Interactive Whiteboard as a Medium for *Nahwu* Learning: Bridging Technology and Arabic Grammar Education

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Abstract : People who have mastered *Nahwu* often struggle to adjust to using technology. This research investigates the integration of Interactive Whiteboards (IWBs) as a transformative tool in *Nahwu* (Arabic syntax) learning, addressing the longstanding challenges associated with traditional pedagogical approaches. The study emphasizes the unique contribution of IWBs in bridging the gap between traditional *Nahwu* instruction and technology-based learning by incorporating multimodal strategies, such as dynamic diagrams, real-time feedback, and interactive sentence-building exercises. These features not only enhance student engagement but also simplify the comprehension of intricate grammatical rules, making *Nahwu* more accessible to modern learners. The qualitative research involved 30 students and 5 educators from an Islamic boarding school, utilizing interviews, focus group discussions, classroom observations, and document analysis. Key findings demonstrate that IWBs significantly improve cognitive retention, student participation, and the overall effectiveness of *Nahwu* instruction. Practical recommendations include providing robust teacher training on IWB integration, designing interactive lesson plans tailored to the needs of Generation Z learners, and leveraging IWB capabilities to foster collaborative and inquiry-based learning environments. This study highlights IWBs as a cornerstone in modernizing Arabic grammar education, offering actionable insights for educators and institutions aiming to implement technology-driven teaching solutions effectively.

INTRODUCTION

Those who have mastered *Nahwu* often find it difficult to adapt to technology. This is because they have spent years immersed in studying *Nahwu* and are accustomed to teaching it using the same traditional methods passed down through generations. It's not that they reject technology, but their age and the many years dedicated solely to *Nahwu* have left them little time or opportunity to familiarize themselves with modern tools. It's much like older adults given a high-end smartphone—they tend to use it only for messaging and calls, unaware of the many other features and applications it offers. In the era of Industry 4.0, numerous applications are now available to support and enhance the process of

learning Arabic, offering innovative tools to facilitate more effective and engaging instruction[1].

These technological advancements provide educators with opportunities to integrate digital solutions into their teaching practices, such as interactive whiteboards, language-learning apps, and virtual classrooms. By leveraging these tools, Arabic language education can become more accessible, interactive, and tailored to the needs of modern learners. This adaptation not only aligns with global technological trends but also ensures that Arabic instruction remains relevant and impactful in an increasingly digital world[2].

Interactive Whiteboards (IWBs), as one such technological breakthrough, have gained prominence for their ability to transform traditional classrooms into dynamic, engaging, and interactive learning environments. However, their application in teaching Arabic grammar, specifically *Nahwu* (Arabic syntax), remains underexplored. *Nahwu*, a cornerstone of Arabic language education, is often perceived as challenging due to its intricate rules and structures, which demand a high level of cognitive engagement from learners[3]. Traditional methods of teaching *Nahwu* frequently rely on rote memorization and static delivery, which can hinder student engagement and comprehension.

This study investigates the integration of IWBs into *Nahwu* instruction as a means to address the pedagogical challenges associated with this subject. Interactive Whiteboards offer a multimodal approach, enabling educators to utilize visual aids, animations, and instant feedback mechanisms to elucidate complex grammatical concepts. This capability aligns with contemporary educational practices that emphasize active learning and student-centered methodologies.

Previous research on IWBs has demonstrated their effectiveness in fostering student engagement and improving learning outcomes in various disciplines, such as mathematics, science, and foreign languages. Studies have highlighted how IWBs facilitate the visualization of abstract concepts, promote collaborative learning, and provide immediate reinforcement through interactive features[4]. Despite these findings, little attention has been given to their role in Arabic grammar education, particularly in *Nahwu*. Existing literature has primarily

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1 Alfan Sujefri and Ihda Filzafatin Habibah, "Analysis of Needs to Learn Arabic through Instagram," International Journal of Arabic Language Teaching 5, no. 02 (October 1, 2023): 245, https://doi.org/10.32332/ijalt.v5i02.7180.

2 Masnun Masnun, Nur Hanifansyah, and Syarif Muhammad Syaheed bin Khalid, "Senior Teaches Junior (STJ) Approach in Enhancing Arabic Vocabulary through Kitab Af'al: A Case Study in Malaysia," Arabi : Journal of Arabic Studies 9, no. 2 (2024), https://doi.org/10.24865/ajas.v9i2.851.

3 Muhamad Solehudin and Nur Hanifansyah, "Arabic Public Speaking in Malaysia: Enhancing Vocabulary and Confidence through Psycholinguistics," International Journal of Arabic Language Teaching 6, no. 02 (December 22, 2024): 143–56, https://doi.org/10.32332/ijalt.v6i02.9920.

4 Inam Ur Rehman and Sehat Ullah, "Gestures and Marker Based Low-Cost Interactive Writing Board for Primary Education," Multimedia Tools and Applications 81, no. 1 (January 2022): 1337–56, https://doi.org/10.1007/s11042-021-11366-1.

focused on conventional instructional strategies, leaving a gap in understanding how modern technology can be harnessed to address the unique challenges of teaching this subject[5]. Interactive whiteboards (IWBs) are technological devices that are part of an enlarged computer monitor[6], allowing users to write by using a special pen to simultaneously control and render information on a display unit[7]. These developments make existing blackboard applications or presentation slides on a computer interactive because they can run programs by using finger touch or markers to write commands. The attraction of IWBs in the learning environment is their interactive nature[8], allowing students to 'leave their seats and build mathematical concepts on a large scale' that involve more senses and instant feedback from their work to the screen. In other words, IWBs increase students' visual and audio ability to understand, engage actively, and try things for themselves, Interactive whiteboards offer innovative opportunities for language learning and usage. Exploring students' perceptions of this technology allows us to identify the most effective strategies for leveraging it to enhance their language learning experience. By understanding how students interact with and respond to this tool, educators can optimize its use to support meaningful and engaging language acquisition[9].

Recent studies highlight the transformative potential of Interactive Whiteboards (IWBs) in enhancing pedagogical practices across diverse educational contexts. Zhou et al. (2022) demonstrated their effectiveness in rural settings, improving teaching quality and student engagement, particularly in areas where traditional methods face limitations [10]. Similarly, Luo et al. (2023) emphasized IWBs' role in facilitating language acquisition in ESL classrooms, offering multimodal learning experiences suited to diverse learning styles[11].

Shi et al. (2021) consolidated these findings through a meta-analysis, showing that IWB-based instruction significantly enhances cognitive learning

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5 Muhamad Solehudin, Nur Hanifansyah, and Iqbal Fathi Izzuddin, "Enhancing Arabic Listening and Vocabulary Acquisition through AI-Powered Music: A Study on Suno AI," Arabiyat : Jurnal Pendidikan Bahasa Arab Dan Kebahasaaraban 11, no. 2 (2024): 175–88, https://doi.org/10.15408/a.v11i2.41994.

6 Zhanni Luo et al., "The Seewo Interactive Whiteboard (IWB) for ESL Teaching: How Useful It Is?," Heliyon 9, no. 10 (October 2023): e20424, https://doi.org/10.1016/j.heliyon.2023.e20424.

7 Asterios Leonidis et al., "CognitOS Board: A Wall-Sized Board to Support Presentations in Intelligent Environments," Technologies 8, no. 4 (November 8, 2020): 66, https://doi.org/10.3390/technologies8040066.

8 Yinghui Shi et al., "Effects of Interactive Whiteboard-Based Instruction on Students' Cognitive Learning Outcomes: A Meta-Analysis," Interactive Learning Environments 29, no. 2 (February 17, 2021): 283–300, https://doi.org/10.1080/10494820.2020.1769683.

9 Aryawira Pratama et al., "Smart Interactive Whiteboard in EFL Class at Islamic University," English Learning Innovation 5, no. 2 (August 6, 2024): 223–35, https://doi.org/10.22219/englie.v5i2.35010.

10 Ying Zhou, Xinxin Li, and Tommy Tanu Wijaya, "Determinants of Behavioral Intention and Use of Interactive Whiteboard by K-12 Teachers in Remote and Rural Areas," Frontiers in Psychology 13 (June 17, 2022): 934423, https://doi.org/10.3389/fpsyg.2022.934423.

11 Luo et al., "The Seewo Interactive Whiteboard (IWB) for ESL Teaching."

outcomes by making abstract concepts more tangible[12]. Wujec-Kaczmarek (2021) highlighted the role of IWBs in fostering interactive, student-centered learning environments in general education and English Language Teaching (ELT). Furthermore, Teng (2021) explored IWB-supported collaborative writing, revealing improvements in writing achievement and metacognitive engagement[13], while Giannikas (2021) examined perspectives from teachers and students, showcasing IWBs' effectiveness in boosting engagement and classroom management[14].

While these studies underscore the benefits of IWBs in various educational settings, their application in Arabic language education remains scarcely addressed. In discussions specifically related to Arabic grammar, such as *Nahwu*, the use of IWBs is almost non-existent. This research seeks to fill this critical gap by investigating IWBs' potential to simplify complex grammatical rules and provide practical insights into integrating technology in Arabic grammar instruction.

Nahwu is the center of Arabic grammar that forms the basic competencies of the Arabic language[15]. Many students of Arabic introduce learning with a strong sentence system[16]. Therefore, the Arabic program that is implemented must be designed as innovatively as possible by also considering the role of technology so that satisfactory lecture results will be obtained.

The development of human education will be even better, not only supported by general lecture media but also by the application of information technology. The development of information technology has made changes more rapidly, and the learning process becomes easier. The development of the times, especially in the fields of information and technology, has brought changes in all aspects of human life. In the field of education, technological developments can be used in the teaching and learning process to achieve optimal results. 'Interactive Technology' is a teaching program that incorporates a combination of multimedia to assist teachers in conveying lessons and helps students learn. The use of interactive whiteboard technology as a lesson has many advantages in the learning process, especially for *Nahwu*.

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12 Shi et al., "Effects of Interactive Whiteboard-Based Instruction on Students' Cognitive Learning Outcomes."

13 Mark Feng Teng, "Interactive-Whiteboard-Technology-Supported Collaborative Writing: Writing Achievement, Metacognitive Activities, and Co-Regulation Patterns," System 97 (April 2021): 102426, https://doi.org/10.1016/j.system.2020.102426.

14 Christina Nicole Giannikas, "Interactive Whiteboards in EFL from the Teachers' and Students' Perspective," Research Papers in Language Teaching and Learning 11, no. 1 (2021): 203–19.

15 Nur Hanifansyah, Menik Mahmudah, and Sultan Abdus Syakur, "Mnemonic Storytelling As A Psycholinguistic Approach To Enhancing Arabic Writing Competence," El-Jaudah : Jurnal Pendidikan Bahasa Dan Sastra Arab 5, no. 2 (December 25, 2024): 31–52, https://doi.org/10.56874/ej.v5i2.2029.

16 Muhamad Solehudin, "Interactive Debate Strategies For Enhancing Arabic Speaking," El-Jaudah : Jurnal Pendidikan Bahasa Dan Sastra Arab 5, no. 2 (December 27, 2024): 92–111, https://doi.org/10.56874/ej.v5i2.2129.

The theory of *Nahwu* and interactive whiteboards has an important role in using interactive whiteboard technology to e-learning Arabic that is developed. In interpreting the use of interactive whiteboard technology, it is at the level of understanding and application. The explanation is to clarify the concept of interactive whiteboard technology, while the application is to adapt technology as the development or advancement of the concept in the lecture. This research is designed to be in accordance with theories which assume that the interactive process can improve the competence of students, especially in mastering the basics of sentence structure to develop the language skills of students.

Nahwu learning, or the study of Arabic grammatical studies, indeed presents various patterns, dynamics, and technicalities that make it more difficult to study. This is an old language that is part of the language system of lexicography, starting from the concept of *letters*, *harakat*, *isim*, *fi'l*, and artistic values, so it is certainly very different from Indonesian or foreign languages, recognizing *nahwu* structures also plays a critical role in mitigating language interference [17].

The integration of technology in education has significantly transformed teaching methodologies across various disciplines. However, the application of Interactive Whiteboards (IWBs) in teaching Nahwu—a core component of Arabic grammar—remains underexplored. Existing studies on IWBs have primarily focused on their benefits in subjects like mathematics and foreign languages, emphasizing their ability to foster engagement and improve learning outcomes. Yet, the potential of IWBs to simplify and demystify the intricate rules of Nahwu has not been adequately addressed in the literature. This research aims to fill this gap by demonstrating how IWBs can revolutionize Nahwu instruction, making it more accessible, interactive, and engaging for modern learners.

This gap is significant because it is a fundamental part of Arabic grammar, essential for mastering the language and analyzing texts accurately[18]. Traditional methods often rely on rote memorization and static explanations, which can feel outdated and fail to engage modern learners. Meanwhile, technologies like Interactive Whiteboards (IWBs) offer dynamic, interactive tools that can make complex rules easier to understand and remember. Despite their proven success in other fields, traditional methods of teaching *Nahwu* often fail to provide comprehensive understanding to all students. While some learners succeed, many struggle, leaving *Nahwu* perceived as a challenging and "elite" subject that only highly intelligent individuals can master. This approach creates a barrier for many students, who view Nahwu as an inaccessible area of study. In contrast, IWBs

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17 Muhamad Solehudin and Yusuf Arisandi, "Language Interference in Arabic Learning: A Case Study of Islamic Boarding Schools in Indonesia," Al-Ta'rib : Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya 12, no. 2 (2024): 423–38, https://doi.org/10.23971/altarib.v12i2.9170.

18 Nur Hanifansyah and Syarif Muhammad Syaheed Bin Khalid, "*Ta'līmu Mahārat al-Qirā'ah Bistikhdām Kitāb al-Nasā'ih al-Dīniyyah li al-Ḥabīb 'Abd Allāh bin 'Alawī al-Ḥaddād*," *Lahjatuna: Jurnal Pendidikan Bahasa Arab* 3, no. 1 (October 12, 2023): 14–23, https://doi.org/10.38073/lahjatuna.v3i1.1423.

make *Nahwu* more inclusive and approachable, transforming it into a subject that students see as manageable and ordinary knowledge. With the support of technology, *Nahwu* becomes easier to learn and more universally accessible, ensuring that all students can engage with and master its concepts. This study explores how IWBs can bridge the gap between traditional methods and modern educational needs, making *Nahwu* learning more engaging and effective while preserving its academic rigor.

The novelty of this research lies in its focus on the pedagogical application of IWBs in teaching *Nahwu*, bridging the gap between traditional grammar instruction and modern technology. By investigating the potential of IWBs to enhance students' comprehension and retention of *Nahwu* concepts, this study aims to provide educators with practical insights for leveraging technology to improve teaching outcomes. Specifically, this research seeks to evaluate the effectiveness of IWBs in enhancing students' understanding of *Nahwu*, identify best practices for implementing IWBs in *Nahwu* instruction, and contribute to the broader discourse on integrating technology in Arabic language education. To address these objectives, the study employs a qualitative approach, examining variables such as student engagement, comprehension, and retention. Through this exploration, the study aims to demonstrate how modern tools can be adapted to meet the needs of learners, ultimately advancing the field of Arabic language education.

METHOD

This study adopts a qualitative approach to explore the effectiveness of Interactive Whiteboards (IWBs) in facilitating the teaching and learning of *Nahwu* (Arabic syntax) [19]. By focusing on the experiences and perceptions of both students and educators, the study aims to gain a deeper understanding of how IWBs can enhance engagement, comprehension, and retention in *Nahwu* instruction. The participants included 30 students and 5 Arabic language teachers from Islamic Boarding School Darullughah Wadda'wah, an Islamic educational institution specializing in Arabic language instruction. The students, aged between 16–18 years, were selected from intermediate-level classes and had a foundational understanding of *Nahwu*. Teachers were chosen based on their experience in teaching *Nahwu* and their willingness to integrate IWBs into their instructional practices, to explore the challenges faced by learners with a foundational understanding of *Nahwu* who are transitioning to more advanced concepts. The qualitative research design primarily utilized primary data, gathered through semi-structured interviews, focus group discussions, classroom observations, and

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19 John W Creswell and J David Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (Los Angeles: SAGE Publications, 2020).

document analysis. These methods were complemented by secondary data from lesson plans and instructional materials.

Data analysis followed a thematic approach, involving iterative coding and triangulation to ensure the reliability and depth of findings. The coding process began with open coding to identify recurring themes, followed by axial coding to establish relationships between themes, and selective coding to integrate the core findings with the research objectives. This systematic approach ensured that the data was analyzed comprehensively, offering insights into the role of Interactive Whiteboards (IWBs) in enhancing *Nahwu* instruction.

Data were collected through several qualitative methods. Semi-structured interviews were conducted with both teachers and students to explore their experiences with IWBs in *Nahwu* lessons, focusing on perceptions of engagement, understanding, and usability[20]. Classroom observations were carried out during *Nahwu* lessons in classrooms equipped with IWBs to document teacher-student interactions, the use of IWBs to present material, and student participation. Observation notes emphasized patterns of engagement and the effectiveness of IWBs in clarifying grammatical rules. Additionally, focus group discussions (FGDs) with students facilitated collaborative discussions about their learning experiences using IWBs, offering insights into the collective impact of IWBs on *Nahwu* comprehension. Document analysis of lesson plans, student notes, and teacher presentations provided further understanding of how IWBs were integrated into the curriculum and the instructional strategies employed by teachers.

The study is structured as follows: the methodology section outlines the qualitative approach and data collection methods; the results and discussion highlight key findings and their implications; and the conclusion discusses the broader impact of IWBs on Arabic language education.Thematic analysis was employed to identify recurring themes and patterns in the qualitative data[21]. Transcriptions of interviews and FGDs were coded and analyzed alongside classroom observation notes and document analyses to triangulate findings[22]. Themes related to engagement, comprehension, instructional strategies, and the overall impact of IWBs on *Nahwu* instruction were developed and interpreted in the context of the research objectives and existing literature on technology-enhanced language learning. The study adhered to ethical guidelines for

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20 Omolola A. Adeoye-Olatunde and Nicole L. Olenik, "Research and Scholarly Methods: Semi-structured Interviews," JACCP: JOURNAL OF THE AMERICAN COLLEGE OF CLINICAL PHARMACY 4, no. 10 (October 2021): 1358–67, https://doi.org/10.1002/jac5.1441.

21 John W. Creswell, A Concise Introduction to Mixed Methods Research (SAGE Publications, Inc, 2021).

22 Matt O'Leary, Classroom Observation: A Guide to the Effective Observation of Teaching and Learning, 2nd ed. (Second edition. | New York: Routledge, 2020.: Routledge, 2020), https://doi.org/10.4324/9781315630243.

educational research by obtaining informed consent from all participants, ensuring they understood the research purpose and their right to withdraw at any time. Anonymity and confidentiality were maintained, with data securely stored and used solely for research purposes. By focusing on qualitative insights, this study provides a rich understanding of how IWBs can transform the teaching and learning of *Nahwu*, contributing to the broader discourse on integrating technology into Arabic grammar instruction and offering practical recommendations for enhancing pedagogical practices.

RESULT AND DISCUSSION

Arabic at Pon Pes Darullughah Wadda'wah (Dalwa) is already very good[23], but sometimes there are difficulties in understanding *Nahwu*, especially for new students, even though they are very fluent in conversation[24]. The understanding of *Nahwu* can become significantly more accessible and enjoyable for students when teachers incorporate appropriate teaching methods and effective instructional media into their learning activities[25]. By utilizing strategies and tools that cater to the diverse needs and learning styles of students, educators can simplify complex grammatical concepts and create an engaging classroom environment. Employing well-designed media and innovative approaches not only enhances students' grasp of *Nahwu* but also encourages active participation, making the learning process more effective and impactful.

These results align with previous research suggesting that technology-enhanced learning tools, such as IWBs, improve student engagement and comprehension. The visual and interactive nature of IWBs appears to address common challenges in *Nahwu* instruction by enabling students to visualize abstract grammatical rules and receive immediate feedback. For instance, the use of dynamic diagrams and animations to illustrate sentence structures allowed students to grasp concepts such as *mubtada'*, *khabar* and *munada* relationships more effectively than traditional static materials. This finding is consistent with studies in other disciplines that highlight the benefits of IWBs in fostering active learning environments.

Teachers play a crucial role not only as educators but also as facilitators who inspire and motivate students to learn and master Arabic[26]. In Arabic language

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23 Segaf Baharun and Nur Hanifansyah, "Efektivitas Pembelajaran Kitab Al-Af'al Al-Yaumiyyah Pada Daurah Ramadhan Di Pon Pes Dalwa," Shaut Al-Arabiyah 12, no. 2 (November 29, 2024), https://doi.org/10.24252/saa.v12i2.52825.

24 Nur Hanifansyah and Menik Mahmudah, "Enhancing Arabic Vocabulary Mastery Through Communicative Strategies: Evidence from Malaysia.," Al-Ta'rib : Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN 12, no. (2) (2024): 263–78, https://doi.org/10.23971/altarib.v12i2.9082.

25 Muhammad Kafahulloh and Mohamad Zaka Al Farisi, "Students' Perspectives on the Use of Powtoon Learning Media in Learning Nahwu," International Journal of Arabic Language Teaching 6, no. 02 (August 14, 2024): 182–96, https://doi.org/10.32332/ijalt.v6i02.9626.

26 Ranita Sari et al., "Exploring the Arabic Learning Strategies at Senior High School" 7, no. 1 (2024).

learning, their ability to select and implement teaching strategies that align with students' needs and characteristics is essential. Teachers are also responsible for creating a supportive and engaging learning environment that helps students grasp the material more effectively[27]. Thus, the success of Arabic language teaching largely depends on the teacher's skills in applying appropriate learning strategies.

Identifying traditional teaching methods of *Nahwu* must adjust to the character and behavior of the current generation, Gen Z, who are already preoccupied with technology, are impatient, and have a short attention span. Interactive whiteboards can be used as a medium for teaching *Nahwu* that takes into account the behavior and interests of Generation Z to receive the material being taught. Attractive interactive whiteboard material was designed that engages the interest of the participants and includes interactive exercises and quizzes about the materials covered. Anima, on the other hand, introduces material step by step. Finally, the results demonstrate a significant effect of the exposure sequence, particularly the educational nature of the applied materials. Moreover, it asserts the vitality of innovating Arabic materials regarding the didactic use of technology and interactive whiteboards to captivate and enhance learning experiences in terms of fun and intensity [28]. Furthermore, it asserts the necessity of adapting teaching strategies and bringing digital and interactive aspects to the context of the madrassa or any Arabic educational context.

This research touches on the teaching of *Nahwu* integrated with the modern educational perspective, providing *Nahwu* education to children from refugee families who will bring innovative approaches in learning *Nahwu*, namely in gamifying Arabic as a subject to be presented on an interactive carpet. Besides, there is also a component for recalling material. In defining learning outcomes, these educational materials are expected to attract the interest of students who are part of Generation Z, use most of the senses that humans have, and increase daily learning intensity[29]. Then, this research will rely on dictionaries and materials for linguistics and methodologies. The theory and practice of gamification in the learning process, i.e., the implementation in the learning generic process, occurs from a historical and practical perspective, with particular attention to areas of the

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27 Muhamad Solehudin, Nurhanifansyah Nurhanifansyah, and Syaheed Kholid, "The Effectiveness of Using the Kitab Muhawarah in Enhancing Arabic Speaking Proficiency in Malaysia," An Nabighoh 26, no. 2 (December 3, 2024): 251–68, https://doi.org/10.32332/an-nabighoh.v26i2.251-268.

28 D. Hamilton et al., "Immersive Virtual Reality as a Pedagogical Tool in Education: A Systematic Literature Review of Quantitative Learning Outcomes and Experimental Design," Journal of Computers in Education 8, no. 1 (March 2021): 1–32, https://doi.org/10.1007/s40692-020-00169-2.

29 Abd. Fattah et al., "Arabic in the USA and the Genealogy of Arab-Americans: From Migration to Integration," Cogent Social Sciences 10, no. 1 (December 31, 2024): 2321712, https://doi.org/10.1080/23311886.2024.2321712.

educational process involving modern information and technology[30]. Support was given to different innovative solutions for including components of active competition and participation, which can not only improve the automatisms of *Nahwu* concepts in primary letters but also allow a framework for exploring modern and more in-depth content at a higher cognitive level. The gamification mechanism via quiz and material has the learning objective of *Nahwu* in showing grammar competence[31].

Innovation in *Nahwu* education is necessary. The conditions of *Nahwu* education are currently not very attractive to students. The target of learning *Nahwu* is only seen as the selection of lower quality students. The existence of an interactive whiteboard as a medium is a starting point for searching for the renewal of Arabic language learning. The interactive whiteboard adds value for the teacher in teaching Arabic, especially for *Nahwu* science. *Nahwu* learning facilitated by the interactive whiteboard is expected to create a new atmosphere in the process of *Nahwu* learning[32]. Gamification is a method that utilizes a game as a powerful motivator. It uses game-style design and game elements in non-playful contexts.

The concept of gamification in learning *Nahwu* is a good attempt to attract the young generation to be interested in learning *Nahwu*, which is easily forgettable. Gamification plays a role in overcoming that problem. In games, competition is one of the vital components[33]. Because of that, a technique of providing points to the students who give the right answers can trigger other students to try to be brave in answering questions[34]. In addition to the system of giving points, the arrangement of neatness tendency is also a characteristic of GBL [35]. Teachers may obstruct students from doing the big finishing task if the small finishing task is not completed yet. Such a system fosters student competition in the learning of Arabic. In addition to points, the other approach is the unit system. The system of giving units can increase commitment because of the students'

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30 Giovanni Cunico, Eirini Aivazidou, and Edoardo Mollona, "System Dynamics Gamification: A Proposal for Shared Principles," Systems Research and Behavioral Science 39, no. 4 (July 2022): 723–33, https://doi.org/10.1002/sres.2805.

31 Qurrotul A'yuni et al., "Creative Arabic Learning Based On Quizizz: Model And Impact," An Nabighoh 24, no. 1 (June 30, 2022): 47, https://doi.org/10.32332/an-nabighoh.v24i1.4537.

32 Thabet Bin Saeed Al-Kahlan and Mohamad Ahmad Saleem Khasawneh, "Advantages of Using the Interactive Whiteboard as an Educational Tool from the Point of View of Middle School Teachers in Asir Region," 2023, https://doi.org/10.59670/ml.v20iS1.3641.

33 Minatur Rokhim, Fina Mega Oktaviani, and Randi Safii, "Articulate Storyline Application: Development of Foreign Language Learning Media on the Aspects of Listening Skills," ELOQUENCE : Journal of Foreign Language 2, no. 1 (April 30, 2023): 224–40, https://doi.org/10.58194/eloquence.v2i1.670.

34 Hamidulloh Ibda et al., "Digital Learning Using Maktabah Syumilah NU 1.0 Software and Computer Application for Islamic Moderation in Pesantren," International Journal of Electrical and Computer Engineering (IJECE) 13, no. 3 (June 1, 2023): 3530, https://doi.org/10.11591/ijece.v13i3.pp3530-3539.

35 Mustapha Qureshi et al., "Scale For Measuring Arabic Speaking Skills In Early Children's Education," Journal International of Lingua and Technology 1, no. 2 (August 13, 2022): 114–30, https://doi.org/10.55849/jiltech.v1i2.81.

caring desire to complete the task. In a game-based context, it can foster competition between the members of one team[36]. The goal is oriented towards an aspiration to reach the end of the challenge. Gamification is a fun concept that can influence *Nahwu* teaching.

Illustration of the results of the interactive whiteboard application in the class can be added. The young generation is very familiar with the interactive whiteboard for learning rather than with whiteboard markers[37]. This is illustrated when the researcher first came to the classroom accompanied by a teacher who was holding a laptop instead of a whiteboard marker[38]. At that time, students in class joked that the lesson using a laptop was more fun. Later, after the teacher turned on the laptop and the interactive whiteboard screen appeared, the students welcomed him with laughter [39]. The lesson was also exciting.

The use of interactive whiteboards proves to be highly beneficial as a tool for mind mapping in the classroom. This interactive process not only enhances the learning environment but also makes Arabic language lessons more impactful, particularly in the complex domain of *Nahwu*. When students learn with joy, they are more willing to overcome challenges, transforming difficulties into exciting opportunities for growth.

The qualitative findings of this study highlight the transformative impact of Interactive Whiteboards (IWBs) on *Nahwu* instruction, offering rich insights into the experiences of both students and educators. Thematic analysis of data from interviews, focus group discussions, classroom observations, and document analysis revealed several key themes that underline the potential of IWBs in enhancing *Nahwu* learning.

Enhancing Students' Understanding of *Nahwu* through IWBs

The findings reveal that IWBs significantly enhance students' comprehension of *Nahwu* by providing multimodal learning experiences. Visual aids and dynamic diagrams clarified complex grammatical concepts like the relationship between *mubtada'* and *khabar*. This aligns with Shi et al. (2021), who

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36 Dexani Widyasari et al., "Wordwall Media and Its Impact on Understanding Light Material in Class V Elementary School Science Subjects," Jurnal Penelitian Pendidikan IPA 10, no. 5 (May 31, 2024): 2581–85, https://doi.org/10.29303/jppipa.v10i5.7214.

37 Mokibelo Michael Mokoena, Sibongile Simelane-Mnisi, and Andile Mji, "Challenges and Solutions for Teachers' Use of Interactive Whiteboards in High Schools," Universal Journal of Educational Research 10, no. 1 (January 2022): 36–47, https://doi.org/10.13189/ujer.2022.100104.

38 Mahboubeh Fannakhosrow et al., "A Comparative Study of Information and Communication Technology (ICT)-Based and Conventional Methods of Instruction on Learners' Academic Enthusiasm for L2 Learning," ed. Ehsan Namaziandost, Education Research International 2022 (March 20, 2022): 1–8, https://doi.org/10.1155/2022/5478088.

39 Tamara Vagg et al., "Multimedia in Education: What Do the Students Think?," Health Professions Education 6, no. 3 (September 2020): 325–33, https://doi.org/10.1016/j.hpe.2020.04.011.

argue that interactive visuals make abstract concepts more tangible, fostering cognitive engagement[40].

The improvement observed in this study suggests not merely a replication of these findings but an expansion. While prior studies emphasize general cognitive benefits of IWBs, this research highlights their potential to address specific challenges in Arabic grammar education. For example, the immediate feedback provided by IWBs aligns with psycholinguistic principles of reinforcement, which are essential for mastering intricate rules in *Nahwu*. This dynamic interaction creates a bridge between theory and practice, making the grammatical rules more accessible.

The results also indicate a shift in both teacher and student roles. Teachers transitioned from being primary sources of information to facilitators, enabling more collaborative and inquiry-based learning. This supports Giannikas (2021), who noted that IWBs encourage student-centered approaches. Students, in turn, became active participants, engaging in constructing sentence structures collaboratively. This aligns with Vygotsky's theory of social constructivism, which posits that knowledge is co-constructed through interaction.

The effectiveness of IWBs in engaging Generation Z learners underscores their alignment with the preferences and cognitive behaviors of this demographic. Unlike traditional rote learning methods, IWBs cater to their need for interactive and visually stimulating content. This generational adaptation highlights how IWBs not only facilitate learning but also bridge the gap between traditional educational approaches and the digital habits of younger learners.

While the use of colors and diagrams was identified as beneficial, their impact should not be overstated. Shi et al emphasize that the efficacy of such features depends on their integration within a broader pedagogical framework. In this study, colors acted as mnemonic aids, but their effectiveness was amplified when combined with interactive sentence-building exercises. This supports the argument that multimodal strategies are most impactful when used cohesively. Interactive Whiteboards (IWBs) feature an innovative tool that automatically corrects basic Arabic letter formation. This functionality ensures that students write letters accurately, addressing common issues such as incorrect letter shapes or improper connections in cursive writing. For example, if a student writes the letter ﺐ(ba) with an incorrect dot placement or attaches it improperly to another letter, the IWB highlights the error and provides the correct formation. This feature acts as a real-time tutor, helping students master the foundational aspects of Arabic script writing with precision and confidence.

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[40] Shi et al., "Effects of Interactive Whiteboard-Based Instruction on Students' Cognitive Learning Outcomes."

The challenges identified, such as the need for teacher training, resonate with findings by Mokoena et al. (2022)[41], who stressed that technology's potential is often underutilized due to inadequate preparation. This study further highlights that without proper training, teachers may rely on IWBs as mere presentation tools rather than leveraging their interactive capabilities. Addressing this requires structured professional development programs focused on pedagogical strategies for technology integration.

Best Practices for Implementing IWBs in *Nahwu* Instruction

Best practices for implementing IWBs in Nahwu instruction include designing structured lesson plans that incorporate interactive activities and collaborative exercises. Teachers must undergo comprehensive training programs to maximize the potential of IWBs, focusing on their interactive features and pedagogical applications. Additionally, lesson content should be tailored to the cognitive preferences of Generation Z learners, utilizing multimedia resources and gamified exercises to maintain engagement and participation.

Students consistently reported feeling more engaged and motivated during lessons that utilized IWBs. Focus group discussions revealed that the interactive features of the whiteboard, such as the ability to manipulate sentence structures and access multimedia resources, made the learning process more dynamic and enjoyable. Teachers observed that students participated more actively, asking questions and volunteering to solve problems on the whiteboard, which contrasted with the passive behavior often observed in traditional classroom settings. One teacher remarked, "The IWBs brought energy to the class, turning grammar lessons into interactive discussions rather than monotonous lectures."

IWBs were found to play a significant role in helping students grasp complex grammatical concepts. Observations highlighted how visual aids, such as dynamic diagrams and animations, clarified abstract ideas like *mubtada'* and *khabar* relationships. Students expressed that visual and features on the interactive whiteboard were observed to support mnemonic recall by visually segmenting grammatical elements, such as *mubtada'* and *khabar*. However, the effectiveness of this approach lies not merely in the use of color itself but in its integration with dynamic diagrams and interactive sentence-building exercises. This combination allows students to associate rules with visual and tactile cues, fostering a deeper cognitive connection, as supported by Shi et al. (2021)[42]. While colors play a facilitative role, their impact is maximized when aligned with other multimodal strategies.

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41 Mokoena, Simelane-Mnisi, and Mji, "Challenges and Solutions for Teachers' Use of Interactive Whiteboards in High Schools."

42 Shi et al., "Effects of Interactive Whiteboard-Based Instruction on Students' Cognitive Learning Outcomes."

Contribution to Arabic Language Education through Technology Integration

In the current era, teachers generally use traditional methods to teach *Nahwu*, those who often use traditional methods will have difficulty using new technology, so the younger generation, especially Gen Z and in the future Gen Alpha, to master *Nahwu* better, which is then implemented through IWB teaching, this is what is called innovation and revolution, innovation because it is new learning, and revolution is breaking down the old understanding that *Nahwu* must be learned with traditional methods.

For example, MAXHUB Interactive Display serves as an exemplary model of IWB technology that aligns with these pedagogical goals. Its advanced features, including a responsive multi-touch screen, 4K Ultra HD resolution, wireless screen sharing, and integrated camera and microphone array, provide a robust foundation for interactive and collaborative Nahwu instruction. Furthermore, with support for dual operating systems (Android and Windows) and applications for platforms like Zoom and Microsoft Teams, MAXHUB creates a seamless integration of technology and language pedagogy. These features allow educators to deliver lessons that are visually engaging, interactive, and tailored to the unique needs of Arabic grammar education.
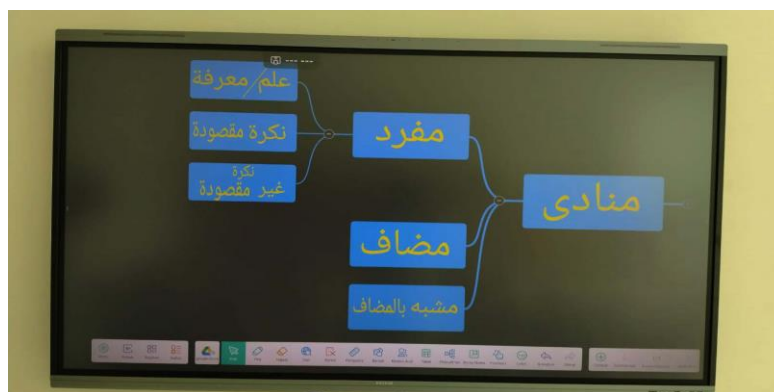
Image 1. Interactive Whiteboards (IWBs) serve as a bridge between technology and *Nahwu*

Mind mapping serves as a cognitive anchor, while the use of visual acts as a mnemonic aid[43], enabling students to recall concepts more effectively. Coupled with psycholinguistic approaches, this method integrates emotional and cognitive dimensions of learning, making *Nahwu* easier to understand and more memorable. By creating a positive and stimulating atmosphere, educators can empower students to approach learning with enthusiasm, ensuring that even the most complex topics become an enjoyable and rewarding experience.

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43 Menik Mahmudah, Nurhanifansyah Nurhanifansyah, and Syarif Muhammad Syaheed bin Khalid, "Psycholinguistic Approaches to Enhancing Arabic Speaking Proficiency through Comic Strips," *Arabiyatuna: Jurnal Bahasa Arab* 8, no. 2 (November 2024): 804–26, https://doi.org/10.29240/jba.v8i2.11349.

While these findings are promising, alternative explanations and potential limitations should be considered. The significant improvement in the experimental group could be partially attributed to the novelty effect, as students were likely more engaged due to the introduction of new technology. Additionally, the study was conducted over a relatively short duration of six weeks, which may limit the generalizability of the results to longer-term educational settings. Future research should consider extending the duration of the study to assess the sustained impact of IWBs on *Nahwu* learning.

Another limitation of this study is the potential influence of teacher proficiency in using IWBs. Teachers in the experimental group underwent preliminary training to integrate IWBs into their lessons, but varying levels of comfort and expertise with the technology may have impacted the results. Future research should explore the role of teacher training and its influence on the effectiveness of IWBs in language instruction.

Study strengthen the argument that IWBs have the potential to revolutionize *Nahwu* instruction. Not only do they enhance students' comprehension, but they also provide a richer, more relevant learning experience that aligns with the needs of today's learners. While acknowledging the challenges, this study contributes valuable insights into how technology can be effectively integrated into Arabic language education. Moving forward, emphasis on teacher training and the development of technology-based instructional materials will be critical to ensuring the long-term benefits of IWBs in *Nahwu* education. These efforts will help educators create a sustainable and engaging framework for teaching complex grammatical concepts, fostering a deeper and more meaningful connection to the Arabic language.

This study reinforces the theoretical framework of multimodal learning and psycholinguistics by illustrating how the integration of visual, tactile, and interactive elements can align with cognitive principles of retention and comprehension. The findings suggest that Interactive Whiteboards (IWBs) significantly enhance student engagement and understanding by offering a dynamic platform for visualizing abstract grammatical concepts, such as sentence structures in *Nahwu*. These results provide a theoretical foundation for expanding the application of IWBs to other areas of Arabic language education, such as morphology or semantics, where similar challenges in complexity and cognitive demand exist.

From a practical perspective, this study highlights actionable strategies for educators. For instance, the use of IWBs for collaborative sentence building and color-coded syntax analysis can be adapted across varying levels of proficiency and instructional objectives. Beyond *Nahwu*, IWBs can be utilized to teach vocabulary acquisition, conversational skills, or literary analysis, offering

opportunities to visualize poetic structures or linguistic nuances in classical Arabic texts and arudh analysis. These practical recommendations extend the relevance of this research to diverse contexts within Arabic language education, demonstrating the adaptability of technology to meet modern pedagogical demands..

CONCLUSION

This study demonstrates the potential of Interactive Whiteboards (IWBs) to revolutionize the teaching of *Nahwu* by integrating visual, tactile, and interactive features into Arabic grammar instruction. While the findings affirm the benefits of IWBs in enhancing student engagement, comprehension, and retention, they also provide actionable insights for educators seeking to modernize Arabic language education. For instance, using IWBs to visualize complex grammatical concepts, such as mubtada' and khabar relationships, can simplify learning processes and foster deeper understanding. Moreover, the application of IWBs can be extended to teaching other linguistic aspects, such as morphology or syntax in literary texts, thus broadening their impact within Arabic language pedagogy.

This research has limitations that warrant further exploration. The relatively small sample size and short duration of the study may restrict the generalizability of the findings. Future research should examine the long-term effects of IWBs in diverse educational settings and their scalability across different levels of Arabic language instruction. Additionally, while the study highlights the necessity of teacher training for effective IWB implementation, further investigation into structured professional development programs is essential to optimize their use.

Integrating emerging technologies such as Artificial Intelligence (AI) with IWBs could enhance personalized learning and real-time feedback mechanisms. Future studies should explore these innovations to further enrich Arabic grammar instruction and address the unique challenges of teaching classical languages in a rapidly evolving digital landscape. By addressing these areas, the research can contribute not only to improving Arabic language education but also to advancing the pedagogical applications of technology in language learning globally.

In conclusion, this study bridges the gap between traditional grammar instruction and modern technology by demonstrating the transformative potential of IWBs in Arabic grammar education. It underscores the necessity of investing in teacher training, technical support, and interactive tools to modernize instruction. While challenges remain, the integration of IWBs offers a pathway toward creating inclusive, engaging learning experiences that adapt to contemporary learners' needs while preserving the academic rigor of *Nahwu* instruction.

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