Gamification and ai in english language training for nurses: trends and outcomes

Ida Dian Sukmawati[1*], *Martyarini Budi* Setyawati[2], *Agung Budi* Prasetio[3]

[1]Faculty of Social Sciences, Universitas Harapan Bangsa, Indonesia
[2]Faculty of Health Sciences, Universitas Harapan Bangsa, Indonesia
[3]Faculty Computer Science, Institut Teknologi Tangerang Selatan, Indonesia

Abstract. The purpose of this systematic literature review (SLR) is to investigate how gamification and artificial intelligence can be included into nursing students' English language instruction. English language competency has grown in importance for nurses, particularly in the global healthcare setting where precise documentation and efficient communication are essential. However, busy schedules frequently make it difficult for nursing students to find time for language study, which frequently results in lower motivation and engagement during the learning process. Gamification has been shown to be successful in raising motivation and learning engagement through components like leaderboards, badges, and points. AI makes it possible to customize learning by creating materials according to each student's need and giving them immediate feedback, which might help them become more proficient in the language. This research synthesizes studies on the use of these technologies in nursing education, identifies key trends, evaluates learning outcomes, and discusses challenges such as limited access to technology and lack of training for teachers. The results show that gamification and AI have great potential in improving nursing students' English competency, especially in enhancing their professional communication skills.

1 Introduction

1.1 Introduction

English language proficiency has now become one of the most crucial skills in nursing, especially when it comes to communicating with patients from various international backgrounds as well as compiling accurate and timely medical documentation [1]. In this era of deepening globalization, where cross-border patient mobility is on the rise, the mastery of English by medical personnel, including nurses, not only helps in day-to-day communication, but also has a much greater impact on the overall quality of healthcare they provide.

A good command of the language can reduce the risk of communication errors that could potentially harm patients, as well as increase efficiency in medical decision-making [2].

* Corresponding author : idadiansukmawati@uhb.ac.id

However, the English language learning process for nursing students is often faced with major challenges, including tight educational schedules that leave them with less time to focus on language acquisition [3]. These challenges often lead to decreased motivation and learner engagement in the learning process, which in turn can impact on the achievement of suboptimal learning outcomes.

Gamification, or the use of game elements in the education process, is an innovative approach that has been proven effective in increasing learner motivation and engagement [4]. Elements such as point awards, badge systems, tiered challenges and competitive leaderboards can create a more engaging and interactive learning environment. This more enjoyable learning experience helps learners feel more motivated and actively involved in the learning process, compared to traditional methods that tend to be monotonous.

Artificial intelligence (AI) plays an increasingly significant role in modern education, especially in the personalization of learning. AI can be used to customize learning materials based on learners' individual needs, monitor learning progress, and provide quick and accurate feedback [5]. This allows learners to correct their mistakes in real-time and direct focus on aspects that still need improvement. The combination of gamification and AI offers enormous potential in improving the effectiveness of the English learning process among nursing students. In addition to increasing student engagement, this approach can also help create a learning experience that is more adaptive, interactive and relevant to their needs in the field.

1.2 Research Objectives

The goal of this study is to provide a thorough review and analysis of the literature on the use of artificial intelligence and gamification in nursing students' English language instruction. The research will map the utilization of various educational tools and determine current trends in their implementation in nursing education through this analysis. In order to determine the degree to which gamification and artificial intelligence have improved nursing students' English language proficiency, the study also focuses on assessing the learning outcomes that have been attained through their utilization.

This study aims to reveal the challenges and obstacles that may arise during the process of integrating these technologies, both from a technical and pedagogical perspective, as well as from the point of view of the readiness of teaching staff and students. Thus, this study is expected to provide comprehensive guidance for nursing education institutions in optimizing the use of gamification and AI, as well as developing strategies to overcome obstacles that may arise in the application of these methods in the future.

1.3 Research Questions

The research questions addressed in this study are as follows:

- What are the current trends in the use of gamification and AI in English language training for nurses?
- How does the application of gamification and AI affect English learning outcomes among nursing students?
- What are the challenges and limitations faced in integrating gamification and AI in English language education for nursing?

2 Methods

2.1 Search Strategy

This study's extensive literature search was conducted using several prestigious academic databases that are well-known in the scientific community, including PubMed, Scopus, Google Scholar, and ERIC. In order to guarantee a wide and representative coverage of pertinent, high-caliber, peer-reviewed research, these databases were chosen. Every database was chosen on the basis of its strength and emphasis on offering references pertinent to the domains of technology, education, and health.

A number of particular keywords were chosen with attention during this search procedure to guarantee the precision of the search results and their applicability to the subject of the study. The terms "gamification," "artificial intelligence," "English language training," "nursing education," and "nurse communication skills" were among the most often utilized keywords. The study theme, which combines educational technology, language training, and nursing education situations, is mostly covered by these terms. It is anticipated that this approach will enable a thorough and in-depth identification of all the material pertaining to the use of gamification and artificial intelligence in nursing students' English language instruction.

2.2 Inclusion and Exclusion Criteria

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
The study, which was published in a peer-reviewed publication, looks at how gamification and artificial intelligence might be used to help nursing students learn English.	Articles that are not peer-reviewed, such as blogs or industry reports that lack a clear research methodology.
Articles published within the last 10 years (2014-2024).	Studies published more than 10 years ago (before 2014).
A study that discusses the elements of AI technology and gamification in relation to nursing education.	Research not related to nursing education.
Research conducted in a formal nursing education environment.	Studies with weak research design or insufficient analysis.
Articles written in English	Studies written in a language other than English.

2.3 Selection Procees

This Systematic Literature Review (SLR) used a tiered literature selection method with multiple organized steps to make sure that only high-quality and pertinent studies made it into the final analysis. The title and abstract of each discovered study were used to perform an initial screening in the first stage. This stage sought to ascertain the research' initial level of relevance to the review topic. Studies that passed the first screening stage's fundamental requirements moved on to the full-text assessment phase, when the article's whole content

was carefully examined. The purpose of this review was to make sure that the inclusion and exclusion criteria were being fully followed.

A comprehensive assessment of each study's methodological quality was carried out after they successfully completed the full-text evaluation phase. At this point, the methodological validity and reliability of each study's findings were evaluated using evaluation instruments like PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The final synthesis only contained research that satisfied the strict quality requirements. Ensuring the methodological soundness and reliability of the findings given in this literature review is crucial for upholding academic integrity.

All decisions related to the exclusion of studies were clearly documented, along with the reasons supporting each decision. This documentation aims to maintain transparency in the selection process and improve the reproducibility of the study, allowing other researchers to repeat the selection process with consistent results.

2.4 Data Collection

A methodical and controlled methodology was used to collect data for this study in order to guarantee the accuracy and consistency of the information taken from the chosen publications. Information was extracted from every publication that satisfied the inclusion and exclusion criteria as part of the data gathering process. Core information including study titles, author names, publication years, research goals, methodology, and important findings and outcomes from each study were among the extracted data. After that, each chosen article was arranged using a pre-made data collecting sheet, with a focus on important variables pertinent to the study's goals, like gamification components, the use of AI technology, and its impact on nursing students' English language instruction.

3 Results

3.1 Description of Incorporated Studies

Fig.1 shows the study selection process using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram. The process started with the identification of 1,113 records from the database, with no additions from the registry. In the next stage, 42 duplicates were removed, and 189 records deemed irrelevant based on automation criteria (such as books or review articles) were also excluded, leaving 883 records to be screened.

After the screening stage, 369 records were excluded because they did not meet the language criteria, were not health-related, or were not peer-reviewed. Of the 514 reports remaining for further review, 369 were inaccessible due to incomplete or unretrievable articles. In the final stage, 145 reports were examined for eligibility, but 116 reports were removed for not having a DOI. A total of 29 studies were included in the systematic review for further analysis.

3.2 Trends in the Use of Gamification and AI

This research clearly demonstrates a significant improvement in the application of gamification elements, such as points systems, badges, and leaderboards, as strategies designed to effectively increase student motivation and engagement in English language learning. The use of points and badges serve as powerful incentives, encouraging students to complete academic tasks in a more active and motivated manner, while leaderboards create

a competitive atmosphere that inspires higher participation and a desire for continuous improvement.

Artificial intelligence technology plays an important role in facilitating the personalization of learning. Through AI's ability to tailor learning content to the needs and ability levels of individual students, the learning process becomes more adaptive and responsive. AI technology also enables the automatic delivery of feedback, giving students the opportunity to immediately identify and correct mistakes made in real-time, thus improving the efficiency of the learning process.

AI's ability to comprehensively track individual learning progress gives lecturers and teachers greater insight into student development. This enables the provision of more timely and accurate pedagogical interventions and support, which in turn contributes to the optimization of learning outcomes. Thus, the integration of gamification elements and AI in the context of English language learning not only increases motivation and engagement, but also leads to a more adaptive, efficient and personalized approach to learning.

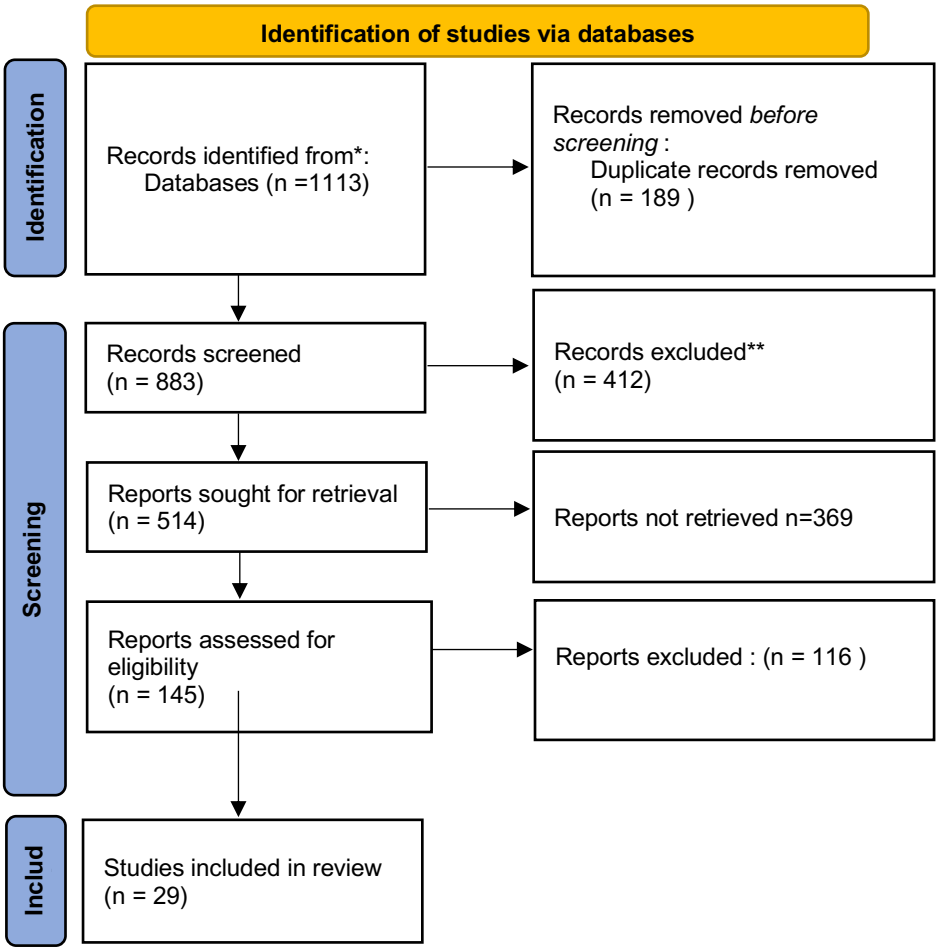

Fig. 1. Study Selection Proccess

Table 2. Summary of Included Research

Title	Author	Methods	Main Finding	Relevance
The Role of Simulation in Developing Communication and Gestural Skills in Medical Students	[6]	Use of simulation to develop communication and gesture skills in medical students through realistic clinical scenarios.	The use of simulation was shown to be effective in improving students' non-verbal and verbal communication skills, which are essential elements in medical practice.	Illustrates the importance of simulation in honing communication skills that can be applied in the development of safety-based smart contracts in drug development.
Communication Skills Training for Physicians Improves Patient Satisfaction	[7]	Conduct communication skills training for physicians and measure their impact on patient satisfaction through post-training surveys.	Communication training significantly improves patient satisfaction, especially in the aspects of listening and empathy.	Communication skills training in the context of transparent and secure smart contract-based data interaction between healthcare providers and patients.
Factors Affecting Professional Ethics in Nursing Practice in Iran: A Qualitative Study	[8]	In-depth interviews with nurses in Iran to identify the factors that influence professional ethics in nursing practice.	Professional ethics are influenced by work culture, societal norms, and emotional management by nurses.	Illustrates the importance of ethics in medical data sharing, relevant to design a transparent smart contract-based system in drug development.
Telehealth and eHealth in Nurse Practitioner Training: Current Perspectives	[9]	Perspective analysis regarding telehealth and eHealth in nurse practitioner training, with a focus on communication skills and adjustment in virtual interactions.	Traditional communication skills should be adapted in telehealth visits, with an emphasis on the importance of eye contact in virtual interactions.	Highlighting the necessary adjustment of communication skills in technology-based interactions, relevant to developing smart contracts in drug development with better data security.
The Effect of Nurse Empowerment Educational Program on Patient	[10]	Nurse empowerment education program to improve patient safety culture, using	Nurse empowerment education has proven to be	It relates to the need for better communication in secure data

Safety Culture: A Randomized Controlled Trial		pre- and post-intervention measurement methods.	effective in improving patient safety culture by improving professional communication skills.	sharing in the health sector, in line with the implementation of smart contracts.
A Serious-Game Framework to Improve Physician/Nurse Communication	[11]	Using a serious game framework focused on dialogue-based communication to improve communication between doctors and nurses.	GLIMPSE serious games improve critical communication methods that can improve patient safety.	Development of technology-based interactive communication, which can be used in smart contract systems in the healthcare sector.
How Do Australian Palliative Care Nurses Address Existential and Spiritual Concerns? Facilitators, Barriers and Strategies	[12]	Interviews with Australian palliative care nurses to explore how they deal with patients' existential and spiritual issues.	The development of a nurse-patient relationship and good communication skills are the main themes in the interview.	Effective communication in patient care, which is relevant to the development of a secure and transparent smart contract system.
Perinatal Death: Bereavement Interventions Used by US and Spanish Nurses and Midwives	[13]	Comparing nurse and midwife interventions in the US and Spain in managing perinatal deaths, focusing on communication skills and bereavement support.	Significant differences were found in the need for knowledge and communication skills between nurses and midwives in both countries.	Extensible communication needs for data sharing through secure and structured smart contracts.
Patient-clinician communication: American Society of Clinical Oncology consensus guideline	[14]	Develop guidelines for effective communication between patients and oncology clinicians, especially in palliative care and support for critically ill patients.	This guide emphasizes the importance of communication training, but it cannot replace key clinical skills.	Communication skills to ensure security, transparency, and compliance in data sharing through smart contracts in drug development.
The rise of ChatGPT: Exploring its potential in medical education	[15]	The study explores the potential of ChatGPT in medical education, with a focus on the integration of AI and its impact on medical student learning.	AI, especially ChatGPT, could revolutionize medical education by facilitating learning, although it will need curriculum adjustments to meet current	Applications of artificial intelligence in health learning that can be adapted to smart contract technology and data sharing in drug development.

			pedagogical needs.	
Benefits of Gamification in Medical Education	[16]	Compare the use of gamification in medical education at different stages of clinical training, with a focus on improving engagement and learning effectiveness.	Gamification increases student engagement and facilitates a more interactive learning experience compared to conventional learning techniques.	Provides insight into the application of gamification in medical education, which can be helpful in improving learning methods in clinical training programs.
Artificial Intelligence in Medical Education	[17]	Analyze the role of artificial intelligence in medical education, including verbal and written communication training for healthcare professionals.	Better communication training is needed for doctors to adapt to technological advances and new languages in clinical practice.	Provide important information on how technology can be integrated into the medical education curriculum to improve communication skills.
Exploring the Importance of Emotional Intelligence Training Programme on Soft Skills: A Randomised Controlled Trial	[18]	Using a randomized controlled trial to test the effectiveness of an emotional intelligence training program on soft skills among nursing students	Emotional intelligence training programs have proven to be effective in improving the soft skills of nursing students	Soft skills in nursing education and can be a reference for the development of future training programs.
Digital Proficiency: Assessing Knowledge, Attitudes, and Skills in Digital Transformation, Health Literacy, and Artificial Intelligence among University Nursing Students	[19]	Using correlational descriptive design to assess nursing students' knowledge, attitudes, and skills towards digital transformation and artificial intelligence.	Nursing students demonstrate good knowledge and a positive attitude towards digital transformation and artificial intelligence services.	Provide a better understanding of the educational needs to improve digital literacy among nursing students.
Assessing Nurse Educators' Competencies for Adopting Blended Learning in the Skills Labs in Uganda's Public Nursing Schools	[20]	Analyze the competencies of nurse educators in adopting blended learning in skills laboratories in Ugandan public nursing schools, by collecting data from 40 randomly selected nurse educators.	The results showed significant inadequacies: only 25% of educators were proficient in LMSs such as Moodle, 20% were effective in using Zoom and Microsoft Teams, and 12.5% were	A professional development program aimed at improving the digital competencies of nurse educators, which is essential for the effective implementation of blended learning.

			skilled in using television video as an additional educational resource.	
General practice nurse education: Attitudes to training	[21]	Using in-depth interviews and thematic analysis to investigate attitudes toward general practice nurse education and its impact on the future workforce.	Participants showed a positive attitude towards the new general practice nurse degree program, despite some dissatisfaction regarding education funding and lack of national qualifications.	Offers important insights into structural issues in general practice nurse education that must be addressed for future development.
Handing over and letting go: using online continuing medical education in teaching and assessing medical English language and communication skills to undergraduates	[22]	Using online continuing medical education (CME) materials to teach and assess medical English skills to medical students.	Well-selected CME materials can engage students in the use of authentic language in a context they recognize from their future workplace.	The use of CME in language education for medical students, which can be applied in other teaching programs.
Effect of Artificial Intelligence Course in Nursing on Students' Medical Artificial Intelligence Readiness	[23]	Evaluating the impact of artificial intelligence (AI) courses in the nursing curriculum on student readiness to face medical AI, with 300 students involved.	AI courses have a positive effect on students' readiness to understand the application of AI in nursing practice, with more than 67% of participants stating the need for the course.	Integration of AI courses in nursing curriculum to prepare students for changes in healthcare.
Gamification and Solo Taxonomy: A Strategy To Promote Active Engagement And Discipline In Language Learning	[24]	Researching the impact of gamification using the Kahoot! on the active and disciplined involvement of students in English language learning among the 35 students of the nursing program.	Gamification based on the SOLO taxonomy positively affects student active engagement and discipline, although there are some connectivity issues.	Demonstrating that technology integration can improve English language skills, with a reliable internet connection being a key factor.
Effect of Communication Skills Training on	[25]	Using a pretest-posttest design to evaluate changes in the empathy level of	There was a significant increase in student empathy	Emphasizing the importance of communication skills in quality

Empathy of Nursing Students		nursing students after communication skills training.	scores after training, indicating the need for a regular training program in the nursing curriculum.	nursing care and the need for continuous development.
Artificial Intelligence: Implications for Nursing Education	[26]	To review the latest research on the integration of artificial intelligence in nursing education and the challenges faced.	Highlight the potential of artificial intelligence to improve teaching and learning methods, as well as the need for training for instructors.	Provides insight into the application of new technologies in nursing education that can help address deficiencies in communication skills.
English Language Proficiency and Its Relationship with Academic Performance and the Nurse Licensure Examination	[27]	Secondary analysis of research data to assess the effect of English language proficiency on academic performance and nursing licensing examinations.	A significant relationship was found between English language proficiency and academic performance and nursing licensing exam results.	Describe the importance of language skills in nursing education and their influence on professional success.
Research Trends on Digital Games and Gamification in Nursing Education	[28]	Analyze articles on digital games and gamification in nursing education.	Demonstrate increased collaboration and methodological variation in gamification-related research in nursing education.	Provide evidence that game-based learning can improve student engagement and learning outcomes.
Role of Artificial Intelligence in Education	[29]	Examining the application of artificial intelligence in education to improve learning outcomes and student interaction.	Highlighting the positive impact of artificial intelligence in education, especially in online teaching during the COVID-19 pandemic.	Demonstrate the importance of technology in improving teaching methods and educational accessibility.
Developing Nursing English Instructional Materials by Using Simulation Technique to Increase English Oral Communication	[30]	Developing nursing English teaching materials using simulation techniques to improve students' oral communication skills.	Students showed improvement in speaking skills despite facing challenges in the method.	Provides a practical approach to improving language skills in nursing.

Skill for Nursing Undergraduate Students				
Enhancing Professional Communication Skills in Teaching English for Specific Purposes	[31]	Gather information from students to identify needs and challenges in professional communication in the health sector.	Applying professional communication techniques with simulated patient participation can improve students' skills.	Provide strategies for improving the teaching of professional communication in the context of English for specific purposes.
Interpersonal Communication Skills of Nurse Managers and Nursing Performance	[32]	To assess the relationship between the interpersonal communication skills of nurse managers and the performance of nurses in two hospitals in Indonesia.	There was a significant relationship between managers' communication skills and nurse performance, with motivation being a consistent variable.	Emphasizing the importance of interpersonal communication in nursing management to improve performance.

4 Discussion

4.1 Outcomes from Gamification and AI

The application of gamification and artificial intelligence (AI) in English language education has shown very positive results, especially in improving student engagement as well as their language skill attainment. The concept of gamification, which involves the use of game elements in the learning environment, has proven effective in motivating students to engage more actively in the learning process. This is in line with research showing that interactive and fun learning environments can increase students' interest and participation, making them more motivated to learn and practice language skills.

On the other hand, the use of AI systems in English language learning provides faster and more accurate feedback to students. With AI's ability to analyze language errors immediately and provide corrective suggestions, students can identify and address their weaknesses in language use effectively. Research shows that immediate and constructive feedback contributes to continuous improvement in language skills, increasing students' confidence when communicating in English.

Overall, the combination of gamification and AI technology not only increases student motivation and engagement, but also plays a crucial role in a more effective and interactive learning process, supporting the achievement of optimal learning outcomes in English language skills.

4.2 Challenges and Limitations

While the application of gamification and artificial intelligence (AI) in nursing education is showing promising results, there are a number of significant challenges. One of the main obstacles is the limited access to advanced technology in many institutions, especially in

developing countries. Unequal access to technological infrastructure limits widespread adoption, making it difficult for some institutions to integrate gamification and AI into learning programs. In addition, the lack of specialized training for faculty in using these technologies hinders the optimal utilization of these innovations. Without adequate guidance, many educators are not ready to use these technologies effectively.

Other challenges include limited resources in some institutions, such as budget and infrastructure that do not support the maximum use of these technologies. Methodological weaknesses in the study, such as the small sample size and short duration of the study, also limit the generalizability of the results obtained. More comprehensive and long-term research is needed to ensure that these technologies can actually significantly improve learning outcomes in nursing education. By overcoming the constraints of access, training and research methodology, gamification and AI technologies have great potential to change the landscape of nursing education.

5 Conclusions and Recommendations

5.1 Conslusions

This research highlights the important role that gamification and artificial intelligence (AI) play in supporting English language learning among nursing students. The combination of these two approaches significantly increased students' motivation and engagement in the learning process, making them more active participants. In addition, the use of gamification makes learning more interactive and fun, which has a positive impact on the overall achievement of language skills. Meanwhile, AI technology allows for quick and accurate feedback, which plays an important role in helping students correct language errors more effectively and efficiently.

Furthermore, both methods not only focus on increasing motivation, but also have a direct impact on developing communication skills, which is an essential competency in the nursing profession. Good communication skills are essential for nurses to be able to interact effectively with patients from different cultural and linguistic backgrounds, thus contributing to the delivery of more holistic and high-quality care.

5.2 Recommendations for Further Research

Based on recent data analysis, there are several interesting research opportunities in the healthcare sector. First, there is potential for research on developing AI-based communication training models for healthcare workers, given the importance of communication skills in healthcare. Second, the use of simulation technologies such as virtual reality (VR) and augmented reality (AR) in nursing education offers opportunities for research exploring their effectiveness over traditional methods. In addition, the topic of cross-cultural communication training for nurses in multi-cultural environments is particularly relevant in the era of globalization. Research related to professional ethics is also important, particularly regarding how AI-based tools can assist ethical decision-making in nursing practice. Finally, the integration of AI in communication skills training for nurses, particularly through the use of natural language processing (NLP), offers an innovative approach to improving the quality of nurses' interactions with patients.

5.3 Best Practices for Implementation

Nursing education institutions need to prioritize training for teaching staff so that they can effectively adopt gamification and artificial intelligence (AI) technologies in the learning process. This training is important to ensure that teachers understand how to use these technologies to manage classes, provide faster feedback, and create a more interactive and engaging learning environment for students. In addition to training, investment in technological infrastructure such as hardware, software, and adequate internet access is also needed to support the full implementation of gamification and AI.

Curriculum development that integrates gamification and AI will have a significant impact on learning outcomes. A well-designed curriculum can optimize the use of these technologies to improve nursing students' motivation, engagement, and communication skills. With a structured approach, students will be better equipped to master the language and communication skills essential to the nursing profession, while improving the quality of health care they provide.

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