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Empowering future nurses: Transforming English speaking skills with VAK-AR digital learning

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Abstract: Effective communication is a fundamental skill for nursing professionals, especially in clinical settings where English proficiency is crucial for patient care and interdisciplinary collaboration. This study aims to examine the effectiveness of a Visual-Auditory-Kinesthetic (VAK) learning model integrated with Augmented Reality (AR) in enhancing the English-speaking skills of nursing students. Employing a pre-experimental design with a one-group pre-test and post-test, the research involved undergraduate nursing students from Universitas Muhammadiyah Magelang (Unimma) and Stikes Surya Global enrolled in an English for Specific Purposes (ESP) course. The material focused on two core topics: "Giving Admission" and "Symptoms and Physical Problems." Data were analyzed using a paired t-test to determine significant differences before and after the intervention. The findings indicate a substantial improvement in students' speaking proficiency, with average scores increasing from 58.1% (pre-test) to 89.6% (post-test), achieving a gain score of 76.14%, categorized as high. The study concludes that the VAK-AR learning model is effective in improving English-speaking skills within nursing contexts. Practically, this model offers an engaging, immersive digital learning experience that supports students' linguistic development in healthcare settings. The results provide valuable insights into integrating educational technology with language instruction for nursing education.

Keywords: *Augmented reality, English for nursing, ESP, Digital learning, Speaking skills, VAK learning model.*

1. Introduction

English proficiency is a critical component of professional competence for nurses working in multilingual healthcare environments. Effective communication between nurses and patients is essential for ensuring accurate diagnosis, quality patient care, and interdisciplinary collaboration [1-4]. However, communication barriers due to limited English proficiency can lead to misinterpretation of symptoms, reduced patient satisfaction, and even medical errors [1, 5]. In response to these challenges, English for Specific Purposes (ESP) courses in nursing education aim to equip students with linguistic and communicative skills necessary for real-world clinical settings [6, 7]. Despite their importance, traditional ESP teaching methods still rely heavily on textbook-based learning and rote memorization, which often lack interactivity, practical application, and real-world relevance. This limitation necessitates the adoption of more engaging, technology-enhanced learning models to bridge the gap between theoretical knowledge and actual clinical practice [8, 9].

To address this issue, innovative pedagogical approaches integrating Augmented Reality (AR) and multimodal learning have gained prominence in language and healthcare education [10-13]. AR enhances traditional learning by providing immersive, contextual, and interactive experiences, enabling students to engage with real-world clinical scenarios [12, 14, 15]. Unlike conventional ESP instruction, AR-based learning models offer dynamic visualizations and simulations, allowing students to practice nursing-related conversations in an authentic and interactive environment [12, 16-18]. When combined

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with the Visual-Auditory-Kinesthetic (VAK) model, AR can accommodate diverse learning preferences, boost student engagement, and improve speaking confidence [19, 20]. The VAK model emphasizes learning through visual input (e.g., videos, diagrams, AR content), auditory cues (e.g., spoken interactions), and kinesthetic activities (e.g., role-playing clinical scenarios). Such an approach aligns with modern educational psychology and active learning strategies, ensuring higher retention rates and practical language use in nursing contexts [21, 22].

2. Research Objectives

This study evaluates the feasibility and effectiveness of the VAK-AR learning model in improving English speaking skills among nursing students. Specifically, it aims to:

1. Assess the impact of the VAK-AR model on students' English-speaking performance by comparing pre-test and post-test results.
2. Measure the improvement in students' ability to communicate in clinical contexts through interactive learning strategies.
3. Determine the gain score using N-Gain Score Analysis to validate the effectiveness of the learning model [23].

3. Method

This study evaluated the feasibility of using a VAK-based learning model integrated with Augmented Reality (AR) to improve the speaking skills of nursing students in an English for Nursing course. The sample included students from the Nursing Study Program at Universitas Muhammadiyah Magelang (Unimma) and STIKes Surya Global, who were enrolled in an ESP course focused on "Giving Admission" and "Symptoms and Physical Problems". The intervention integrated Augmented Reality-based simulations with visual, auditory, and kinesthetic learning activities, specifically designed to replicate real-world clinical interactions. Students participated in interactive role-playing exercises, where they engaged with AR-based patient scenarios, practiced medical dialogues, and responded to symptom-related inquiries in English.

A pre-test and post-test experimental design was employed, with no control group, and results were analyzed using a paired t-test to evaluate students' progress. The effectiveness of the intervention was measured using N-Gain Score Analysis, which categorizes improvement levels as low, moderate, or high based on students' pre-test and post-test scores [23].This approach ensures statistical validity in assessing learning outcomes and provides empirical evidence for the feasibility of VAK-AR in nursing education [23].

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4. Result and Discussions

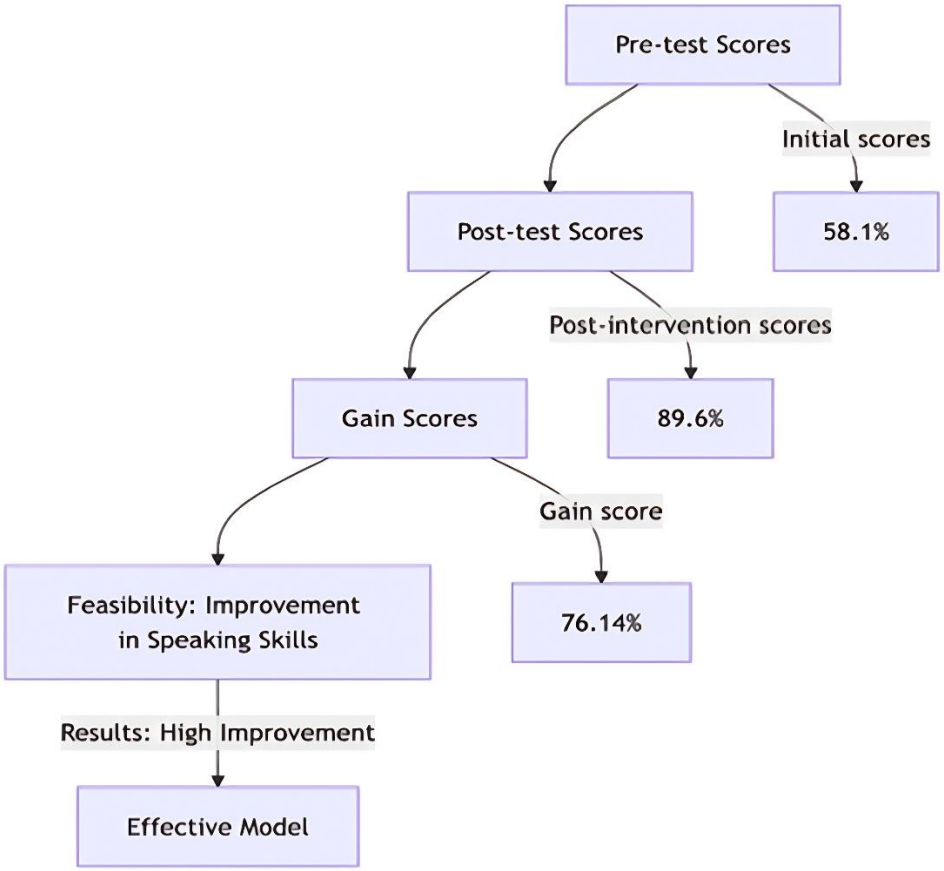

Figure 1.
English Speaking Skill Improvement Flow using VAK-AR Model.

The diagram above provides a visual representation of the process used to evaluate the feasibility and effectiveness of the VAK-AR-based learning model in improving English speaking skills among nursing students. Initially, the students' speaking abilities were assessed using a pre-test. This assessment provided a baseline measurement of their English speaking skills before any intervention. The results of the pre-test indicated that the average score was 58.1%. This score serves as a starting point, reflecting the level of proficiency in English speaking that students had before engaging with the augmented reality (AR) and Visual-Auditory-Kinesthetic (VAK) learning approach. The pre-test served as an important benchmark to measure the progress made throughout the study.

Following the pre-test, the VAK-AR learning model was implemented as part of the intervention. The students were exposed to augmented reality-based scenarios and activities that incorporated visual, auditory, and kinesthetic learning methods. These activities were tailored to the specific needs of nursing students, allowing them to practice essential English language skills relevant to their profession, such as giving admissions and discussing symptoms and physical problems. After completing the intervention, the students took a post-test to measure their progress. The results from the post-test were highly encouraging, as the average score increased significantly to 89.6%. This substantial improvement demonstrates that the VAK-AR model effectively enhanced the students' English speaking abilities. The post-test score reflects the students' ability to apply their language skills in more complex and realistic scenarios.

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To quantify the improvement, the difference between the pre-test and post-test scores was calculated and represented as the Gain Score. This gain score averaged 76.14%, showing that, on average, the students' English speaking skills improved by more than 70% after undergoing the intervention. This gain is a clear indication that the VAK-AR model had a significant positive impact on the students' language proficiency. The substantial increase in gain score demonstrates not only the effectiveness of the learning model but also its potential to support rapid skill development in students, particularly in a field as demanding as nursing, where communication is key to success.

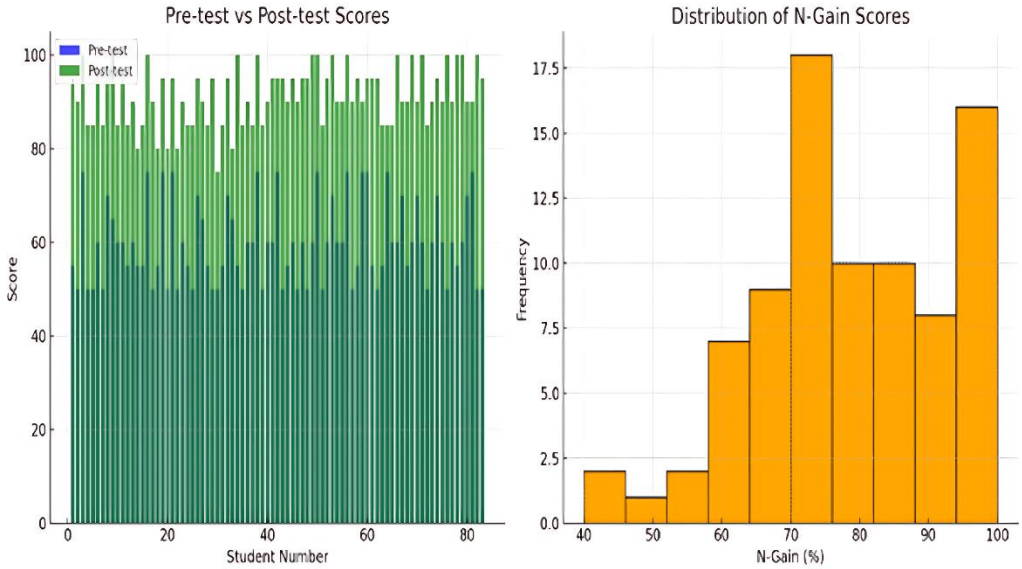

Figure 2.
Speaking Score Comparison and N-Gain Distribution.

The visualizations of the results:

1. Pre-test vs Post-test Scores: The bar chart compares the scores before and after the intervention for each student. The green bars represent the post-test scores, showing a significant improvement over the pre-test scores (blue bars).
2. Distribution of N-Gain Scores: This histogram shows the distribution of N-Gain scores, which represents the level of improvement for each student. As seen, a large proportion of students experienced substantial improvements, with the majority scoring over 70% in their N-Gain, indicating high effectiveness of the learning model.

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To quantify the improvement, the difference between the pre-test and post-test scores was calculated and represented as the Gain Score**.** This gain score averaged 76.14%**,** showing that, on average, the students' English speaking skills improved by more than 70% after undergoing the intervention. The gain score was calculated using the formula:

$$\text{N GAIN} = \frac{\text{Post-test Score} - \text{Pre-test Score}}{\text{Ideal Score} - \text{Pre-test Score}}$$

This calculation showed a clear indication that the VAK-AR model had a significant positive impact on the students' language proficiency. The substantial increase in gain score demonstrates not only the effectiveness of the learning model but also its potential to support rapid skill development in students, particularly in a field as demanding as nursing, where communication is key to success.

In line with the N-Gain Score Categories, the students' improvements were categorized as follows: those with a gain score greater than 0.7 were categorized as having "High Improvement", while those with a score between 0.3 and 0.7 were categorized as having "Moderate Improvement," and those with a score less than 0.3 were categorized as having "Low Improvement." The data indicates that a significant proportion of students achieved "High Improvement," highlighting the effectiveness and feasibility of this approach. According to (Creswell & Creswell) the N-Gain scores were categorized as follows:

- > 0.7 = High Improvement
- $0.3 < g \leq 0.7$ = Moderate Improvement
- $g < 0.3$ = Low Improvement

The diagram also emphasizes that the improvement in students' speaking skills was not marginal but rather substantial, with many students experiencing "High Improvement." This highlights the feasibility of using this learning model to address the specific needs of nursing students in learning English for professional purposes. The data confirms that the VAK-AR model can provide a meaningful and effective way to enhance English speaking proficiency in nursing students, ensuring that they are better equipped to communicate in their professional environment. Ultimately, the results of this study validate that the VAK-AR-based learning model is an Effective Model, as it resulted in significant gains in speaking abilities. These findings underscore the value of integrating AR and VAK learning techniques into language education, particularly in fields that require specialized communication skills such as nursing.

5. Conclusion

The observed improvement in students' English-speaking skills can be attributed to the tailored use of the VAK model in combination with AR technology. By engaging students visually (through AR scenarios), audibly (via interactive dialogues), and kinesthetically (involving practical role-plays), the model ensured that different learning styles were supported, leading to more effective language acquisition.

Additionally, the study highlights how technology-enhanced ESP instruction can bridge the gap between theoretical knowledge and clinical application, better preparing nursing students for real-world patient interactions [24, 25]. The learning materials focused on "Giving Admission" and "Symptoms and Physical Problems", both of which are crucial for nursing students. This context-specific content not only motivated students but also helped them connect their learning with real-world applications, which is an essential element in ESP courses like English for Nursing.

The results provide empirical support for the implementation of AR in healthcare education, emphasizing the importance of student-centered, immersive learning environments in professional

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language training [12, 26]. The high N-Gain percentages indicate that the AR-based VAK model is an effective tool in enhancing professional language skills, particularly in speaking, which is often challenging for students in professional fields like nursing. Additionally, the combination of AR technology with the VAK model likely provided a more immersive and interactive learning experience, fostering better retention and confidence in speaking.

By validating the feasibility and effectiveness of the VAK-AR model, this study offers valuable insights for educators, curriculum designers, and policymakers seeking to integrate innovative digital tools into ESP and healthcare education. Future research should explore the scalability of AR-based learning models and their potential application in broader healthcare training programs, ensuring that language education keeps pace with advancements in medical and technological fields.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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