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AUGMENTED REALITY IN LANGUAGE LEARNING: IMPROVING PROFICIENCY AND MOTIVATION AMONG VOCATIONAL SCHOOL LEARNERS

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Abstract
This study investigates the use of Augmented Reality (AR) as an innovative approach to enhance language learning among vocational school students. Conventional teaching methods often struggle to engage learners with low motivation, which can hinder their language development and reduce long-term learning outcomes. By integrating AR into classroom practice, this research seeks to bridge that gap by fostering student motivation, engagement, and proficiency. The study employed a pre-experimental design with pre- and post-intervention assessments to evaluate the impact of AR implementation. Findings demonstrate that AR contributed to substantial improvements in students' language competence, moving learners from basic to more advanced levels of proficiency while also stimulating their interest and participation in learning activities. These outcomes highlight the potential of AR as a complementary tool within vocational education, offering opportunities to strengthen both linguistic skills and student attitudes toward language learning. The study suggests that embedding AR in pedagogical practice can create more inclusive and interactive environments, paving the way for future research on sustainable integration of technology in language education.

Keywords: *Augmented Reality (AR), Language Proficiency, Vocational School*

Introduction

The modern global scenario requires multiple-language fluency because it generates individual and vocational success. Learning multiple languages enables individuals to develop their cognitive skills better while improving their connection with different cultures (Dervin et al., 2020; Rafiqa & De Vega, 2025). Because of rising language requirements, educators and researchers focus on creating innovative

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educational methods. Previous research has identified different instructional approaches, yet there is an essential lack of complete evidence regarding how these interventions can lead to specific advantages for diverse student populations.

According to Agust & Shanahan (2017) and Liu & Lahoz (2024), structured educational programs substantially benefit language proficiency, but their performance level usually differs between different cultural settings and demographic groups. Only numerical assessments were part of previous research studies that neglected to evaluate fundamental qualitative aspects of learning intervention results alongside student motivation and emotional reactions to participation (Nassaji, 2020). Such variables both keep student peer interactions and their overall attitudes as key determinants for achieving success in language education methods, according to Rabgay (2018). Research by Maxwell et al. (2017) fails to present a comprehensive view that combines statistical results with student experiential analysis. The absence of inclusive research methods generates direct opposition to requests for multidimensional language learning assessment methods that combine quantitative data with qualitative observations.

Educational innovation introduces technology, especially AR, which creates promising prospects to enhance student engagement (Fan et al., 2020; Gaikwad & Mulay, 2024). Research demonstrates how AR applications create two key advantages for language learners as they enhance their interest and support flexible learning styles for a more interactive study environment. Including modern technology in conventional educational settings creates an inclusive learning environment that caters to a wide range of linguistic student requirements (Vega et al., 2025). A comprehensive teaching method will raise student interest in learning while creating the foundation needed to create better educational approaches forra specific contexts.

Research on technology integration with pedagogical methods requires a thorough evaluation of language acquisition variables, including cognitive processing and emotional and social learning aspects, to develop complete educational teaching strategies (Li & Lan, 2022). The existing research requires a framework linking knowledge of learning diversity with technological advancement to improve the

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efficiency of existing literature. Students who encounter properly designed educational technology acquire better language proficiency and cultural knowledge in their language learning process.

Considering these compelling insights and the potential for technological innovation to address existing gaps, this study seeks to investigate "How does the integration of AR technology into language learning comprehensively impact overall learning outcomes, including both quantitative aspects like improved language proficiency and qualitative aspects such as student engagement, motivation, and emotional responses".

Method

This research employed a pre-experimental design to evaluate the influence of augmented reality (AR) on the development of language proficiency among 12th-grade students at SMKN 4 Tarakan. From a total population of 244 students, a random sample of 80 participants was selected to represent population diversity in accordance with established research methodologies (Ary et al., 2014). Prior to the intervention, students underwent an initial language proficiency assessment using the English Test adopted from the English for SMK Book. This test served as an official measurement tool for skill assessment.

The validity of this instrument was ensured through expert panel review and comprehensive content validity analysis. Its reliability was subsequently confirmed with a Cronbach's Alpha of 0.87 obtained from preliminary try-out tests conducted on a separate group of students, thereby guaranteeing the consistency and stability of the measurement tool. The test categorizes language proficiency into various score intervals, each corresponding to a specific qualitative descriptive level:

Table 1. Qualitative Descriptive Level

Qualitative Descriptive	Score Range
Deficient	38 – 46
Deficient - Sufficient	47 – 55
Sufficient	56 – 64

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Sufficient - Good	65 – 73
Good	74 – 82
Good – Excellent	83 – 91
Excellent	92 – 100

The core procedure of this study involved a twelve-week long treatment period where students engaged with AR educational technology. Throughout these twelve weeks, students participated in interactive language learning sessions primarily through immersive designs implemented by AR applications (Cen et al., 2020). Upon the completion of the twelve-week AR technology project, students took their second standardized language proficiency test, which was the same English Test used in the pre-intervention phase. Research analysts then utilized paired t-tests to examine the data pairs from the pre- and post-test combinations, aiming to study the effectiveness of AR technology. These organized methods were designed to generate significant findings about modern technology systems which enhance language training in vocational institutions.

Results

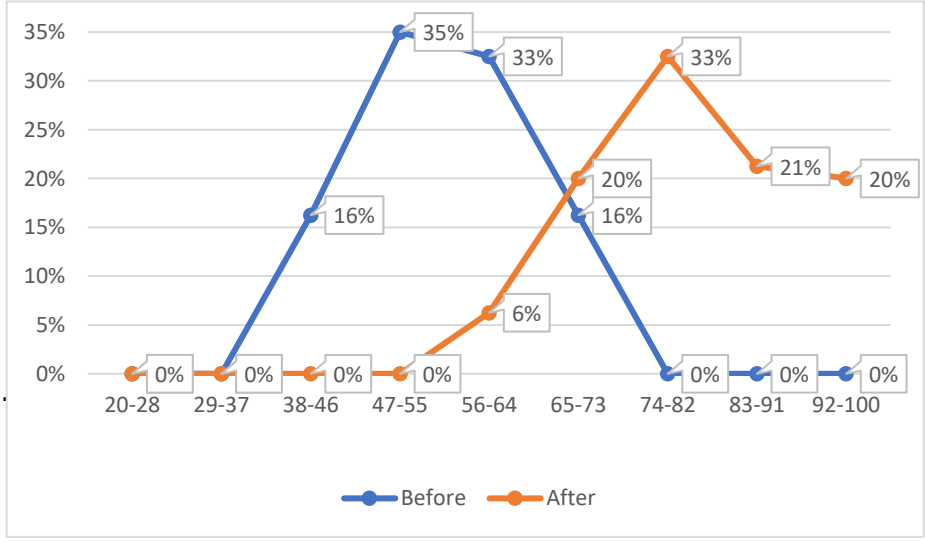

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Figure 1. Before and After Intervention

Educational interventions must be assessed to enhance language learning results. Educational interventions have resulted in the critical development of students' language proficiency. The research observes student performance changes by reviewing intervention results through statistical distribution analysis before and after implementing the approach. The collected data shows significant changes in proficiency levels, which generate essential changes to superior performance areas. Implementing their specific educational method resulted in substantial growth because the number of proficient students increased by three to twenty percent (20%).

Educational methods successfully taught advanced language understanding and usage, which allowed students to improve all their learning competencies. Before the intervention, there were no participants in the 74-82 interval. However, after implementing the intervention in the 74-82 interval, 26 new participants totaled 33% of the total number. Research evidence indicates the measure worked successfully because it brought in unengaged students and enhanced their capability within the language framework. The 83-91 intervention period attracted 17 participants as project success indicators after the implementation of the intervention was complete.

Results from the intervention demonstrate a substantial improvement in language aptitude because the number of participants decreased in beginner stages (38-46 and 47-55) while it increased in upper-level groups. The data indicates that instructional approaches with strategic educational methods in training-based education produce anticipated learning outcomes. The conversion of original data produced several visual presentations, including tables and graphs, for displaying learner development statistics. The visual displays in this research provide dual benefits: they improve data understanding while making study progress easily

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trackable for research results. Educational methods establish specific purposes to lead to substantial improvements in language teaching curricula, as evidence shows. New research findings derived from collected data confirm successful execution, which produces fresh possibilities for both Language Education research development and software application creation.

This research demonstrates that the educational intervention strategy led students to improve their language proficiency because their scores decreased by -25.800, with significant increases in proficient participants. These results are significant because they show how the intervention successfully enhanced language proficiency, which is crucial for language learning success. These findings prove reliable because the statistical calculations show a -17.265 t-value and a .000 p-value, indicating the intervention generated significant measurable improvements, which were unlikely because of random chance. These findings correspond with established academic research because structured educational methods produce better language results.

Multiple studies have verified that practical instructional approaches produce substantial language progress because well-designed educational techniques produce superior learning outcomes. The multiple study design is a valuable qualitative research tool in studying the links between the personal, social, behavioral, psychological, organizational, cultural, and environmental factors that guide organizational and leadership development (Halkias et al., 2022). The research confirms that these intervention methods boost learner engagement and language growth, especially for unenthusiastic students.

Additional variables should be considered when explaining the documented improvements. Enhanced language proficiency would be explained through student-driven motivation levels, other outside influences, and peer contact effects. The intervention served as a crucial factor, yet multiple other variables might have influenced results, which support the need for comprehensive language education strategies. While this research program accepts several constraints as conditional factors, the experimental results may not apply consistently across all language

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learners because the research sample fails to include all language learners in its representation. The total dependency on quantitative assessment could enable researchers to miss essential qualitative elements within language learning, such as student engagement and emotional responses toward the intervention. Research studying this intervention should combine quantitative methodologies with qualitative data collection because it would produce a holistic view of its effects on language education.

Educational interventions need thorough evaluation to boost language learning results and recent findings demonstrate a specific intervention leads to improved language proficiency students. The research used matched student data points before and after the intervention period to demonstrate improved proficiency measurements accompanied by lower grades along with higher standards achievement.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Before - After	-25.800	13.366	1.494	-28.774	-22.826	-17.265	79	<.001

Figure 2. Paired Sample Test

The paired sample test results indicate a statistically significant difference between the "Before" and "After" measurements. The mean difference is -25.8, meaning that on average, the "After" values are 25.8 units lower than the "Before" values. According to post-treatment mean difference results, the participants exhibited a significant decrease in their scores to -25.800 following the intervention. The scores display distributed variations of 13.366, which indicates the participants' different responses. The precision of the mean difference calculation derives from its standard error measurement, which amounts to 1.494. The 95% confidence interval analysis confirms that the actual mean difference exists between -28.774 and -22.826. A statistical comparison exists based on the t-value of -17.265 and degrees of freedom (df) of 79, which produces the p-value result of .000. The observed data proves statistically meaningful for this outcome because the obtained p-value surpasses 0.05.

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The conducted research validated how the intervention created positive impacts, which led to significant performance gains for participants.

Discussion

The results of the educational intervention clearly demonstrate significant improvements in students' language proficiency. Specifically, the intervention led to a decrease in the scores of beginner students, while the number of students in higher proficiency groups increased. Statistical analysis revealed a mean difference of -25.800, with a t-value of -17.265 and a p-value of .000, confirming that the observed improvements were statistically significant and not due to random chance. This finding is important because it indicates that the educational intervention was effective in enhancing language proficiency among the students. The substantial increase in the number of students achieving higher proficiency levels, coupled with the decrease in beginner-level students, shows the intervention successfully elevated overall language competence. These results are significant not only because of their statistical reliability but also because they highlight the potential of structured, targeted educational methods to positively impact language learning outcomes.

When compared with similar studies, these findings are consistent with previous evidence on the effectiveness of well-structured educational interventions in language learning. Numerous studies have shown that instructional strategies focusing on active student engagement and tailored learning methods can lead to significant improvements in language proficiency. For instance, studies by Kulal et al. (2025), Rasheed et al. (2021), and Shi et al. (2021) found that carefully designed interventions, including those that integrate motivational aspects and peer interaction, enhance learner outcomes.

Alternative explanations for the observed improvements might include external factors such as the motivation levels of students (Steenbergen et al., 2020), the influence of peer interactions, or other educational practices occurring concurrently with the intervention. These factors could have contributed to the observed changes, though the intervention itself remains a key factor in the students' improvement (Kim et al., 2019; McGrew et al., 2019). However, this study does have some limitations.

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The research sample may not be fully representative of all language learners, as it focused on a specific group of students, potentially skewing the results.

Furthermore, the reliance on quantitative data alone may overlook important qualitative aspects, such as student engagement, emotional responses, and individual learning preferences Shekhar et al. (2019). Future research could benefit from combining quantitative and qualitative methods to provide a more holistic understanding of the intervention's impact. Earlier studies (Marrahi & Belda, 2024) the qualitative research revealed the desire of the young learners to use AR in the learning process.

Nevertheless, problems have risen such as unwillingness and unpreparedness in using AR by educators. This highlights the importance of the creation of the overall awareness-building and training of the secondary education educators, both focused on the pedagogical possibilities of the AR technology itself and its optimal use in the educational sphere. According to (Herlandy et al., 2020) displaying the object and the atmosphere of the practicum as in real life is the key to the success of the media development being carried out. This got adopted when the augmented reality media development was used and the material components were created in 3D animation that had the ability to make the students appear like they could see them in reality.

Conclusion

This research examines the impact AR has on language proficiency development at SMK 4 vocational school for its 12th-grade students. Research-based on participant performance needed a pre-experimental design approach that collected data points through pre-tests and post-tests. Based on researcher findings, the participants who received AR intervention substantially grew in language aptitudes. Results indicated that educational participants achieved decreased proficiency scores by 25.800 points with improved numbers of students determining advanced levels. Successful technology integration into traditional educational practices can be observed through this research's results, which achieve statistical significance based on their t-value at -17.265 and p-value at .000.

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The results of this study meet all the targets established during the initial planning stage. Students with lower motivation showed great interest in AR teaching systems while their language proficiency were both better understood and became more practically competent. The educational outcomes demonstrate that digital technology use in teaching methods can enhance vocational instruction. AR implementation enables educators to transform language learning, thus creating new possibilities for educational field development. Future investigations need to study the effects of AR intervention on language proficiency maintenance throughout extended periods. The research must evaluate the multifold demographic aspects that may modify these identified results. Researchers must explore additional educational topics where AR technologies could be successfully applied to create future development opportunities.

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