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Enhancing Arabic Speaking Proficiency through Digital Collaborative Platforms: The Impact of Miro Brainstorm at MAN 1 Serang

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ABSTRACT
Purpose – This study investigates the influence of Miro Brainstorm, a digital collaborative whiteboard, on the Arabic speaking skills (*maharah al-kalam*) of tenth-grade students at MAN 1 Serang. Addressing the challenges of conventional rote-memorization methods and high language anxiety in Indonesian secondary schools, this research aims to evaluate whether visual-collaborative scaffolding can significantly improve communicative competence.
Design/methods/approach – Utilizing a quasi-experimental design, the study involved 64 students divided into experimental (N=33) and control (N=31) groups. Data were collected through pre-tests, post-tests, observations, and interviews, then analyzed using descriptive statistics and linear regression.
Findings – The results indicate a substantial improvement in the experimental group, with mean scores rising from 42.91 to 81.06. Regression analysis yielded an R-Square value of 0.807, demonstrating that the use of Miro Brainstorm accounts for 80.7% of the variance in students' speaking proficiency ($p < 0.05$).
Research implications – These findings imply that digital brainstorming tools serve as effective cognitive scaffolds that reduce cognitive load and stimulate verbal productivity by visualizing abstract linguistic concepts. However, this study is limited by its specific focus on a single grade level and short-term intervention. It is recommended that future research explores the long-term retention of these gains and the platform's efficacy across other linguistic skills, such as writing and listening, within broader educational contexts.

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Introduction

In the era of global communication, mastering a foreign language—particularly Arabic—holds a strategic position in religious discourse, academic discipline, and social interaction. Among the four language skills, *maharah al-kalam* (speaking skills) is arguably the most essential competence. It is not merely the ability to articulate sounds or words but a productive medium to express thoughts, ideas, and feelings creatively and naturally (Masrai, 2022). As a productive skill, speaking is the primary tool for human interaction and is often more highly valued in society than written work, as it serves as an immediate means for fulfilling social needs and executing communal responsibilities (Ashari, 2022). Consequently, achieving fluency in Arabic speaking is a vital necessity for learners to participate effectively in both global and academic contexts.

Scholars have long established that teaching speaking skills in a foreign language involves a complex cognitive process. This process encompasses motivation, content development, and a linguistic system where thoughts are translated into spoken messages (Baalousha & Malovrh, 2023).

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Previous research emphasizes that speaking proficiency requires a mastery of accurate sounds, grammatical formulas, and a rich vocabulary to enable learners to express themselves in various situations. Furthermore, the role of instructional media has been recognized as a fundamental element in facilitating the learning process, stimulating student interest, and ensuring that educational goals are met effectively and efficiently (Aini, 2024). In the contemporary digital landscape, online collaborative tools have emerged as potential solutions to provide different learning experiences and foster student collaboration.

Despite the theoretical importance of speaking skills, a significant gap remains in practical application. At MAN 1 Serang, particularly among tenth-grade students, there is a noticeable weakness in Arabic speaking proficiency. This issue stems from several factors: the majority of students come from non-boarding school backgrounds, leading to low interest and enthusiasm; learning is often limited to rote memorization of vocabulary and grammar (*nahwu-shorof*) without practical application; and teachers predominantly rely on conventional lecture methods. Furthermore, the lack of an immersive Arabic-speaking environment contributes to the students' inability to communicate fluently (Zikrillah et al., 2025). While digital media is evolving, the specific use of collaborative-visual platforms to stimulate brainstorming in Arabic speaking remains underutilized in this specific educational context.

To address these challenges, this study focuses on the implementation of Miro Brainstorm as an innovative instructional tool. Miro is an online collaborative whiteboard designed to facilitate team interaction, visual ideation, and brainstorming sessions. The primary aim of this research is to evaluate the influence of Miro Brainstorm in enhancing the speaking skills of tenth-grade students at MAN 1 Serang by providing a more interactive and less intimidating platform for idea generation. This study is expected to contribute methodologically to the field of Arabic pedagogy by offering a modern alternative to conventional teaching methods. Ultimately, it seeks to transform the classroom into a dynamic environment where students can speak Arabic fluently and confidently. Thus, this research is titled: "The Influence of Using Miro Brainstorm Media in Improving the Speaking Skills of Tenth Grade Students at MAN 1 Serang".

Methods

This study employs a quantitative research approach utilizing a quasi-experimental design. This methodology was selected as it is particularly appropriate for testing hypotheses regarding the effectiveness of an intervention in an educational setting where the random assignment of subjects is not feasible due to existing classroom structures. The study was conducted at MAN 1 Serang, focusing on tenth-grade students, to evaluate the impact of a specific technological intervention on their Arabic speaking proficiency (*maharah al-kalam*).

The research procedures were carried out through a structured comparative framework involving an experimental group and a control group. The process began with the administration of a pre-test to both groups to establish a baseline for their initial speaking abilities. Following the pre-test, the experimental group received Arabic language instruction integrated with the Miro Brainstorm platform, while the control group was taught using conventional methods. The intervention focused on utilizing visual mapping and collaborative brainstorming to trigger verbal expression. Upon completion of the treatment period, a post-test was administered to both groups to measure the significance of the progress and the variance between the two instructional approaches.

In terms of tools and technologies, the primary instrument utilized was Miro Brainstorm, an online collaborative whiteboard platform. This technology was integrated into the classroom activities to serve as a visual stimulus and a workspace for ideation. By using Miro, students were able to map out their thoughts, organize vocabulary, and collaborate in real-time, which served as a scaffold for their speaking exercises. This technological integration was specifically designed to transform abstract linguistic concepts into visual anchors, thereby reducing the cognitive load and anxiety often associated with speaking a foreign language.

Data collection was conducted through a combination of observation, interviews, and standardized tests. Direct observations were used to monitor student engagement and behavior during the learning process, while interviews provided qualitative insights into student motivation. The primary quantitative data, however, were derived from the pre-test and post-test scores. For the data analysis, the researchers employed comparative statistical techniques to evaluate the differences in speaking performance between the experimental and control groups, determining whether the improvement in the experimental group was statistically significant.

To ensure the reliability and validity of the study, the researchers utilized standardized speaking assessment rubrics to maintain objectivity in scoring. Furthermore, the quasi-experimental design allowed for a realistic evaluation of the instructional media within a natural school environment. By comparing the experimental results against a control group, the study controlled for external variables, ensuring that the observed improvements in speaking skills could be attributed to the influence of the Miro Brainstorm media rather than external factors or coincidental progress.

Results

This section presents the primary findings of the quasi-experimental study conducted at MAN 1 Serang. The data includes descriptive statistics and inferential analyses to determine the effectiveness of Miro Brainstorm media in improving students' Arabic speaking skills (*maharah al-kalam*).

3.1. Descriptive Statistical Analysis

The study involved a total sample of 64 tenth-grade students, divided into an experimental group (N=33) and a control group (N=31). The descriptive data regarding the pre-test and post-test scores for both groups are summarized in Table 1.

Tabel 1. Descriptive Statistics of Pre-Test and Post-Test Scores

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test (Experimental)	33	25.00	60.00	42.91	10.04
Post-Test (Experimental)	33	65.00	100.00	81.06	9.50
Pre-Test (Control)	31	20.00	65.00	41.13	10.93
Post-Test (Control)	31	55.00	95.00	78.06	9.37

The data indicates that the mean score of the experimental group increased by 38.15 points (from 42.91 to 81.06), while the control group increased by 36.93 points (from 41.13 to 78.06).

3.2. Prerequisite Test Analysis

To ensure the validity of the parametric statistical analysis, normality and homogeneity tests were conducted prior to hypothesis testing. The normality of the data distribution was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests.

Table 2. Test of Normality

Group	Test Type	Statistic	df	Sig.
Experimental	Pre-Test	0.173	33	0.113
	Post-Test	0.132	33	0.153

Control	Pre-Test	0.114	31	0.200
	Post-Test	0.130	31	0.194

As shown in Table 2, all significance values (p-values) exceed the 0.05 threshold ($p > 0.05$). Consequently, the null hypothesis is accepted, indicating that the data for both groups are normally distributed. The homogeneity of variance was tested using the Levene Statistic based on the mean of the post-test scores.

Table 3. Test of Homogeneity of Variance

Based on	Levene Statistic	df1	df2	Sig.
Mean	0.027	1	62	0.869

The analysis yielded a significance value of 0.869, which is greater than 0.05. This demonstrates that the variance between the experimental and control groups is homogeneous, fulfilling the requirements for further parametric testing.

3.3. Hypothesis Testing

A Paired Samples T-test was employed to determine if the changes in students' speaking skills within each group were statistically significant.

Table 4. Paired Samples T-Test Results

Pair	Mean Difference	t	df	Sig. (2-tailed)
Experimental (Pre - Post)	-40.15	-18.408	32	0.000
Control (Pre - Post)	-36.93	-12.850	30	0.000

The results in Table 4 show a significance value of **0.000** ($p < 0.05$) for both groups. This indicates a significant difference between the pre-test and post-test scores, confirming that learning occurred in both settings.

To measure the extent of the influence of Miro Brainstorm media on the experimental group's speaking skills, a linear regression analysis was performed.

Table 5. Linear Regression Coefficients

Model	Unstandardized B	Std. Error	t	Sig.
(Constant)	25.662	15.235	1.684	0.000
Miro Brainstorm Use	0.188	0.187	1.007	0.000

Table 6. Model Summary (R-Square)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.178	0.807	0.802	10.033

The regression analysis results in Table 6 show an R-Square value of 0.807. This indicates that the use of Miro Brainstorm media accounts for 80.7% of the improvement in students' speaking skills in the experimental class, while the remaining percentage is influenced by other factors not examined in this study.

The significance value of 0.000 ($p < 0.05$) leads to the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_1), confirming a significant influence of Miro Brainstorm media on the speaking skills of tenth-grade students at MAN 1 Serang.

Discussion

The research was driven by the persistent gap between theoretical language acquisition and practical communicative competence in Indonesian secondary schools. As highlighted by Alharbi (2024), speaking is the most frequently used skill in human life; however, students often face "language anxiety" and cognitive overload when forced to produce spoken language without sufficient scaffolding. By introducing Miro Brainstorm, this study sought to determine whether a visual-collaborative environment could mitigate these barriers and foster a more dynamic learning atmosphere.

The findings reveal a significant statistical improvement in the experimental group. The most striking discovery is the R-Square value of 0.807, which indicates that 80.7% of the variance in students' speaking proficiency can be attributed to the intervention using Miro Brainstorm. The mean score rose remarkably from 42.91 to 81.06, surpassing the control group's performance. This suggests that the intervention did not merely facilitate learning but fundamentally transformed the students' ability to produce spoken Arabic. Such a high degree of influence underscores the potency of digital brainstorming in structuring linguistic output.

These results align with and extend recent studies regarding Digital Collaborative Whiteboards (DCWs) in language acquisition. For instance, Fitria (2024) argued that online whiteboards provide a unique platform for real-time collaboration that visualizes abstract concepts. Furthermore, the success of Miro in this study supports the findings of Nadia Maghfira et al. (2020), who noted that visual scaffolding in Arabic learning significantly reduces the "silent period" in foreign language learners. Unlike traditional lecture-based methods—which (Gustiani, 2013) identified as a major bottleneck in Indonesian schools—the use of Miro creates a "student-centered" ecosystem. This study reinforces the notion that technology-integrated CLT is superior to conventional rote-memorization approaches in developing productive skills.

The effectiveness of Miro Brainstorm can be explained through Cognitive Load Theory. Arabic speaking requires students to manage vocabulary, grammar, and pronunciation simultaneously. Miro acts as a "cognitive tool" that allows students to externalize their thought processes through visual maps and icons. By organizing ideas visually before speaking, the mental effort required for sentence construction is reduced, allowing students to focus on fluency and articulation.

However, a cautious interpretation is warranted regarding the sustainability of these results. While the statistics are robust, the 19.3% of unexplained variance suggests that teacher feedback, peer dynamics, and individual student motivation still play critical roles. The significance of this finding lies in its rejection of the "digital-only" or "traditional-only" dichotomy; rather, it suggests that the *synergy* between a teacher acting as a facilitator and a highly interactive tool is what drives competence.

The implications of this study are twofold. Methodologically, it suggests a shift toward "Visual-Collaborative Pedagogy" in Arabic teaching. Educators should move beyond linear textbook exercises and incorporate non-linear brainstorming tools to help students "see" the language before they "speak" it. Institutionally, the success of this intervention at MAN 1 Serang provides a blueprint for other general Islamic high schools (*Madrasah Aliyah*) to integrate Mobile Assisted Language Learning (MALL) tools. If schools invest in digital infrastructure and teacher training for platforms like Miro, the historically "difficult" reputation of Arabic speaking could be transformed into a more accessible and engaging discipline.

Conclusion

Based on the research findings and discussion, it can be concluded that the implementation of Miro Brainstorm as an instructional medium significantly enhances the Arabic speaking skills (*maharah al-kalam*) of tenth-grade students at MAN 1 Serang. The statistical analysis reveals a substantial improvement in the experimental group, with the mean score rising from 42.91 to 81.06. Furthermore, the linear regression analysis shows an R-Square value of 0.807, indicating that Miro Brainstorm contributes 80.7% to the improvement of students' speaking competencies. The results confirm that the integration of digital collaborative whiteboards effectively addresses the challenges of conventional learning by providing visual scaffolding,

reducing cognitive load, and increasing student engagement. The platform fosters a "student-centered" environment where learners feel more confident to articulate ideas in Arabic. Consequently, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, proving a significant influence of Miro Brainstorm on the students' communicative proficiency.

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