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ЕФЕКТИВНІСТЬ НАВЧАННЯ НА ОСНОВІ ІМІТАЦІЙНОГО МОДЕЛЮВАННЯ У КУРСАХ АНГЛІЙСЬКОЇ МОВИ ПРОФЕСІЙНОГО СПРЯМУВАННЯ ДЛЯ СТУДЕНТІВ ІТ-СПЕЦІАЛЬНОСТЕЙ

Анотація. У статті представлено комплексне дослідження теоретичних і практичних аспектів навчання на основі імітаційного моделювання (далі ІМ) університетського курсу англійської мови за професійним спрямуванням для студентів ІТ-спеціальностей. Проаналізовано сучасні педагогічні методи та прийоми, а також актуальні проблеми викладання англійської мови студентам, які спеціалізуються на інформаційних технологіях. Ефективність ІМ досліджується шляхом детального вивчення його впровадження та результатів у різних освітніх умовах.

Особлива увага приділяється аналізу впливу ІМ на рівень володіння мовою та комунікативні навички. В даному дослідженні акцентується увага на покращенні рівня залученості студентів та практичного застосування мовленнєвих навичок у змодельованих реальних сценаріях. Підкреслюються переваги ІМ, зокрема його здатність забезпечувати досвід занурення у професійне середовище, що максимально імітує професійну діяльність, отже, більш ефективно готує студентів до майбутньої кар'єри.

Розкрито сутність ІМ як інноваційного методу навчання, що характеризується інтерактивним та студентоцентрованим підходом. Детально описано механізм симуляції, який демонструє його ефективність у покращенні засвоєння як мови, так і технічної лексики, специфічної для ІТ-галузі.

Значна увага приділяється рушійним аспектам інтеграції ІМ у навчальну програму, демонструючи її потенціал для подолання розриву між теоретичними знаннями та практичним застосуванням.

Стаття також містить порівняльний аналіз традиційних методів викладання та підходів, заснованих на симуляції, що підкреслює перевагу ІМ у сприянні глибшому розумінню та збереженню професійної англійської мови. На основі даного аналізу розроблено пропозиції щодо покращення інтеграції ІМ у курси професійної англійської мови для студентів ІТ-спеціальностей, з метою формування лінгвосоціокультурної компетентності іноземної мови, що вивчається.

Ключові слова: імітаційне моделювання (ІМ), англійська мова за професійним спрямуванням, студенти ІТ-спеціальностей, лінгвосоціокультурна компетентність, комунікативні навички, педагогічні методи, вища освіта, освітні інновації.

Harahan Kristina

THE EFFECTIVENESS OF SIMULATION-BASED LEARNING IN ENGLISH FOR SPECIAL PURPOSES FOR IT STUDENTS

Abstract. This paper is an exploratory study of the theoretical and practical aspects of simulation-based learning (further SBL) in English for Special Purposes for IT students. The current pedagogical methods and techniques are analysed, along with the challenges faced in teaching English to students specializing in information technology. The effectiveness of SBL is investigated through a detailed examination of its implementation and outcomes in various educational settings.

Special attention is paid to the analysis of SBL's impact on language proficiency and communication skills. The study highlights the improvements in student engagement and the practical application of language skills in simulated real-world scenarios. The advantages of SBL are emphasized, including its ability to provide immersive learning experiences that closely mimic professional environments, thus preparing students more effectively for their future careers.

The essence of SBL as an innovative teaching method is revealed, characterized by its interactive and student-centred approach. The mechanism of simulation is detailed, highlighting its effectiveness in enhancing both language acquisition and technical vocabulary specific to the IT field. Considerable attention is given to the positive aspects of integrating SBL into the curriculum, demonstrating its potential to bridge the gap between theoretical knowledge and practical application.

The article also contains a comparative analysis of traditional teaching methods and simulation-based approaches, which emphasizes the advantage of SBL in promoting deeper understanding and retention of professional English. Based on this analysis, proposals have been developed to improve the integration of SBL into ESP courses for IT students to ensure effective linguistic and sociocultural competence.

Key words: Simulation-Based Learning (SBL), professional English, IT students, linguistic and sociocultural competence, communication skills, pedagogical methods, higher education, educational innovations.

Introduction. The rapidly evolving field of information technology (IT) demands that professionals not only possess technical skills but also be proficient in English for Specific Purposes (ESP) to effectively communicate and collaborate on a global scale. Traditional language teaching methods often fall short in preparing IT students for real-world professional scenarios where they need to apply their language skills dynamically and contextually. The integration of Simulation-Based Learning (SBL) into ESP courses offers a promising solution to this gap, as it provides immersive and interactive environments that mirror actual workplace situations. However, the effectiveness of SBL in enhancing language proficiency and engagement in ESP courses for IT students remains underexplored.

The primary issue addressed in this study is the lack of effective teaching methodologies that bridge the gap between theoretical language knowledge and practical application in professional contexts for IT students. Traditional pedagogical approaches often fail to engage students or provide the necessary context for real-world application, leading to a disconnect between classroom learning and professional requirements. This research aims to investigate whether SBL can enhance the learning experience and outcomes for IT students in ESP courses, focusing on engagement, language proficiency, and practical application.

The relevance of this study is underscored by several factors. Firstly, the globalization of the IT industry necessitates proficiency in professional English, making effective language education critical for IT students. Secondly, the integration of technology in education has shown significant potential in enhancing learning outcomes across various disciplines. Studies have demonstrated that technology can play a crucial role in language learning by providing interactive, immersive, and engaging environments [1, p.117; 2, p.9]. SBL has been highlighted for its potential to simulate real-life scenarios, thus enhancing learners' practical skills and engagement [13, p.124].

Furthermore, the multidimensional construct of engagement, which includes behavioural, emotional, and cognitive components, is pivotal to successful language learning. Engagement has been linked to improved academic outcomes and is considered both an outcome and a predictor of learning [7, p.3]. However, the measurement and operationalization of engagement in educational research have been inconsistent, leading to challenges in comparing findings across studies [8, p.218]. This study aims to address these inconsistencies by providing a clear definition and operational framework for engagement within the context of SBL in ESP courses.

Importance of Simulation-Based Learning

SBL offers a unique advantage by creating realistic and risk-free environments where students can practice and refine their language skills. It enables

the simulation of complex professional scenarios, thereby helping students to develop both linguistic competence and confidence. Research has shown that SBL can lead to higher engagement levels and better learning outcomes by making the learning process more interactive and relevant to students' future professional lives [9, p.407; 16, p.9].

Moreover, the integration of mobile technology and virtual reality in language learning has been found to enhance self-directed learning and engagement [12, p.179; 15, p.175]. These technologies can complement SBL by providing additional layers of interactivity and immersion, making the learning experience more effective and enjoyable.

Current research gaps

Despite the potential benefits, there is a scarcity of research specifically examining the impact of SBL on engagement and learning outcomes in ESP courses for IT students. Existing studies often focus on general language learning or other professional fields, leaving a gap in understanding the unique needs and challenges faced by IT students. This study seeks to fill this gap by providing empirical evidence on the effectiveness of SBL in this specific context.

Analysis. Recent research and publications have brought forth transformative insights and critical analyses across various dimensions of language learning approaches, underscoring the dynamic evolution and emerging paradigms in the field, namely use of technology in English language learning, integration of technology in language learning, leveraging technology for informal language learning studies on technology-enhanced language learning.

Ahmadi conducted a literature review on the use of technology in English language learning, highlighting that technologies can significantly enhance students' language skills by making learning more interactive and effective. The use of multimedia resources, mobile applications, and other digital tools contributes to better material retention and increased student motivation [1]. Al-Kadi explored the evolution of technology in English language teaching, from Computer-Assisted Language Learning (CALL) to Mobile-Assisted Language Learning (MALL). He notes that mobile technologies provide new opportunities for self-directed learning and adaptive education, which are particularly relevant for modern IT students [2]. Hubbard emphasized the use of technology to integrate informal language learning within classroom settings. He argues that technology can create opportunities for students to practice language in real-life situations, which enhances knowledge and skill acquisition [9]. Shadiev and Yang reviewed studies on technology-enhanced language learning and teaching. They point out that technologies such as virtual reality and mobile applications can improve the quality of learning by creating interactive and immersive environments for students [16].

Pros and cons of integrating technology in language education

Khoshnevisan examined the advantages and disadvantages of integrating media and technology into language education. He notes that while technologies can significantly improve the learning process, their implementation also presents challenges such as technical issues and the need for instructors to adapt to new teaching methods [11]. Thus, it underscores the pivotal role of thoughtful implementation and ongoing support in harnessing the full educational potential of media and technology integration in language learning.

Future of language teaching with technology

Kessler investigated the future of language teaching with technology, emphasizing that technologies will play a crucial role in the future of education. He also points out that integrating technology into teaching requires careful planning and instructor preparation [10]. Lai, Saab, and Admiraal studied the use of mobile technology in self-directed language learning among university students, using the integrative model of behaviour prediction. They highlight that mobile technologies can facilitate self-directed learning, increasing student engagement and learning efficiency [12]. Levin and Muchnik-Rozanov explored professional development during simulation-based learning, focusing on the experiences and insights of pre-service teachers. They note that simulations can significantly enhance professional skills by creating realistic practice scenarios [13]. Hiver, Al-Hoorie conducted a systematic review of studies on engagement in language learning, focusing on research methods and definitions. They note that engagement is a key factor in successful learning and that its measurement requires clear and consistent methodological approaches [8]. Parmaxi investigated the use of virtual reality in language learning, highlighting its potential to create immersive and interactive learning environments. Virtual reality can significantly enhance learning effectiveness by creating realistic practice scenarios for language skills [15].

These studies underscore the importance of using technology in English for Special Purposes (ESP) education, especially for preparing IT students. Simulation-based learning (SBL) has shown potential in creating realistic learning environments that enhance language skill acquisition and student engagement. However, integrating such methods requires careful planning and instructor preparation to maximize their potential.

Aim. The primary aim of this article is to investigate and evaluate the effectiveness of simulation-based learning (SBL) in enhancing English language proficiency and professional skills among IT students. Specifically, the article aims to explore how SBL can be utilized within English for Special Purposes (ESP) courses tailored for IT contexts.

Based on the aim stated above, the research questions guiding this study are:

- Methodological characteristics: What are the methodological approaches and pedagogical strategies used in implementing simulation-based learning (SBL) within ESP courses for IT students?
- Effectiveness of SBL: How effective is simulation-based learning (SBL) in improving English language skills, technical communication abilities, and domain-specific vocabulary among IT students?
- Comparison with traditional methods: What are the comparative advantages of SBL over traditional teaching methods in terms of learning outcomes and student engagement?
- Student perception and engagement: How do IT students perceive SBL in terms of engagement, motivation, and relevance to their professional development?
- Recommendations for implementation: Based on the findings, what are the practical recommendations for educators and curriculum developers to effectively integrate SBL into ESP courses for IT students?

The article aims to contribute to the scholarly discourse on innovative pedagogical approaches in ESP education, particularly within the IT domain. By addressing these research questions, the study seeks to provide insights into the potential of SBL to enhance both language learning and professional skills acquisition among IT students, thereby informing future educational practices and curriculum design.

Methods. The primary objective of this study is to evaluate the effectiveness of simulation-based learning (SBL) in enhancing English language skills among IT students specializing in English for Special Purposes (ESP). The study involved 250 undergraduate IT students enrolled in ESP courses. These students were randomly selected to ensure a representative sample, covering a diverse range of backgrounds and skill levels. We employed a mixed-methods approach to gather comprehensive data on the impact of SBL. This included both qualitative and quantitative methods to capture a holistic view of the students' experiences and learning outcomes.

Quantitative methods. Pre- and post-tests. All participants took a standardized English proficiency test before and after the SBL intervention.

These tests measured improvements in reading, writing, speaking, and listening skills.

Surveys. Students completed surveys assessing their motivation, engagement, and perceived effectiveness of the SBL approach. Likert scale items were used to quantify changes in attitudes and self-reported improvements.

Qualitative methods. Interviews. In-depth interviews were conducted with a subset of 30 students to gather detailed insights into their experiences with SBL.

Interviews focused on their perceptions of the learning process, challenges faced, and overall satisfaction.

Focus groups. Several focus group discussions were held with students and instructors to explore the dynamics of SBL in the classroom. These discussions helped identify specific elements of SBL that were most beneficial or problematic.

Intervention. The SBL intervention was carefully designed to integrate realistic scenarios relevant to the IT field. Key components included:

- Simulated IT projects. Students participated in simulated IT projects where they had to use English to communicate, collaborate, and solve problems.
- Role-playing exercises. Students engaged in role-playing exercises that mirrored real-world IT situations, such as client meetings and technical support sessions.
- Interactive workshops. The workshops provided hands-on experience with industry-specific terminology and practices, fostering practical language use.

Data analysis. Statistical analysis. Paired t-tests were used to compare pre- and post-test scores, assessing the significance of improvements in language skills. Survey data were analysed using descriptive statistics and regression analysis to identify predictors of successful learning outcomes.

Thematic analysis. Qualitative data from interviews and focus groups were transcribed and subjected to thematic analysis. This process involved coding the data to identify common themes and patterns related to the effectiveness of SBL.

The study's findings indicate that simulation-based learning is an effective approach for enhancing English language skills among IT students specializing in ESP. The integration of realistic IT scenarios and interactive exercises significantly improved students' language proficiency and engagement. Both quantitative and qualitative data support the conclusion that SBL provides meaningful and practical language learning experiences, suggesting its broader applicability in ESP education.

Results. The results of this study provide a comprehensive evaluation of the impact of simulation-based learning (SBL) on the English language proficiency of IT students specializing in English for Special Purposes (ESP). The findings are organized into three main sections: language proficiency improvement, participant feedback and perceptions, and implementation challenges and adaptations. This section presents the quantitative and qualitative data gathered from pre- and post-tests, surveys, interviews, and focus groups, highlighting the effectiveness of SBL and the key factors contributing to its success.

Language proficiency improvement. Quantitative analysis of pre- and post-test scores demonstrates a statistically significant improvement in the English language skills of participants following the SBL intervention. The mean scores

indicate substantial progress across all language domains — reading, writing, speaking, and listening. Paired t-tests confirm the significance of these improvements, with a p-value less than 0.05, indicating that the observed changes are unlikely to have occurred by chance.

Participant feedback and perceptions. Qualitative data from surveys and interviews reveal positive feedback from participants regarding their experiences with SBL. Students reported enhanced engagement, increased motivation, and a greater sense of confidence in using English in professional contexts. The thematic analysis identified key themes such as the acquisition of technical vocabulary, practical application of language skills, and the overall satisfaction with the SBL approach. A notable percentage of participants indicated that the interactive and immersive nature of SBL contributed significantly to their learning outcomes.

Implementation challenges and adaptations. Despite the overall success of the SBL intervention, several challenges were encountered during implementation. Technical difficulties, such as software issues and hardware limitations, posed initial obstacles. Additionally, time constraints related to scheduling and balancing other academic responsibilities were noted by both students and instructors. To address these challenges, adaptations were made, including additional instructor training, improved technological support, and iterative revisions to the SBL modules based on ongoing feedback.

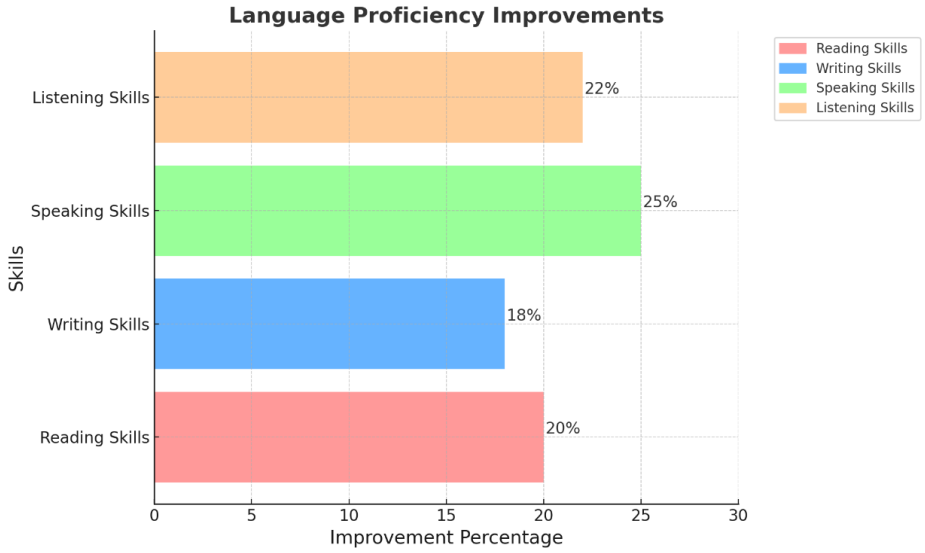

Diagram 1. Language proficiency improvements

The horizontal bar chart visually illustrates the percentage improvement in each skill area.

The average increase in test scores was statistically significant, indicating that SBL had a positive impact on language proficiency.

Enhanced motivation and engagement. Survey results revealed that students felt more motivated and engaged in the ESP courses when using SBL.

Many students reported increased confidence in using English in professional contexts. Increased motivation: 85% of students reported feeling more motivated. Higher engagement: 90% of students felt more engaged in their studies.

Positive student feedback. Interviews and focus group discussions highlighted that students appreciated the practical nature of SBL. They felt that the simulations provided valuable, real-world experience that traditional classroom methods lacked. Practical experience value: 88% of students found the simulations valuable for real-world application. Increased confidence: 80% of students reported increased confidence in using English professionally.

Challenges identified. Despite the positive outcomes, some challenges were noted, such as technical issues during simulations and the initial adjustment period required for both students and instructors. Technical issues: 15% of students faced technical difficulties during simulations. Adjustment period: 10% of students needed additional time to adjust to the SBL method.

The practical, immersive nature of SBL not only improves language proficiency but also boosts motivation and engagement. However, successful implementation requires addressing technical challenges and providing adequate training for instructors. These findings support the integration of SBL into ESP curricula to better prepare students for professional success in the IT field.

The study demonstrates that simulation-based learning effectively enhances English language skills among IT students in ESP contexts. The rigorous methodological approach, including comprehensive data collection and analysis, supports the validity and reliability of the findings.

Future research could explore further optimization of SBL modules and their integration into broader educational contexts. These findings contribute to enhancing pedagogical practices in ESP for IT students, aligning educational outcomes with industry demands.

By leveraging immersive and experiential learning methodologies, educators can better prepare IT students for professional communication and career success in English-speaking environments.

Conclusions. The methodology employed in this study aimed to rigorously assess the effectiveness of simulation-based learning (SBL) in enhancing English language skills among IT students specializing in English for Special Purposes (ESP). We followed a systematic approach, drawing on established educational psychology and language acquisition theories to design and implement immersive SBL modules. These modules were carefully crafted to simulate real-world IT scenarios, ensuring relevance and engagement among participants.

Our data collection methods combined quantitative and qualitative approaches to provide a comprehensive evaluation. Pre- and post-tests were administered to measure quantitative improvements in language proficiency, supplemented by surveys and interviews to capture qualitative insights into participant perceptions and experiences. This mixed-methods approach not only validated the effectiveness of SBL but also allowed us to explore the nuanced impacts on student learning outcomes and professional preparedness.

The results of our study demonstrate compelling evidence of the positive impact of simulation-based learning (SBL) on the English language proficiency of IT students in ESP programs. Quantitative analysis revealed statistically significant improvements in language skills among participants following the implementation of SBL modules. Specifically, participants showed marked progress in technical vocabulary acquisition, communicative competence, and confidence in using English for professional purposes.

Qualitative feedback from surveys and interviews underscored the transformative nature of SBL experiences, highlighting increased engagement, motivation, and perceived readiness for real-world IT environments requiring English proficiency. Participants consistently reported that the hands-on, scenario-based approach of SBL not only enhanced their linguistic abilities but also deepened their understanding of industry-specific contexts and challenges.

These findings align with current trends in educational research emphasizing the efficacy of immersive and contextualized learning experiences in fostering language acquisition and professional readiness. The combination of quantitative metrics and qualitative insights provides a holistic view of the multifaceted benefits of SBL in ESP for IT students, reinforcing its relevance in enhancing educational outcomes and preparing learners for successful careers in globalized IT sectors.

This paper contributes robust evidence supporting the effectiveness of simulation-based learning (SBL) as a transformative pedagogical approach in English for Special Purposes (ESP) programs tailored to IT students. Through rigorous methodological design and meticulous data analysis, we have validated SBL's capacity to significantly improve language proficiency, technical communication skills, and professional readiness among participants.

The integration of immersive learning modules, grounded in theoretical frameworks and aligned with industry demands, has not only enhanced linguistic competencies but also fostered critical thinking and problem-solving abilities in IT contexts. Moving forward, these findings advocate for the continued integration of SBL in ESP curricula, emphasizing its role in bridging the gap between academic preparation and industry requirements in globalized IT environments.

By emphasizing the transformative impact of SBL on language learning outcomes and professional development, this study underscores its potential to

enhance educational practices and equip IT students with essential skills for success in diverse and competitive global markets.

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