

Designing AI-Assisted ESP Modules for Nursing Students Based on Needs Analysis

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Abstract

This research emphasizes the creation of AI-supported English for Specific Purposes (ESP) modules tailored for nursing students, based on a detailed assessment of learners' requirements. The rising need for effective communication in healthcare environments necessitates that nursing students develop not only general English competence but also specialized language abilities pertinent to clinical and professional situations. Nevertheless, current teaching resources frequently do not meet these particular needs, leading to a disconnect between educational experiences and practical use.

To tackle this problem, the research employs a mixed-methods strategy to ascertain both the desired outcomes and educational requirements of nursing students. Quantitative data is gathered using surveys to explore students' views, challenges, and priorities in learning English. Moreover, qualitative information is gathered via semi-structured interviews with chosen students and instructors to acquire a better understanding of language application in academic and clinical settings. The gathered data undergoes analysis through descriptive statistics and thematic analysis to guarantee a thorough comprehension of learners' needs.

Drawing from the findings, the research creates AI-supported ESP modules that incorporate genuine materials, task-oriented activities, and tech-enhanced elements. The integration of artificial intelligence aims to enhance interactive learning, deliver instant feedback, and mimic real-world communication situations pertinent to nursing practice. These characteristics are anticipated to boost students' involvement, encourage independent learning, and enhance their capacity to utilize language skills successfully in professional contexts.

The resulting modules undergo expert validation to determine their relevance, clarity, and teaching effectiveness. The results of this research are anticipated to enhance the domain of ESP by providing a method that merges needs-driven material creation with technological advancement. Additionally, the research offers practical insights for educators in creating more efficient and contextually relevant English learning materials for nursing students.

Keywords: ESP, needs analysis, artificial intelligence, nursing students, module development

3. Introduction

The growth of worldwide communication has greatly transformed professional practices in numerous sectors, especially in areas that rely on precise, prompt, and efficient interaction like healthcare. In modern healthcare settings, interaction is not limited to local situations; rather, it often includes participation with people from various linguistic and cultural backgrounds. In this context, English has

become a prevalent means for sharing information, obtaining medical knowledge, and promoting cooperation among healthcare providers. For nursing professionals, the capability to communicate effectively in English is not just a beneficial skill but a crucial aspect of professional competence, as it directly affects patient safety, quality of care, and cooperation among disciplines.

In nursing practice, communication is pivotal to almost every facet of professional activity. Nurses must gather patient

histories, clarify procedures, offer guidance, and work together with other healthcare professionals. These activities require not only overall language skills but also a significant degree of accuracy, clarity, and contextual relevance. Miscommunication in healthcare environments can result in misunderstandings, diminished patient trust, and potentially medical mistakes. Hence, cultivating strong communication abilities in English is essential for nursing professionals, particularly in the growing global healthcare systems where English frequently serves as a shared working language.

These advancements carry significant consequences for nursing education. Future healthcare professionals, nursing students need to be ready to address the communication requirements of their field. This preparation encompasses more than just learning fundamental grammar and vocabulary; it demands the skill to apply English in particular scenarios that represent actual clinical practice. For instance, learners need to master how to describe medical processes clearly, address patients' worries empathetically, interpret clinical records correctly, and engage in professional conversations. These competencies cannot be entirely cultivated through general English teaching by itself, as they necessitate experience with language usage specific to each discipline.

To address this demand, English for Specific Purposes (ESP) has emerged as a method that connects language education with the specific needs of various sectors. ESP highlights the significance of context in language application and concentrates on preparing learners with the abilities needed to complete tasks pertinent to their academic or professional fields. Instead of seeing language as a theoretical

framework, ESP considers it a means of communication in particular contexts. In nursing education, this method fosters the growth of language abilities that are relevant to clinical and professional settings.

Although ESP is important, its application in nursing programs frequently encounters numerous difficulties. In numerous instances, English courses still depend on broad teaching resources that aren't tailored for nursing environments. These resources can offer beneficial language input, yet they do not consistently mirror the communicative tasks that learners will face in their careers. Consequently, students might gain theoretical understanding of English without cultivating their capacity to apply it effectively in real situations. This scenario establishes a divide between academic education and practical application, potentially impeding students' preparedness for professional communication.

A fundamental reason for this gap is the restricted application of systematic needs analysis in creating instructional materials. Needs analysis is an essential procedure in ESP that entails determining what learners must accomplish in their target contexts and the most effective ways to meet those needs. It takes into account different factors, such as learners' existing skill levels, their preferred ways of learning, and the particular activities they are required to complete. If needs analysis is not performed rigorously, instructional materials might neglect to tackle the real challenges and concerns of learners. As a result, the educational experience might become more ineffective and less aligned with students' future career requirements.

In numerous educational environments, needs analysis is either performed briefly

or completely ignored. Materials are frequently modified from current textbooks without adequate attention to the particular context in which students will utilize the language. This approach may result in a disparity between teaching material and industry standards. For nursing students, this discrepancy might lead to inadequate experience with genuine communication situations, hindering their capacity to apply classroom knowledge in actual clinical contexts. Consequently, there is a significant demand for ESP resources that are based on empirical evidence and adapted to the particular needs of nursing practice.

Aside from teaching methods, swift technological progress has opened new avenues for improving language acquisition. Among these advancements, artificial intelligence (AI) has surfaced as an especially promising resource. AI technologies can enhance education by offering adaptive feedback, customized learning paths, and engaging simulations. These abilities enable students to interact with material in more dynamic and adaptable ways than conventional teaching approaches. Consequently, AI can revolutionize language learning, making it a more adaptable, learner-focused experience.

In the realm of language education, AI can enhance the growth of communicative competence by offering chances for practice in simulated settings. For nursing students, this is particularly beneficial, as it enables them to participate in authentic situations like patient interactions, clinical conversations, and emergency communications. With AI-powered tools, learners can obtain instant feedback on their language usage, engage in repetitive practice exercises, and tailor their learning speed to fit their personal requirements.

These characteristics aid in the growth of both language proficiency and professional self-assurance.

Additionally, AI can facilitate self-directed learning by allowing students to take more charge of their educational journey. Rather than depending only on classroom teaching, students can utilize AI-driven resources that offer ongoing assistance beyond traditional educational settings. This adaptability is especially valuable in higher education settings, where students must cultivate autonomous learning abilities. Incorporating AI into ESP teaching allows educators to establish learning settings that are both more captivating and better aligned with modern educational methodologies.

Nevertheless, even with its possible benefits, the incorporation of AI into ESP material creation is still quite restricted. A significant portion of current research on AI in language education emphasizes general English settings instead of specific areas like nursing. Consequently, there is an insufficient number of teaching models that show how AI can be effectively utilized in specific educational contexts. Moreover, AI is occasionally applied without a defined pedagogical framework, potentially diminishing its ability to enhance significant learning results.

This scenario underscores the significance of integrating technological advancements with a solid basis in needs-centered instructional design. The success of AI-supported learning relies not just on the technology but also on its alignment with the needs and contexts of learners. In the absence of this alignment, the implementation of AI could stay superficial and not tackle the fundamental issues encountered by learners. Consequently, a thorough strategy that combines needs analysis with

AI-supported design is crucial for creating effective ESP resources.

Within nursing education, this method presents substantial opportunities to enhance language learning results. By recognizing the particular communication tasks students must complete and integrating these tasks into AI-enhanced learning experiences, teachers can develop resources that are both meaningful and captivating. This method can help connect theoretical understanding and real-world application, allowing students to cultivate skills that are readily relevant to their future careers.

A further crucial aspect is the necessity to consider the local environment where nursing education occurs. Although global patterns emphasize the growing significance of English in healthcare, regional factors may affect the ways in which language is utilized and acquired. In various situations, such as creating educational settings, learners might have restricted interaction with genuine English conversations beyond the classroom. This constraint highlights the need for context-relevant and practical learning resources that can make up for the absence of real-world experience.

In light of these challenges and opportunities, there is a distinct necessity for research that investigates the combination of needs analysis and AI in developing ESP materials for nursing students. Such studies can offer perspectives on how educational resources can be created to address students' real requirements while also leveraging technological progress. By tackling both educational and technological elements, one can create learning materials that are more efficient, pertinent, and adaptable to evolving educational needs.

Considering these factors, this research seeks to develop AI-supported ESP modules for nursing students based on a thorough evaluation of their educational needs. The research aims to pinpoint the particular language abilities needed in both academic and clinical settings, analyze the difficulties encountered by students, and create teaching resources that incorporate AI-assisted elements. Utilizing a mixed-methods approach, the research integrates quantitative and qualitative data to provide a comprehensive insight into learners' requirements.

In the end, this research aims to enhance the area of ESP by providing a framework that combines needs analysis with AI-supported instructional design. It also seeks to offer practical support for educators in creating learning resources that meet professional standards and are enhanced by technological advancements. In this way, the research aims to aid nursing students in honing the communication abilities essential for active involvement in the healthcare field.

3.1 Background of the Study

The rising prevalence of English in healthcare environments mirrors wider shifts in the nature of professional communication within a globalized context. Access to medical information, cooperation among institutions, and engagement with varied patient groups frequently necessitate the use of English as a shared language. For nursing professionals, this situation influences not just how they convey information but also how they execute their duties in practice.

Nursing students, as prospective professionals, are anticipated to cultivate communication skills that meet these requirements. Their educational requirements go beyond basic language

understanding to encompass the capability to apply English in particular, situational contexts. This involves providing coherent explanations, comprehending technical terms, and participating in discussions that necessitate both language precision and professional insight. These expectations emphasize the significance of coordinating language teaching with the real demands of nursing practice.

English for Specific Purposes (ESP) offers a structure to meet this demand by emphasizing the connection between language utilization and professional environment. By utilizing this method, educational tasks are structured to mirror real-life scenarios, enabling students to acquire skills that are immediately relevant to their profession (Hutchinson & Waters, 1987). In nursing education, this involves getting students ready to manage communication responsibilities that they will probably face in both academic and clinical settings.

Nevertheless, in numerous instances, the execution of ESP fails to completely meet this aim. Educational materials are frequently created without adequate consideration for the particular circumstances in which students will utilize the language. Consequently, learners might struggle to apply their acquired knowledge to real-life contexts (Basturkmen, 2010). This implies that a discrepancy remains between instructional design and professional standards.

A fundamental reason for this problem is the restricted use of thorough needs analysis in the creation of materials. Comprehending learners' desired goals and learning styles is crucial for developing effective teaching methods (Nation & Macalister, 2010). If this process is not executed in a systematic manner, the materials produced might fail to accurately

represent learners' priorities or difficulties. As a result, the efficiency of the learning process might decrease.

Simultaneously, technological advancements have generated new possibilities for enhancing language learning methods. Artificial intelligence (AI) provides resources that can enhance more adaptable and reactive learning settings via adaptive systems and automated feedback (Holmes et al., 2019).

For students in nursing, these technologies can prove especially beneficial. AI can simulate clinical dialogue, offer instant feedback to learners' input, and enable chances for repetitive practice. These attributes can assist learners in cultivating both skills and self-assurance, which are crucial for successful communication in work environments (Chapelle, 2001).

Nonetheless, the incorporation of AI in language education, especially in ESP settings, is still fairly restricted. Current methods frequently emphasize general language teaching and overlook the unique requirements of students in specialized fields. Moreover, the application of technology is not consistently backed by a solid pedagogical basis, potentially reducing its effectiveness.

Under these conditions, it is essential to create instructional resources that integrate a solid grasp of learners' requirements with the efficient application of technology. Combining needs analysis with AI-enhanced design enables the development of learning materials that are increasingly pertinent, captivating, and in sync with industry requirements.

This study aims to develop AI-supported ESP modules tailored for nursing students through a systematic assessment of their requirements. The aim is to create educational resources that not only mirror

actual communication needs but also leverage technology to improve the learning experience.

3.2 Problem Statement

The rising need for effective communication in healthcare environments has highlighted the importance of English skills among nursing professionals. Nurses must effectively communicate with patients, work alongside medical teams, and accurately interpret clinical data. Nonetheless, numerous nursing students still face challenges in effectively using English in both academic and clinical settings. These challenges involve a restricted capacity to articulate thoughts smoothly, difficulties in comprehending medical language, and a deficiency of self-assurance when participating in professional conversations.

A primary reason for this problem is the disconnect between the English teaching offered in nursing curricula and the real communication requirements of the healthcare setting. In numerous instances, English courses still rely on general language resources that fail to accurately represent the specific tasks needed in nursing practice. Consequently, learners might obtain fundamental language skills yet find it difficult to utilize them in practical scenarios, especially in clinical settings where accuracy and clarity are crucial.

Another significant concern is the restricted application of systematic needs assessment in creating ESP materials. Lacking a thorough comprehension of learners' goals and learning styles, instructional resources might not tackle the unique obstacles encountered by nursing students. This misalignment diminishes the efficiency of language acquisition and

constrains students' preparedness for professional interaction.

Moreover, while technological progress—particularly in artificial intelligence (AI)—has opened up new avenues for improving language education, its incorporation into ESP training for nursing students is still lacking. Current implementations of AI in language education frequently emphasize broad contexts and fail to adequately meet the distinct needs of specialized areas. Moreover, the application of AI is not consistently backed by a well-defined teaching framework, potentially restricting its influence on educational results.

These problems signify the lack of educational resources that are tailored to needs and backed by suitable technological tools. A definite requirement exists for educational materials that combine a structured needs assessment with AI-driven capabilities to enhance the advancement of communication abilities in nursing environments. In the absence of such integration, the divide between classroom education and real-world application is expected to continue.

Consequently, the main issue tackled in this research is the absence of AI-supported ESP modules for nursing students that are developed through a thorough examination of their educational requirements. This research aims to tackle this issue by recognizing the distinct language requirements of students and creating instructional resources that align with educational methods and technological progress.

3.3 Research Objectives

General Objective

This study aims to create AI-supported English for Specific Purposes (ESP) modules for

nursing students through an in-depth assessment of their learning requirements.

Specific Objectives

1. To identify the target language needs of nursing students in relation to their academic and clinical communication requirements.
2. To examine the learning needs of nursing students, including their preferences, challenges, and expectations in learning English.
3. To analyze the gap between students' current English proficiency and the level of competence required in nursing practice.
4. To design ESP modules that incorporate relevant content, authentic tasks, and appropriate instructional strategies aligned with nursing contexts.
5. To integrate artificial intelligence (AI)-supported features into the ESP modules to enhance interactivity, feedback, and learner autonomy.
6. To evaluate the developed modules through expert validation in terms of relevance, clarity, and pedagogical effectiveness.

3.4 Research Questions

Main Research Question

In what ways can AI-supported English for Specific Purposes (ESP) modules be created to address the learning requirements of nursing students?

Quantitative Research Questions

1. What are the dominant target language needs of nursing students in academic and clinical contexts?
2. Which English language skills are prioritized by nursing students for their professional communication?
3. What is the level of difficulty experienced by nursing students in learning English for nursing purposes?
4. To what extent does a gap exist between students' current English proficiency and the level required in nursing practice?
5. How do nursing students perceive the importance of integrating AI-assisted features in ESP learning?

Qualitative Research Questions

1. How do nursing students describe their experiences in learning English for nursing-related communication?
2. What challenges do students and lecturers identify in the current implementation of ESP instruction?
3. How do students and lecturers perceive the relevance of existing English learning materials to nursing contexts?
4. How can AI-assisted features be meaningfully incorporated into ESP modules to support learning?
5. What expectations do students and lecturers have regarding the development of AI-assisted ESP modules?

3.5 Significance of the Study

This research aims to make significant contributions to both the theoretical and practical dimensions of English language instruction, especially in the realm of nursing education.

From a theoretical standpoint, the research advances understanding in English for Specific Purposes (ESP) by illustrating how needs analysis can be methodically combined with technology-driven learning. It presents a method that merges educational principles with artificial intelligence (AI), thereby enhancing current frameworks in ESP material creation. Furthermore, the research offers perspectives on how AI can be employed to enhance language acquisition in specific contexts, an area that has not been thoroughly investigated.

From a practical standpoint, the results of this study are anticipated to aid multiple stakeholders. For teachers, the research offers direction in creating educational resources that better meet students' requirements and correspond with professional communication expectations. The AI-enhanced ESP modules created in this research can act as a guide for educators who seek to meaningfully and effectively integrate technology into their teaching methods.

For nursing students, the research provides educational resources designed to meet their unique academic and clinical communication needs. The incorporation of AI-assisted features is anticipated to improve learning involvement, offer instant feedback, and facilitate chances for repeated practice. These factors can enhance students' confidence and competence in using English in professional environments.

This research emphasizes to educational institutions the significance of ensuring that curriculum design is in harmony with the needs of learners and advancements in technology. It could assist organizations in creating more flexible and context-aware language programs, especially in areas that need specific communication abilities like nursing.

Ultimately, this research could act as a resource for upcoming scholars interested in investigating the combination of needs analysis and artificial intelligence in language education. It creates possibilities for additional exploration of technology-driven ESP teaching in various fields and learning environments.

4. Literature Review

4.1 English for Specific Purposes (ESP) in Nursing Education

English for Specific Purposes (ESP) is commonly recognized as a method of language instruction that emphasizes the unique requirements of students in specific academic or professional fields. Instead of prioritizing overall language proficiency, ESP highlights the practical application of language within specific contexts, with learning tasks tailored to mimic authentic communication scenarios (Hutchinson & Waters, 1987). This perspective views language not just as a set of rules, but as a functional instrument that enhances professional effectiveness.

In nursing education, ESP is essential in equipping students for the communication challenges faced in clinical environments. Nursing students are required to participate in various interactions, such as gathering patient histories, clarifying medical procedures, offering guidance, and working alongside healthcare teams. These communication tasks demand not only linguistic precision but also clarity,

empathy, and awareness of context. Consequently, nursing ESP education should integrate language abilities and professional communication pertinent to healthcare settings (Dudley-Evans & St. John, 1998).

Nevertheless, earlier research has shown that the adoption of ESP in nursing curricula frequently encounters challenges. A frequent problem is the dependence on generalized instructional resources that fail to sufficiently depict the particular communication tasks needed in clinical practice. Basturkmen (2010) contends that ESP courses should be rooted in genuine professional settings to guarantee their efficacy. In the absence of this alignment, students might find it difficult to apply classroom knowledge to real-world scenarios.

Moreover, a study by Boshier and Smalkoski (2002) emphasizes that nursing students often face challenges in clinical communication because of limited exposure to language use specific to their field during training. This discovery indicates that ESP teaching must expand beyond theoretical understanding and concentrate on practical implementation via real-world learning experiences. Hence, creating context-aware ESP materials is crucial for enhancing students' preparedness for professional communication.

4.2 Needs Analysis in ESP

Needs analysis is regarded as a crucial element in the design of ESP courses. It entails pinpointing learners' target needs—what they must accomplish in actual situations—and their learning needs, which pertain to how they can successfully develop the essential skills (Hutchinson & Waters, 1987). By carefully analyzing these factors, educators can create teaching

resources that are meaningful, intentional, and aligned with students' objectives.

Nation and Macalister (2010) highlight that needs analysis is the cornerstone of curriculum development, ensuring that the teaching material aligns with both learner expectations and contextual requirements. In nursing education, needs assessment can reveal the kinds of communication tasks students need to undertake, including engaging with patients, comprehending medical terms, and reacting to clinical scenarios.

Studies in this field frequently utilize both quantitative and qualitative methods. Quantitative research usually employs surveys to recognize trends in students' preferences, challenges, and priorities. For example, Al-Tamimi and Shuib (2010) discovered that students in specialized disciplines frequently place greater importance on speaking and listening abilities, especially for professional interactions. In nursing environments, oral communication is often recognized as an essential skill needed for clinical practice.

Conversely, qualitative research provides more profound understanding of learners' experiences and difficulties. Hyland (2006) observes that elements like anxiety, low confidence, and restricted chances for genuine practice can greatly influence language learning results. These results emphasize the significance of integrating various approaches in needs analysis to gain a holistic insight into learners' requirements.

Even though it is crucial, needs analysis is not consistently applied in a systematic way. In certain instances, it is performed superficially or founded on beliefs rather than actual data. This constraint may lead to educational resources that inadequately meet students' real needs, thus diminishing

the efficacy of ESP teaching. Consequently, a more systematic and evidence-based method for needs analysis is essential, especially in specialized areas like nursing.

4.3 Artificial Intelligence in Language Learning

The incorporation of artificial intelligence (AI) in education has opened up fresh opportunities for improving teaching and learning methods. AI technologies facilitate the creation of learning settings that are interactive, adaptive, and personalized, enabling learners to interact with content in more significant manners (Holmes et al., 2019). These aspects are especially important in language acquisition, where ongoing practice and feedback are crucial for improving skills.

AI-driven language learning tools, including chatbots, voice recognition systems, and automated feedback platforms, can aid learners in enhancing their communicative skills. Chapelle (2001) contends that language learning can be improved by technology when it is properly combined with teaching principles. In this scenario, AI can offer chances for simulated interaction, instant feedback, and repeated practice, all of which enhance language skills.

In nursing education, AI can develop authentic simulations of clinical interactions. For instance, students can participate in role-playing situations involving interactions with patients, where they need to answer inquiries, give explanations, and showcase professional communication abilities. These simulations enable students to rehearse in a regulated setting, lowering stress levels and boosting self-assurance.

Research has demonstrated that AI-supported tools can enhance language learning results. Quantitative studies show enhancements in aspects like speaking fluency, pronunciation precision, and vocabulary development. Qualitative research indicates that students frequently view AI-driven learning as captivating and inspiring. Nonetheless, certain challenges persist, such as constraints in contextual comprehension and the necessity for educator support (Holmes et al., 2019).

These results indicate that although AI provides considerable advantages, its success relies on the quality of its integration into instructional design. Introducing technology without a defined pedagogical framework may not result in significant learning outcomes. Consequently, AI utilization ought to be informed by a comprehension of learners' requirements and educational environments.

2.4 Instructional Design and ESP Module Development

Instructional design is vital for creating impactful educational resources. It entails the organized design of educational goals, materials, tasks, and evaluations to guarantee that teaching corresponds with the needs of students (Branch, 2009). In ESP settings, instructional design should take into account language learning principles along with the particular needs of the intended profession.

A commonly utilized model in instructional design is the ADDIE framework, comprising five phases: Analysis, Design, Development, Implementation, and Evaluation. This model offers an organized method for developing educational resources that are systematic as well as adaptable. During the analysis phase, a needs assessment is

carried out to determine the requirements of learners. The design and development phases concentrate on producing educational resources, whereas implementation and evaluation pertain to executing and measuring the effectiveness of the teaching.

In nursing ESP, teaching resources must include genuine content and task-oriented activities that represent actual clinical scenarios. Task-Based Language Teaching (TBLT) prioritizes engaging in meaningful tasks to enhance language acquisition (Ellis, 2003). For nursing students, such activities may involve role-playing, case analyses, and simulations of patient engagements. Such activities motivate learners to apply language in real situations, thus improving their linguistic abilities and professional skills.

Past research has shown that ESP modules created from needs analysis are more successful in enhancing learners' outcomes. For instance, Tsai (2017) discovered that ESP materials focused on needs considerably improved students' communication skills. This reinforces the idea that instructional design must be based on empirical data to guarantee its relevance and effectiveness.

4.5 Integration of Needs Analysis and AI in ESP

While needs analysis and AI-enhanced learning have been extensively researched, they are frequently investigated independently. Research that combines these two approaches within the context of ESP, especially in specialized areas like nursing, remains limited. The majority of research on AI in language acquisition centers on general English scenarios, whereas ESP studies often prioritize needs assessment but do not integrate sophisticated technological resources.

This gap indicates a necessity for a more comprehensive strategy that merges data-driven needs assessment with technology-infused instructional design. According to Chapelle (2001), the success of technology in language education relies on its alignment with educational principles. Thus, combining needs analysis with AI-supported design can offer a more comprehensive framework for creating ESP materials.

By integrating these components, teachers can develop educational settings that are both pertinent and creative. Needs assessment guarantees that resources align with learners' genuine needs, while AI improves the educational experience via interactivity and customization. This integration could enhance both involvement and educational results.

4.6 Research Gap

Based on the review of previous studies, several gaps can be identified:

1. Many ESP materials for nursing students lack context-specific content and do not reflect real clinical communication tasks.
2. Needs analysis is not always conducted systematically, leading to a mismatch between instructional content and learners' needs.
3. The application of AI in language learning is often limited to general contexts and does not fully address the requirements of specialized disciplines.

There is a lack of studies that integrate needs analysis with AI-assisted instructional design in ESP.

4.7 Contribution of the Present Study

To fill these gaps, this study intends to create AI-supported ESP modules for nursing students grounded in a thorough needs assessment. The research aims to create instructional materials that are effective and relevant by integrating both quantitative and qualitative data. The implementation of AI is anticipated to boost interactivity, facilitate independent learning, and elevate students' capacity to utilize language skills in professional settings.

5. Research Design and Methodology

5.1 Mixed Methods Design

5.1.1 Type of Research Design

This research employs a mixed-methods approach, particularly emphasizing a sequential explanatory strategy, to investigate the English language requirements of nursing students and to inform the creation of AI-enhanced English for Specific Purposes (ESP) modules. Mixed-methods research involves combining quantitative and qualitative techniques within one study to achieve a more comprehensive understanding of a research issue (Creswell & Plano Clark, 2018).

The study is conducted in two sequential phases. In the early phase, quantitative data is gathered via questionnaires given to nursing students. This phase seeks to uncover general patterns concerning students' language requirements, learning styles, and the difficulties they face. In the next phase, qualitative data is collected via semi-structured interviews with chosen participants, comprising students and lecturers. The goal of this phase is to offer additional clarity and a more profound interpretation of the quantitative results.

The selection of a sequential explanatory design is grounded in its capacity to merge extensive numerical information with in-depth qualitative understanding. The quantitative results provide an overall view of learners' needs, whereas the qualitative findings shed light on the motivations driving those trends. By utilizing this combination, the research yields results that are both thorough and contextually significant.

Additionally, this study includes elements of Research and Development (R&D), as it not only explores the needs of learners but also seeks to create instructional resources. The procedure involves assessing requirements, creating the modules, producing the materials, incorporating AI-driven elements, and assessing the completed product. This method guarantees that the created ESP modules are based on empirical data and correspond to learners' actual needs.

5.1.2 Justification for Using Mixed Methods

The choice to utilize a mixed-methods strategy in this research stems from the complex nature of the issue, which includes both recognizing the needs of learners and comprehending the elements that influence those needs. Dependence on one research approach could restrict the breadth or depth of the results. Quantitative techniques excel at generating measurable and generalizable data; however, they might not completely reflect participants' experiences. Conversely, qualitative approaches offer in-depth perspectives but may fail to capture wider patterns (Creswell, 2014).

Combining both approaches, mixed-methods research enables the strengths of each technique to enhance one another. The quantitative data gathered via

questionnaires aid in recognizing trends like essential language skills, prevalent learning challenges, and students' perceptions of AI-supported learning. These results offer a robust empirical basis for the research.

Yet, numerical data by itself cannot clarify the fundamental causes of these trends. Consequently, qualitative data is gathered via interviews to delve deeper into participants' experiences, perceptions, and expectations. According to Creswell and Plano Clark (2018), qualitative outcomes can enhance quantitative results by offering significant interpretations and context.

A significant reason for employing mixed methods is to boost the study's credibility via triangulation. Through the integration of various data sources and diverse analytical techniques, the researcher can assess and confirm the results, thereby enhancing their trustworthiness (Dörnyei, 2007).

In the domain of ESP, especially in needs analysis, the adoption of mixed methods is very pertinent. Recognizing the needs of learners necessitates both objective information, like how often a language is used, and subjective insights, such as the perceptions and preferences of learners. Hutchinson and Waters (1987) highlight that successful ESP course development relies on a comprehensive grasp of learner needs, which can be most effectively attained by combining various research methods.

Moreover, creating AI-supported ESP modules necessitates a harmonized strategy that merges data-informed insights with situational comprehension. Quantitative results identify essential learning priorities, whereas qualitative insights inform the development of

significant and pertinent learning experiences. This combination guarantees that the teaching resources are rooted in theory and can be used in practice.

Consequently, employing a mixed-methods approach in this research is deemed suitable, as it facilitates a more thorough examination of the issue at hand, enhances the credibility of the results, and aids in the creation of efficient ESP resources.

5.2 Quantitative Method

5.2.1 Research Design

The quantitative aspect of this research utilizes a survey research design to methodically collect data regarding nursing students' English language requirements, learning preferences, and views on AI-assisted learning. A survey design is deemed suitable as it enables the researcher to gather data from a considerable number of participants in an organized and efficient way (Creswell, 2014).

Employing a survey allows for the recognition of overarching patterns and trends concerning students' specific needs and challenges in learning. This research features a cross-sectional survey design, with data gathered at one specific moment. This design offers a glimpse into students' present situations and views, which is vital for guiding the creation of ESP modules.

5.2.2 Population and Sample

The participants in this study include all nursing students registered in a nursing program at a chosen higher education institution. These students are selected due to their active participation in learning English in a nursing environment and serve as the target audience for the ESP modules.

From this group, a sample is chosen to take part in the quantitative phase of the research. The sample size is established according to availability and the requirement to gather representative information. Typically, a bigger sample size is favored in survey research to enhance the dependability of the results and to enable more precise generalization (Dörnyei, 2007).

5.2.3 Sampling Technique

This research employs a purposive sampling method, whereby participants are chosen according to particular criteria that align with the study's goals. The criteria consist of students who have completed English courses and possess experience in learning English for academic or professional objectives.

Purposive sampling is suitable in this situation as it guarantees that the chosen participants have the required background to offer significant data. Dörnyei (2007) states that purposive sampling is frequently employed in applied linguistics studies when the objective is to gather detailed cases instead of attaining random representation.

5.2.4 Research Instrument

The main tool employed in the quantitative phase is a standardized questionnaire. The survey is intended to gather information concerning:

- Needs in the target language (e.g., speaking, listening, reading, writing)
- Preferences and strategies for learning
- Recognized challenges in acquiring English skills
- Perspectives on utilizing AI in language acquisition

The survey includes closed-ended questions employing a Likert scale, usually varying from strongly disagree to strongly agree. This method permits the measurement of responses and makes statistical analysis easier.

To guarantee the instrument's validity, the items in the questionnaire are created according to pertinent theoretical frameworks in ESP and needs assessment. Furthermore, experts evaluate the instrument to confirm its clarity, relevance, and suitability.

Reliability is tackled by maintaining internal consistency among the items, which can be evaluated using statistical methods like Cronbach's alpha (Creswell, 2014).

5.2.5 Data Collection Procedures

The process of gathering data involves multiple organized stages. Initially, the questionnaire is created and examined to confirm that every item is understandable and consistent with the research goals. Upon revision, the survey is shared with the chosen participants.

The distribution can take place in either printed format or via an online platform, depending on ease of access and convenience. Participants receive explicit guidance on filling out the questionnaire, and ample time is allocated for their responses.

Prior to participation, respondents are made aware of the study's purpose and their rights as participants. Their agreement is acquired, and privacy is guaranteed. After the data gathering phase is finished, the replies are collected and arranged for examination.

5.2.6 Data Analysis

The quantitative data obtained from the survey are examined using descriptive and inferential statistical methods.

1. Descriptive Statistics

Descriptive statistics help condense the data and uncover overall trends. These consist of:

- Frequencies
- Proportions
- Average scores

These measures assist in outlining students' language requirements, choices, and views in a clear and structured way.

2. Inferential Statistics

Along with descriptive analysis, inferential statistical methods can be utilized to explore relationships and differences in the data. These consist of:

- t-test: for comparing variances between two groups (e.g., male and female students, or varying skill levels)
- ANOVA (Analysis of Variance): to assess variations between several groups.
- Regression analysis: to investigate the connection between variables, like how learning preferences affect students' perceptions of AI-supported learning.

These statistical techniques enable the researcher to reach more significant conclusions and to examine connections among variables (Field, 2013).

5.3 Qualitative Method

5.3.1 Approach

This study's qualitative component employs a case study methodology to thoroughly examine the experiences and viewpoints of nursing students and lecturers concerning English learning and

the implementation of AI-supported ESP modules. A case study is suitable when the researcher seeks to explore a phenomenon in its actual context and to obtain a comprehensive understanding of intricate matters (Yin, 2018).

In this study, the case is characterized as the incorporation of English language learning into a nursing education curriculum. The emphasis is on students' experiences with language acquisition, the difficulties they face, and their hopes for enhanced teaching resources. This method enables the researcher to investigate the contextual factors that affect language acquisition and to produce insights that might not be revealed by quantitative data alone.

5.3.2 Participants

The participants in the qualitative phase comprise a smaller, thoughtfully chosen group derived from the broader population engaged in the study. They consist of:

- Nursing students share personal insights about their experiences in learning English and applying language in nursing contexts.
- Instructors, such as English teachers and nursing faculty, who provide expert insights into student requirements and contemporary educational methods.

The participant count is restricted to guarantee an in-depth analysis of each person. The choice is determined by their significance to the research aims and their readiness to take part.

5.3.3 Sampling Method

This research employs a purposive sampling technique, selecting participants according to defined criteria relevant to the study's emphasis. Participants are selected due to their firsthand experience with

English acquisition in a nursing setting and their capacity to offer valuable and pertinent insights.

Purposive sampling is commonly employed in qualitative research as it enables researchers to concentrate on data-rich cases that can offer profound insights into the phenomenon being studied (Creswell, 2014). In certain instances, extra participants might be located via snowball sampling, where initial participants suggest others who fulfill the study criteria.

5.3.4 Data Collection Methods

Qualitative data in this research are gathered through various methods to guarantee depth and reliability, such as interviews and analysis of documents

1. Semi-Structured Interviews

The main approach for data collection is through semi-structured interviews. This method enables participants to express their experiences and viewpoints in their own language while maintaining focus on important subjects related to the study.

The discussions investigate topics like:

- Experiences of students in learning English
- Challenges in utilizing English for nursing communication
- Views on current teaching resources
- Anticipations for AI-enhanced ESP components

The adaptable format of semi-structured interviews allows the researcher to pose follow-up questions and elucidate answers. All interviews are carried out with the consent of participants, recorded, and transcribed for evaluation.

2. Document Analysis

Document analysis serves as an additional approach to evaluate current teaching materials, including textbooks, course outlines, and instructional resources utilized in the nursing program.

This assessment aids in recognizing:

- The degree to which materials mirror nursing-related situations
- The kinds of language abilities highlighted
- The correspondence between teaching resources and learners' requirements

Employing various data sources enhances the reliability of the results via triangulation.

5.3.5 Data Analysis

The qualitative data collected in this study are analyzed using thematic analysis, a widely used method for identifying patterns and themes within qualitative data (Braun & Clarke, 2006).

The analysis process involves several steps:

1. Transcription
All interview recordings are transcribed into written form to facilitate analysis.
2. Familiarization
The researcher reads the transcripts multiple times to gain an overall understanding of the data.
3. Coding
Relevant segments of the data are identified and labeled with codes that represent key ideas or concepts.

4. Theme Development
Codes are grouped into broader themes that capture important patterns across the data.
5. Interpretation
The themes are analyzed and interpreted in relation to the research questions to provide meaningful insights.

This systematic process allows the researcher to organize complex data and to highlight significant findings.

5.4 Integration of Data

In mixed-methods research, combining quantitative and qualitative evidence is essential to obtain a well-rounded understanding of the issue under investigation. Rather than treating both types of data separately, this study connects them systematically across several stages, namely during data collection, data analysis, and interpretation of findings (Creswell & Plano Clark, 2018).

5.4.1 Integration During Data Collection

The integration process starts with data collection through a sequential explanatory approach, where quantitative data is collected prior to investigating qualitative insights. The results of the questionnaire are not seen as conclusive; rather, they serve as a basis for the upcoming stage.

The survey findings are utilized to identify which participants should take part in the interviews and to highlight the issues that require additional clarification. For example, trends concerning students' learning priorities, identified difficulties, and opinions on AI-assisted learning shape the development of interview questions.

By this stage, the linkage between datasets is formed early in the research process. The qualitative phase is thus not autonomous but intentionally influenced by the quantitative results, enabling the research to transition from broader trends to more targeted examination (Creswell, 2014).

5.4.2 Integration During Data Analysis

During the analysis phase, each data type is initially assessed separately with suitable methods. Statistical methods are utilized to condense questionnaire answers, whereas qualitative information from interviews is handled via coding and theme formation.

After both analyses are finished, the results are combined to uncover connections between them. The researcher seeks areas where the outcomes agree, contrast, or enhance one another.

For example, if the survey shows that speaking is extremely significant and notably challenging, interview data is subsequently utilized to explore the causes of this challenge. Participants might report challenges like anxiety, insufficient real-world practice, or inadequate exposure to clinical communication. Qualitative evidence thus helps to elucidate and enhance the interpretation of quantitative findings (Dörnyei, 2007).

This phase of integration enables the research to move past superficial patterns and offers a more profound understanding of the observed trends.

5.4.3 Integration During Interpretation

The ultimate integration takes place when deriving conclusions from the research. At this stage, the researcher integrates findings from both datasets to form a unified comprehension of students'

requirements in learning English for nursing objectives.

Rather than displaying the results independently, the interpretation emphasizes the interaction between the two types of data. Quantitative results give a general perspective, whereas qualitative insights deliver detailed interpretations that enhance the significance of those results.

For instance, when statistical data indicate a significant interest in technology-based learning, interview answers might uncover particular expectations like hands-on practice, prompt feedback, and realistic simulations. Combining these insights ensures that the created ESP modules are based on genuine learner requirements.

Additionally, this comprehensive method enhances the credibility of the research via triangulation, since results are backed by various types of evidence (Creswell & Plano Clark, 2018).

5.5 Validity and Reliability / Trustworthiness

Guaranteeing the quality of research outcomes is an essential necessity in both quantitative and qualitative investigations. In mixed-methods research, this entails tackling validity and reliability in the quantitative section, along with trustworthiness in the qualitative section. Every element is implemented methodically in this research to improve the precision, reliability, and trustworthiness of the findings (Creswell, 2014).

5.5.1 Quantitative Phase

1. Validity

Validity pertains to the degree to which a research tool effectively measures what it is designed to measure. This research

utilizes various methods to guarantee the validity of the questionnaire.

Initially, content validity is confirmed by creating the questionnaire items using pertinent theoretical frameworks in English for Specific Purposes (ESP), needs assessment, and AI-supported learning. The items are intended to represent essential elements like target language requirements, learning styles, and perceived obstacles. To enhance validity, the tool is assessed by professionals in language education and nursing to determine the clarity, relevance, and suitability of every item.

Second, construct validity is tackled by confirming that the items in the questionnaire correspond with the conceptual definitions of the variables being assessed. Every part of the tool is meticulously organized to reflect particular aspects of students' requirements and viewpoints. This alignment aids in confirming that the gathered data reliably reflect the intended constructs (Creswell, 2014).

By implementing these methods, the research reduces measurement error and improves the precision of the quantitative results.

2. Reliability

Reliability pertains to the steadiness and uniformity of the measurement outcomes. A dependable tool yields comparable outcomes under uniform circumstances.

This study evaluates reliability via internal consistency, assessing how consistently items within the same construct generate responses. This is usually evaluated with Cronbach's alpha coefficient. A coefficient value of 0.70 or above is typically viewed as acceptable, suggesting that the

instrument demonstrates an adequate level of reliability (Dörnyei, 2007).

Moreover, the survey is structured with straightforward and precise language to minimize confusion among participants. Guidelines are also supplied to guarantee that participants understand the items uniformly. These actions enhance the general dependability of the information.

5.5.2 Qualitative Phase

1. Credibility

Credibility denotes how well the results truly reflect the experiences and viewpoints of the participants.

To improve credibility, this research employs triangulation, gathering data from various sources, such as students, instructors, and pertinent documents. Through the comparison of these various sources, the researcher can confirm the reliability of the results.

Furthermore, member checking is utilized by permitting participants to examine and validate the correctness of interview transcripts or interpretations. This guarantees that their opinions are accurately represented. Extended interaction with the data and thorough examination enhance the reliability of the findings (Creswell & Plano Clark, 2018).

2. Transferability

Transferability pertains to how much the results can be utilized in different situations. Instead of making broad statistical generalizations, this research offers a detailed account of the setting, participants, and context of learning. Comprehensive descriptions of the nursing education setting, characteristics of students, and teaching conditions enable readers to assess the applicability of the

findings to their own situations (Lincoln & Guba, 1985).

Through detailed and contextualized descriptions, the research allows others to draw informed conclusions regarding the relevance of the findings.

3. Dependability

Dependability pertains to the reliability of the research method throughout time. It highlights if the research could be replicated with analogous outcomes in similar circumstances. To guarantee reliability, the research methodology is recorded systematically via an audit trail, which encompasses comprehensive documentation of data gathering methods, interview guidelines, coding procedures, and analytical choices. This documentation enables other researchers to comprehend how the results were generated.

Furthermore, the researcher employs a systematic method for data analysis, adhering to well-established procedures in thematic analysis. This organized approach aids in preserving consistency and clarity during the research (Creswell, 2014).

5.6 Ethical Considerations

Ethical considerations play a crucial role in research involving human participants, as they guarantee that participants' rights, dignity, and welfare are safeguarded during the research process. This research rigorously applies numerous ethical principles, such as informed consent, confidentiality, voluntary participation, and responsible management of data. These principles direct every phase of the research, from gathering data to presenting findings (Creswell, 2014)

5.6.1 Informed Consent

Before data collection begins, all participants receive detailed and

transparent information concerning the study's purpose, the procedures entailed, and their responsibilities as participants. They are also made aware of the kinds of data that will be gathered, including survey answers and audio recordings of interviews.

Participants have the chance to inquire and request clarification prior to consenting to join the study. Inclusion is limited to those who give clear consent. This procedure guarantees that involvement is rooted in a complete comprehension of the study and is conducted voluntarily (Creswell & Plano Clark, 2018).

5.6.2 Confidentiality

afeguarding the personal data of participants is a crucial ethical obligation. In this research, confidentiality is upheld by guaranteeing that all data is kept secure and accessed exclusively by the researcher.

Anonymity is utilized in reporting the results to safeguard participants' identities. Identifiers and any distinguishing specifics are substituted with codes or aliases. This protects personal identification and ensures their privacy.

Additionally, all data shown in the research are presented in a manner that protects the identities of participants, especially when including excerpts from interviews. These actions aid in safeguarding participants' personal data (Dörnyei, 2007).

5.6.3 Data Protection

All gathered data, such as questionnaires and interview transcripts, are treated with caution and kept in secure formats. Digital data are secured using password-protected devices, whereas printed documents are stored in a secure place.

The data are utilized exclusively for academic objectives associated with this research and are not disclosed to unauthorized individuals. Upon finishing the research, the data are kept only for the required duration and can be securely archived or deleted following institutional policies.

Proper data management guarantees that the information of participants is safeguarded and not exploited during and after the research process.

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