreign language competence, Greene, Copeland, and Deekens[11] consider the innovative method of incidental learning, and Valero Haro et al. [12] focus on learning through argumentation. While acknowledging the significant contributions of these researchers to the topic, it is essential to note the shortage of studies on

the impact of popular innovative pedagogical technologies and the formation of hard skills, indicating the need for further active exploration.

This study aims to analyse the impact of innovative pedagogical technologies on the development of hard skills in higher education students in conditions close to the realities of professional activity.

## METHODS

To achieve the research goal, various general scientific methods were applied: analysis, synthesis, induction and deduction, formalisation, and generalisation. These methods allowed for identifying and describing the features of developing hard skills and digital competence in the current conditions of forming the labour market.

Analysis and synthesis methods were employed to isolate the main factors forming the essential functionality of information systems in the educational field within the innovative development concept. Induction was used to form predictive vectors for the prospective development of innovative pedagogical solutions in the studied concept. The deductive method highlighted the priority directions of innovative pedagogical technologies in higher education to create learning conditions close to the natural professional environment. The formalisation method was used to define the fundamental concepts of the paradigm shift in higher education towards developing hard skills.

## RESULTS

The structural-functional model of the professional training system in the context of the digitalisation of the labour market today must ensure the development of competitive qualities. Among the main pedagogical prerequisites for the formation of hard skills within professional training in higher education, the following should be highlighted:

- implementation of means of interdisciplinary integration by creating an interdisciplinary educational environment;
- integration of professional and general areas of professional training according to the current labour market requirements;
- utilisation of innovative technologies in the organisation of professional training activities to model interdisciplinary professional cases;
- realisation of integrative formal, informal, and non-formal forms of professional training to ensure compliance and adaptability to the modern labour market.

According to the 2023 results, the most popular and in-demand skills in the hard skills category, as indicated by LinkedIn, include financial management, software development, Structured Query Language (SQL), Java, and Python (figure 1).
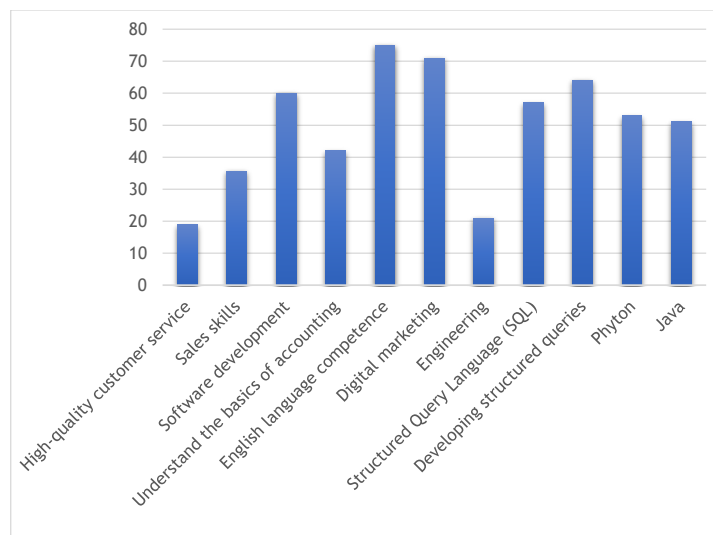


**Figure 1.** Requests for hard skills, %
**Source:** compiled by the author based on[5]

It is essential to emphasise that training specialists with proficient foreign language skills are currently a top priority in the quality educational process. Given the global digitalisation trend, the skills of rapid and effective comprehension and interpretation of foreign content are fundamental factors in making the correct managerial decisions.[13] The digital optimisation of the educational environment has created the prerequisites for effectively incorporating innovative interactive English learning methods into educational programmes.

Among them are "Expert Groups," "Interview," "Project," "Reflexive Circle," and others that help teachers impart specific skills to students.[9]

Various innovative English teaching methodologies, including incidental learning, argumentation, learning by doing science, crossover learning, and others, contribute to developing practical skills for applying English knowledge.

The methodology of incidental learning involves teaching English through the context of observing situations and events, promoting authentic and natural language acquisition. [11] Learners acquire the language in real-life situations, which aids effective learning by encountering new vocabulary and language structures in genuine contexts. The process is unplanned, stimulating interest in the educational process and enhancing the retention of new words. The unexpected nature of incidental learning results from other educational activities, including working with texts in a foreign language, communicating, and mastering other educational disciplines that require English proficiency. Thus, incidental learning activates the potential of integrated lessons for effective English teaching.

The methodology of learning through argumentation stimulates active argumentation and discussion of various issues using English, promoting the development of critical thinking skills, differentiation of evidence and arguments, vocabulary expansion, optimisation of pronunciation skills, and grammar.[12] An essential component of argumentation is the ability to listen to and understand other participants, which fosters the development of corresponding skills. Discussing exciting and relevant topics significantly enhances students' motivation to learn English. In learning through argumentation during a tolerant and reasoned debate model, students acquire new vocabulary, actively engage with the language of other group members, and skillfully formulate responses to cross-arguments.

Science-based research learning involves studying English by implementing scientific projects or research. Incorporating language practice into scientific tasks promotes a broader understanding of the subject matter and its corresponding language functions. English is used in data collection, analysis, and presentation and in developing critical thinking, teamwork, and communication skills. This method ensures an interactive approach to learning, effectively involving students in active participation in scientific research.

The crossover learning approach to teaching a foreign language in educational programs is positioned as a comprehensive educational strategy that combines formal and informal education. This methodology promotes the active development of deep discussions in the learning process, encouraging students to formulate open questions using academic language, adhere to stylistic norms, and develop individual and universal language-communicative models for argumentation. The crossover learning methodology involves studying a foreign language in historical, literary, and scientific contexts, enabling more accessible real-world applications. The synergy of studying English with other subjects intensifies students' motivation to learn and significantly facilitates understanding abstract concepts.

Other less popular but potentially effective innovative approaches to teaching a foreign language include learning by doing and embodied learning. The first approach maximises students' interaction with their environment and actively stimulates them to use foreign communicative skills in real situations. Embodied learning is based on the influence of physical activity on academic and cognitive outcomes, endowing the learning process with a playful character. This method fosters students' interest and enhances learning effectiveness, creating a comfortable atmosphere in the educational environment.

Thus, those above innovative methodological approaches to teaching English within educational programs create an effective new-format learning environment that closely mirrors actual professional conditions, thereby improving the quality of education and ensuring students' effective development of hard skills.

The context-language approach to teaching English is based on implementing several professional pedagogical functions, including didactic-methodological, general cultural, and developmental. This approach allows for modelling the essence of educational activities and integrating cognitive needs into the learning process through various educational activities, usually combining traditional lessons with active ones (role-playing, organisational-activity games, situational tasks, etc.).

Research conducted by foreign scientists at leading higher education institutions (Stanford Institute, Harvard University) has proven that traditional hard skills form the basis of a specialist's career success. However, applying them in synergy with relevant soft skills is advisable, which allows the specialist to quickly adapt to new situations and effectively develop in their career.

Creating a learning environment that closely simulates actual conditions of future professional activity by involving immersive technologies is advisable in higher education. These technologies are identified as integrating virtual content into the physical environment, creating conditions for effective interaction. At the same time, the user perceives virtual components as an integral part. The range of immersive technologies encompasses various programs and tools that allow integration, immersion, or interaction with simulated environments and objects.

Figures 2 and 3 show information on the impact of innovative pedagogical technologies on forming English

language competence as a representative hard skill of the present time.
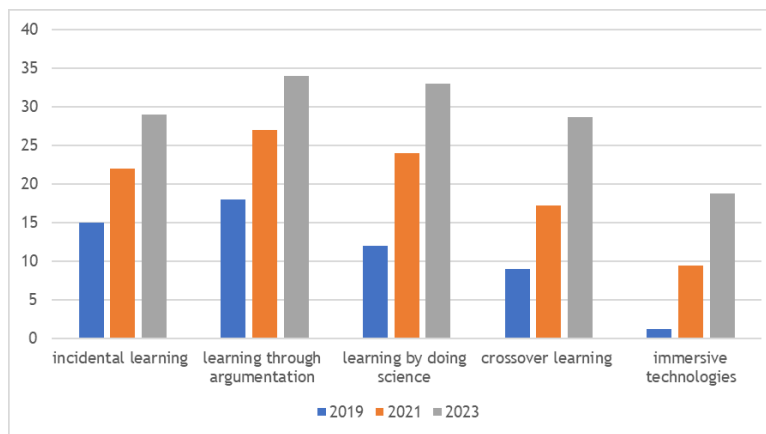


**Source:** compiled by the author based on[14]

**Figure 2.** Dynamics of innovative pedagogical technologies application in developing hard skill - English language competence in European universities
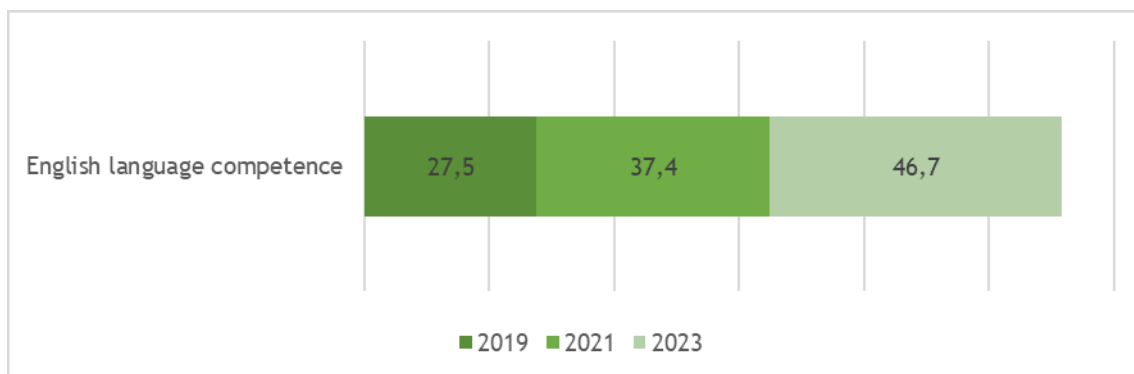


**Source:** compiled by the author based on[5]

**Figure 3.** Dynamics of hard skill - English-language competence of European university graduates

In the process of analysing figure 2 and figure 3, it becomes evident that the increase in English language competence among higher education students depends on implementing innovative pedagogical technologies. This concept is representative of all hard skills that show resilience to modern transformations in the educational space. In the human resource strategy of higher education, it is necessary to encourage the implementation of innovative pedagogical technologies and experiments with new teaching methods, ensuring a continuous professional development process for students in an environment as close as possible to the actual conditions of their future professional activities.

## DISCUSSION

Among contemporary scientific studies focused on hard skills, most researchers[15,16,17] pay attention to society's digitalisation and the labour market's corresponding dynamics. It is necessary to note the scientific position of E. Sinambela et al.[18] which recognises hard skills as the basis of professional realisation and, simultaneously, as the result of a successful pedagogical concept. Fragmentarily, elements of the implementation of innovative pedagogical technologies for the formation of hard skills are reflected in the works of A. Baird, S. Parayitam,[19] G. Cebrián, M. Junyent, I. Mulá.[20] The scientists, among other things, proposed a basis for adapting the tools of interdisciplinary integration to the realities of the professional training process.

Among innovative methods, discussion methods hold a significant place. By encouraging careful consideration of one's thoughts, discussion methods involve open expression with the mandatory justification of one's position on controversial issues.[10] Among the innovative discussion teaching methods that are considered a priority in teaching English are:

- scientific debate, which involves an educational dispute-dialogue where participants argue their position, opposing others;
- judicial sitting, characterised by the search for constructive solutions, requiring role differentiation;
- roundtable, a game that effectively reveals the educational potential in the form of collective

work and is aimed at a discussion format for problem-solving;
- competition in small groups, which is considered appropriate to use as a motivator to stimulate students;
- Brainstorming is a method of intensifying mental activity and developing critical thinking by generating unconventional ideas.

Given the specifics of the dynamics of the priority of hard skills, some authors [21-23] highlight the innovative position regarding foreign language competence as a leader of the necessary hard skills. Some authors [24] promote innovative methods of immersive technologies that create a realistic learning environment for maximum educational activity results. Others [25] argue for the priority of innovative approaches to methodology rather than the means of its implementation, particularly in the format of cross-learning or argumentative learning, or tutoring.[26,27]

The cited authors above are convinced that to maximize the potential of innovative methodologies, it is advisable to consider the needs of different groups of students. Incorporating various multimedia tools and interactive technologies alongside traditional methods can significantly enhance the effectiveness of English language teaching. Notably, the use of innovative digital educational platforms, mobile applications, and online resources is a priority, fostering the full integration of the learning process into the worldview of modern youth.

As scientists are convinced, traditional tools within English language teaching programmes have now incorporated innovative educational projects such as "Blinking Frames" and "First Million," which actively motivate students to learn English and develop essential language skills, mainly listening, speaking, reading, and writing. Additionally, the significant effectiveness of implementing innovative tools such as mind maps, sequencing, and the individualisation of team learning must be noted. These tools allow students to develop communication and critical thinking skills effectively, promoting high-quality language acquisition.

The success of implementing innovative approaches to teaching English in the digital age is determined by teachers' readiness to integrate modern pedagogical technologies into the learning process. Mastering innovative approaches such as tutoring, language portfolios, context-language teaching technologies, language immersion technologies, and individualising the learning process is crucial to this readiness.

Tutoring is a purely individual educational practice. The tutor focuses on the student's request regarding the targeted direction of the learning process. The tutor's competence in analysing the student's personal choice in the educational field contributes to forming the student's conscious motivation. Methods of problem questions, coaching tools, goal setting, and various reflective techniques help develop the student's independence in learning English.

Language portfolio technology involves independently recording and evaluating one's achievements and experiences while learning English. The most promising types of this technology are the language portfolio, which can be used to demonstrate the educational product and the effectiveness of the English language acquisition process, self-assess achievements, and provide feedback in the learning process.

## CONCLUSION

The concept of hard skills in the digital transformation era is considered an integrative definition, positioned as a system of knowledge, abilities, and skills based on the activity's goals and the capability for effective implementation of professional and social functions. The main problem lies in the ambiguity of the definitions under study and the limited level of their practical application in national professional realities.

Efforts by the pedagogical staff to equip students with digital competence and hard skills allow for an exponential increase in performance. Performance is currently defined by programming skills, knowledge of business processes and their current market requirements, and principles of business analysis, in close convergence with professional characteristics from the spectrum of hard skills. These efforts shape the level of professional activity efficiency in the modern labour market and determine the speed of career growth.

Innovative digitalisation technologies, including immersive tools, virtual reality, and artificial intelligence, are particularly effective in forming key professional competencies for higher education students in conditions close to professional activity realities. Forming primary hard skills involves a comprehensive approach based on the convergence of various pedagogical technologies.

The prospect of researching this topic lies in developing methods to improve digital tools for teaching English and studying the impact of digital technologies on the development of language skills in students. Leveraging the potential of interactive platforms, online resources, mobile applications, and other digital tools can significantly optimise student motivation, develop their communication skills, and facilitate the effective and intensive mastery of the English language

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## FINANCING

## CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

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