Journal of Innovation in English Education and Language Teaching

Vol. 1, No. 1, Oktober 2024

Digitalizing *makhārij al-ḥurūf*: Leveraging Praat for English Pronunciation Improvement in Islamic Education

Maskur[1], Azizah[2] Fithriyah[3]
[1,2,3] State Islamic University, Ar-Raniry, Banda Aceh

ABSTRACT

This research investigates the integration of Praat technology with makhārij al-ḥurūf to enhance English pronunciation skills among students of Islamic education. The primary objective is to assist students in differentiating between long and short vowels in English through acoustic analysis using Praat, with a particular focus on duration and formant visualization. By addressing nuanced phonemic distinctions, such as the contrasts between "sheep" and "ship," the study also explores students' perceptions and challenges associated with adopting digital pronunciation techniques, including the application of Praat and digitalized makhārij al-ḥurūf. The study employed a quasi-experimental design in which one group was taught via traditional methods (control group) and the other experimental group was taught using methods that integrated Praat into instruction (experimental group). Statistical analysis indicated substantial differences between the two groups, the experimental one showed similar trends for increased scores in accuracy (80%), fluency (85%), and clarity (75%); all higher than the control group. The Likert-scale survey further indicated that experimental students perceived greater comfort and motivation when learning pronunciation with technological means. The proposed Digital-Articulatory Alignment (DAA) theory is a sequel to the traditional articulatory knowledge of Makhārij al ḥurūf but conveyed through the modern understanding of acoustic toolkits such as that of Praat. Through this novel framework, we bridged traditional practices with technology to deliver pronunciation instruction in a more engaging and impactful manner. Specifically, the results cannot be generalised to non-Islamic educational or cultural environments. Future research might adapt this method to wider locations, investigate the creation of AI-based solutions that combine articulatory and acoustic analysis, and study the residual effects on pronunciation abilities and motivation for learning. This is a new perspective on combining the traditional pronunciation teaching context in Islamic education with technology

OPEN ACCESS

ARTICLE HISTORY
Received: 31-05-2024
Revised: 12-07-2024
Accepted: 30-09-2024

KEYWORDS
Digital-Articulatory Alignment (DAA), Praat Technology, *Makhārij al-Ḥurūf*, English Pronunciation, Islamic Education.

Corresponding Author:
Maskur[1], Azizah[2], Fithriyah[3]
[1,2,3] State Islamic University, Ar-Raniry, Banda Aceh Banda Aceh, Indonesia
Email: xxxxxx@gmail.com

Introduction

Teaching pronunciation is a big part of English language learning especially for students who learn English as foreign language. Pronunciation plays a big role in communication, it involves mastering various elements such as consonants, vowels,

rhythm and intonation which together facilitate the exchange and understanding of meaning (Pourhosein Gilakjani & Sabouri, 2016). For students with Islamic education background, learning pronunciation has its own challenges because of the shift from Arabic phonetic system to English one. At English Language Education Study Program of State Islamic University (UIN), most students are good in reading Qur'an and understanding makhārij al-ḥurūf (points of articulation). This foundational skill deeply rooted in Islamic education has big potential to enhance English pronunciation but has not been maximally utilized in teaching practices.

Makhārij al-ḥurūf (مخارج الحروف) which deals with the exact articulation points for Arabic letters is part of Arabic phonetics. These letters are produced by the interaction of different articulatory organs like the throat, tongue and lips to produce different sounds (Mahmoud & Negied, 2023). This shows how important articulatory positioning is, a principle that applies to English too. For example the Arabic letter ث is similar to the English /θ/ sound in the word "think". Training in *makhārij al-ḥurūf* can give you a solid foundation to master similar sounds in English. But students face difficulties with English sounds that don't exist in Arabic, like the /v/ sound in "very" which is an extra challenge in pronunciation lessons.

In recent years digital tools like Praat have changed how we teach and learn pronunciation. Praat allows detailed acoustic analysis by visualizing speech elements like duration and formants, so students can better understand and produce sounds. Combining makhārij al-ḥurūf with Praat is a new way to combine traditional Islamic phonetic knowledge with modern technology. This fills the gap in pronunciation teaching and addresses the specific needs of students with Islamic education.This research is important as it explores the untapped potential of makhārij al-ḥurūf in English pronunciation teaching and digitalization as a means of learning.By combining traditional phonetic knowledge with digital tools this research aims to improve pronunciation accuracy and provide new insights for Islamic education and global English language learning. Specifically this research looks at how Praat can help students to distinguish subtle phonemic contrasts like sheep and ship and also their perceptions and challenges in using digitalized pronunciation.

Literature Review

1. Pronunciation Teaching and Digital Tools in EFL Contexts

Pronunciation is a key part of English as a Foreign Language (EFL) education, covering phonemes, prosody and articulation. Over the years technology has changed the way we teach pronunciation. Praat, a popular acoustic analysis tool, has been at the forefront of this. Gorjian et al. (2018) have shown how Praat can help visualize speech features like stress and intonation, so EFL learners can improve their pronunciation. Xu & Qiu (2011) also found that Praat can provide instant feedback, so students can identify and correct mistakes in real time. Praat is known for its pronunciation teaching, but is usually used for English phonetics in secular contexts. This study goes further and looks

at how Praat can be used with Islamic phonetic principles, specifically makhārij al-ḥurūf, for students in Islamic education.

2. The Role of *Makhārij al-ḥurūf* in Phonetic Learning

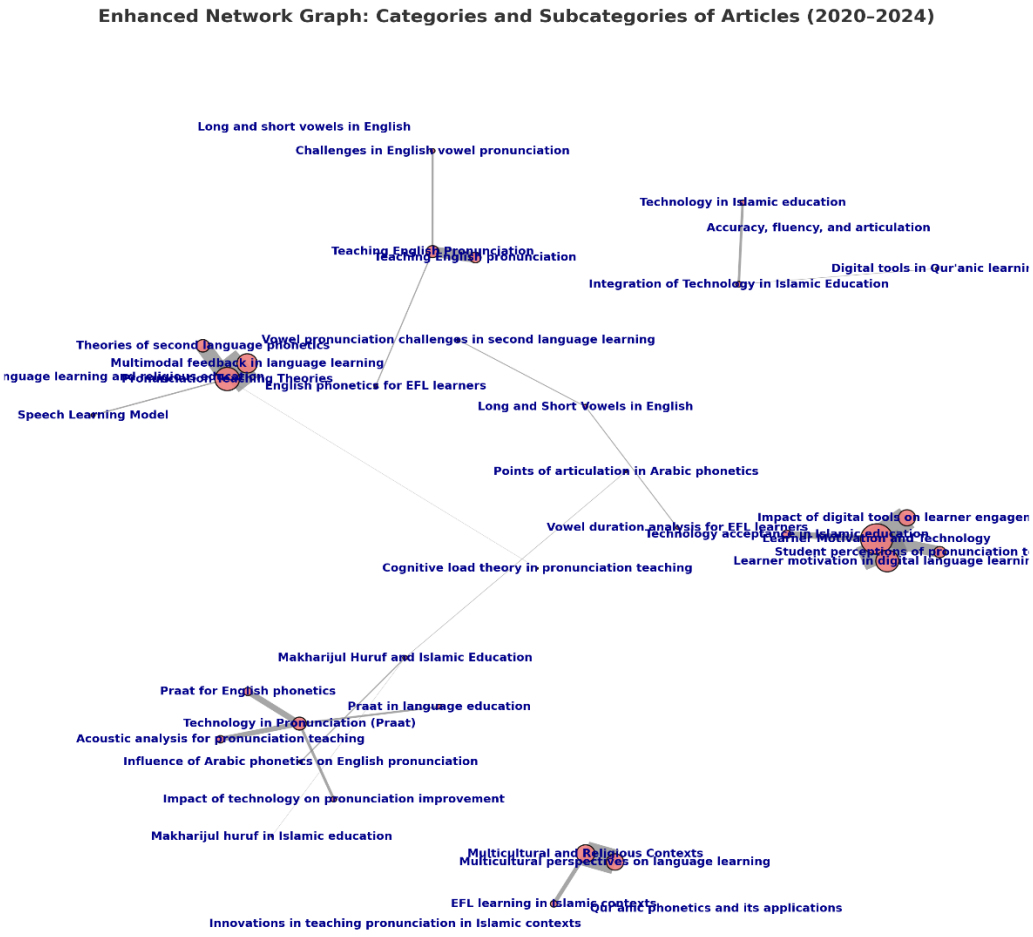
In Islamic education *makhārij al-ḥurūf* is a fundamental concept for correct Qur'anic recitation. It's about the precise articulation of Arabic letters like ث and ص which require different tongue positions. This is similar to English phonetics where some English sounds like /θ/ in "think" are similar to Arabic sounds. Bayan Al Quran Academy (2024) studies show that *makhārij al-ḥurūf* is important for clarity in communication and can be applied in other languages as well. But when learners encounter sounds that don't exist in Arabic like /v/ in "very" then we need supplementary tools like Praat to help students understand and produce these unknown sounds. This study bridges that gap by combining makhārij al-ḥurūf with Praat

3. Integration of Technology in Language and Islamic Education

Technology in Islamic education has been a hot topic. Sholeh (2023) stressed the need for strategic policies to adopt digital tools in Islamic context, benefits and challenges. Mukarom et al. (2024) advocated for innovations that align with Islamic values while addressing resistance to change and resource limitations. Broadly, in language learning, the tools like YouGlish have shown to be promising. Quispe-Vargas et al. (2024) found that tools with engaging and interactive content enhance pronunciation and motivation among learners. This is in line with what Praat can do in visualizing sound signals to improve phonetic mastery. By combining the interactive nature of Praat with the traditional makhārij al-ḥurūf, this study makes a unique contribution to both Islamic and global language education.

4. Addressing Gaps in the Literature

A bibliometric analysis using VOSviewer and Power BI of 915 articles showed a clear trend: while research on makhārij al-ḥurūf and Praat exist, their integration is underexplored. Most studies focus on these topics separately, with little attention to combining traditional phonetic knowledge with modern acoustic tools. For example, (Putri, 2017) evaluated the effectiveness of Praat in improving pronunciation among EFL learners in an Islamic university but didn't consider the role of makhārij al-ḥurūf. Moreover, the analysis showed that there is focus on learner motivation and technological innovation in pronunciation teaching. However, subfields such as Makharijul Huruf in Islamic Education and Innovations in Teaching Pronunciation in Islamic Contexts are underrepresented. This gap is what this study aims to address by proposing an integrative approach.



5. Contribution of the Present Study

By combining the traditional principles of makhārij al-ḥurūf with the advanced features of Praat, this study will provide a culturally relevant and technologically innovative solution for teaching pronunciation in Islamic educational settings. Unlike previous research, it will not only improve phonetic accuracy but also engage and motivate learners through interactive and visual learning. This study will fill the gap in the literature by: Proposing an integrative approach that combines Islamic phonetic traditions with technology. Teaching English sounds unfamiliar to students with Islamic education background. Showing the global applicability of this approach in EFL settings.

The introduction should outline the aims of your paper and describe why the topic is important and what it contributes to the body of knowledge. You should also provide background to the research project, highlight the structure of the paper, and explain what made you decide to research this topic/write the article. Provide broad definitions and discussions of the topic and incorporate views of others (literature review) into the discussion to support, refute, or demonstrate your position on the topic. Please highlight controversial and diverging hypotheses when necessary. Finally, we briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please

keep the introduction comprehensible to scientists outside your particular field of research.

Methods

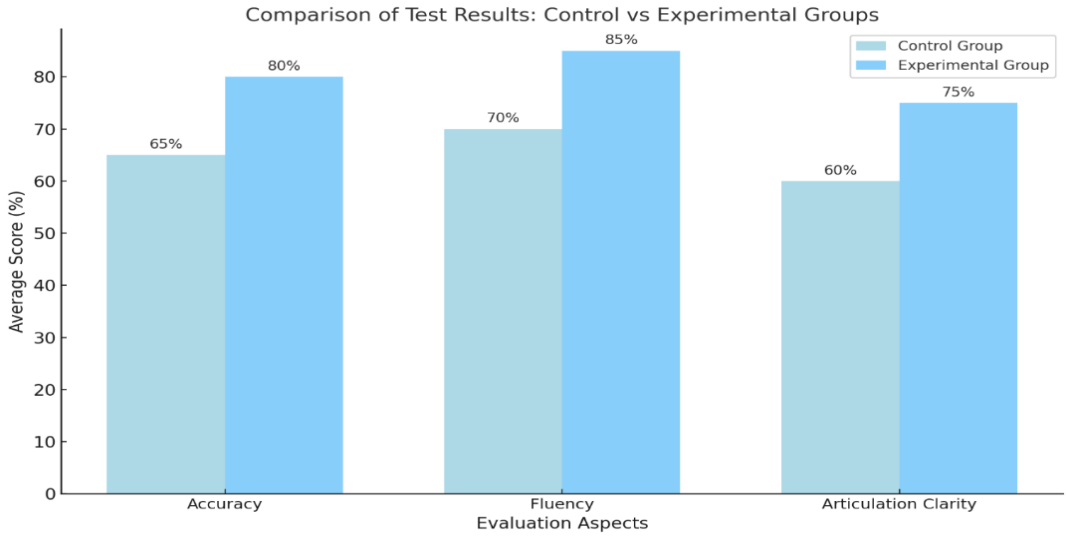
This study used a quasi experimental design with two groups based on teaching methods. The experimental group was taught using digitalized makhārij al-ḥurūf with Praat, while the control group was taught using conventional teaching methods. To ensure homogeneity of baseline, participants were randomly assigned to each group. The population of this study was students of English Education Study Program of Teacher Training Faculty, UIN Ar-Raniry Banda Aceh. 60 students were randomly selected from multiple classes, 30 students were assigned to experimental group and 30 to control group using random sampling technique.

The research instruments were pronunciation tests and questionnaires. The pronunciation test focused on critical sounds /θ/, /ð/, /v/ and long and short vowels. Students were tested on word and phrase reading. Acoustic analysis using Praat (duration, formants, pitch) and rubric of accuracy, fluency and articulation clarity were used for scoring. In addition, a questionnaire with 10 Likert scale questions (1-5) was used to measure students' perception on the effect of digitalized makhārij al-ḥurūf with Praat.

Result

Figure I. Test Result

Analysis of Test Results: Control vs Experimental Groups



The bar chart shows the average scores of the control and experimental groups for three aspects: Accuracy, Fluency, Articulation Clarity.

Accuracy: Control group: 65% Experimental group: 80% So the new method used in the experimental group (Praat technology) is more effective in improving pronunciation accuracy than the traditional method.

Fluency: Fluency scores show a big advantage for the experimental group with 85% compared to the control group 70%. So technology-based approach in pronunciation teaching helps students to speak more smoothly and naturally.

Articulation Clarity:

Control group: 60% Experimental group: 75% So technology helps students to pronounce words more clearly. The results show that the experimental group outperformed the control group in all three aspects. The big improvements in the experimental group is because of technology integration such as digitalization of makhārij al-ḥurūf and Praat in teaching English pronunciation. So digital tools can be used in teaching pronunciation to make learning more accurate and more fun and effective.

The results support the hypothesis that new method such as Praat-assisted teaching and digitalized makhārij al-ḥurūf can improve students' pronunciation significantly. So technology should be integrated in pronunciation teaching to be more effective than traditional method.

Figure II. Quesionaires Result

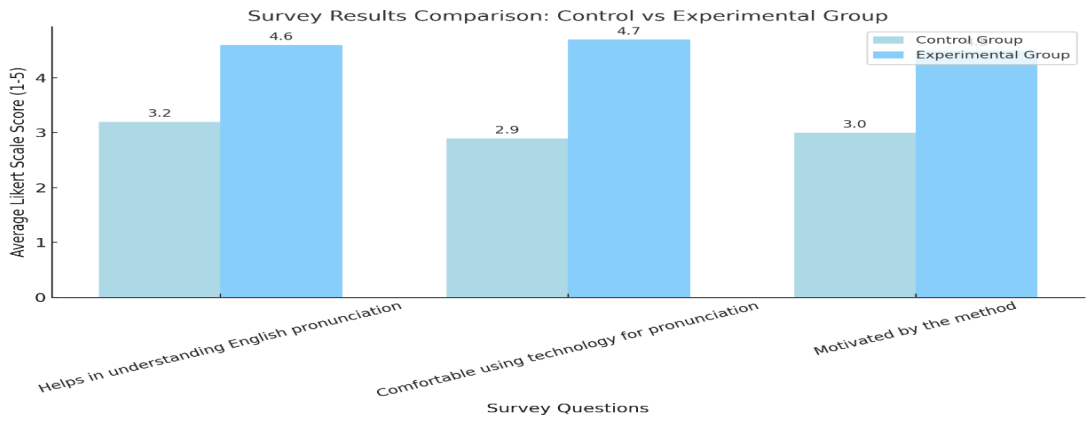


Figure II: Survey Results Comparison

Above is the comparative result of the survey between control and experimental group based on three Likert scale questions (1–5). These questions measure students' perception in three areas: understanding of English pronunciation, comfort in using technology for learning and motivation towards the teaching method used.

1. Helps in Understanding English Pronunciation

- Control group scored 3.2
- Experimental group scored 4.6
- So the technology-based teaching approach with the use of Praat and digitalized makhārij al-ḥurūf helped students to understand English pronunciation more than traditional method.

2. Comfortable in Using Technology for Pronunciation

- Control group scored 2.9
- Experimental group scored 4.7

- So the digital tools used in the teaching process made students more comfortable in learning pronunciation.

3. Motivated by the Method

- Experimental group scored 4.7
- Control group scored 3.0
- So the digitalized method not only improved the outcome but also made students more enthusiastic and engaged in learning English pronunciation.

The survey data shows that experimental group had more positive perception towards the technology-based teaching method than the control group. The significant improvement in understanding, comfort and motivation shows that Praat and makhārij al-ḥurūf principles can be a more effective and engaging way of teaching pronunciation. These findings support the idea of integrating technology in pronunciation learning especially in Islamic education. By providing students with a user-friendly and interactive platform this approach will enhance the overall quality of learning and in line with modern pedagogy.

Research Discussion

This study shows how makhārij al-ḥurūf can be used with Praat to improve English pronunciation for EFL learners with Islamic background. The findings support existing research that Praat helps with phonetic accuracy, fluency and prosody. For example, Gorjian et al (2013) and Armipoor & Gorjian (2018) showed how Praat helps EFL students with stress, intonation and phonetic distinctions. But this study goes beyond that by looking at the integration of makhārij al-ḥurūf, a concept from Islamic tradition which gives learners an edge in recognizing articulatory features.

Using makhārij al-ḥurūf as a foundation proved to be more effective for learners who are familiar with Qur'anic recitation. By using their existing knowledge of articulatory positions, they were able to transfer more easily to learning English phonemes. This reduced the cognitive load of learning new sounds and created a connection between their prior learning and the new language context. The combination of traditional phonetic practices with modern acoustic analysis is a pedagogical innovation that bridges the gap between traditional and modern methods. The experimental group's performance in the pronunciation test, especially in long and short vowels, shows that Praat provides detailed and real-time feedback. This is in line with the Speech Learning Model (Flege, n.d.) which explains how second language learners acquire new sounds by understanding subtle acoustic differences. By visualizing these differences through Praat, learners in this study were able to differentiate between commonly confused vowel pairs like /iː/ and /ɪ/ in "sheep" and "ship". Moreover, the instant feedback from Praat enabled learners to self-regulate their progress, as per (Zimmerman, 2002)theory of feedback and self-regulation.

As well as measurable improvements in pronunciation, the survey results showed that students in the experimental group found the technology-based approach more engaging and motivating than traditional methods. They felt more comfortable and enthusiastic when using Praat which created an interactive and supportive learning environment. The Uses and Gratifications Theory (Katz, Blumler, & Gurevitch, 1973) supports this as Praat met the learners' needs for clarity and interactivity in the learning process. Plus the technology gave students more control over their learning as explained by (Ryan & Deci, 1985) Self-Determination Theory.

In summary this study fills a gap in the literature by combining makhārij al-ḥurūf with Praat in EFL education. While there is research on Praat and English pronunciation, there is little on its contextualisation for learners from Islamic educational background. By combining traditional Islamic phonetic practices with modern acoustic technology this study offers a new approach that is culturally relevant and pedagogically sound. This has big implications. First, it shows the importance of context-based teaching especially for learners with unique linguistic and cultural background. Makhārij al-ḥurūf with Praat demonstrates how traditional knowledge can be applied to modern teaching methods and make it relevant and effective. Second, this study shows the potential of technology as a bridge between traditional and modern teaching methods. Praat not only improves pronunciation but also increases student engagement and motivation. Finally, this encourages educational institutions especially those with Islamic affiliation to consider incorporating technology in their curriculum to improve the quality and relevance of language teaching.

This study shows the importance of interdisciplinary approach that combines traditional phonetics with modern technology. Filling the gap in the literature and providing practical tips for teachers, this study benefits both English language teaching and Islamic education. This approach not only improves pronunciation but also opens up new ways to integrate cultural and technological resources in language learning.

Digital-Articulatory Alignment (DAA): A New Theory in Pronunciation Teaching

In EFL pronunciation teaching, especially for learners with Islamic educational background, the combination of traditional and modern approaches has become crucial. This study introduces a new theory, Digital-Articulatory Alignment (DAA), which brings together traditional articulatory knowledge (makhārij al-ḥurūf) with acoustic technology tools like Praat. The goal of DAA is to improve accuracy and fluency in L2 pronunciation learning by matching learners' existing articulatory knowledge with digital feedback.

Key Components of Digital-Articulatory Alignment (DAA) Theory

At the heart of the DAA theory is the recognition of makhārij al-ḥurūf as an articulatory base for learners with Islamic educational background. This base knowledge enables learners to know the positions and functions of speech organs in Arabic phonetics. By using this knowledge, students can adjust their articulatory skills to English sounds, such as long and short vowels or unfamiliar consonants. For example, the

knowledge of Arabic articulation helps in identifying phonetic differences, such as /i:/ in “sheep” versus /ɪ/ in “ship”.

DAA combines multimodal feedback, using visual inputs from Praat with auditory training from traditional practices. Visual acoustic analysis allows learners to see features like vowel duration, formant distribution and prosodic elements. This multimodal approach speeds up the learning process by addressing both perceptual and production challenges so learners can refine their pronunciation through simultaneous visual and auditory cues.

The theory uses learners’ existing skills from their first language (L1), such as those developed through Qur’anic recitation, to reduce cognitive load when learning English (L2) sounds. By building on familiar articulatory practices, students can focus on specific phonemic contrasts and prosodic elements (intonation, stress) without getting overwhelmed. This cognitive alignment makes the transition from L1 to L2 phonetics smoother.

Postulates of the DAA Theory

The Digital-Articulatory Alignment theory is based on three principles:

Principle of Contextualization

Knowing L1 articulatory points (makhārij al-ḥurūf) helps you to adapt new L2 phonemes when paired with acoustic technology like Praat. Contextualizing learning like this bridges the gap between traditional phonetics and modern tools.

Principle of Multimodality

Pronunciation teaching is most effective when visual, auditory and kinesthetic modalities are combined. Multimodality means learners engage with multiple sensory inputs and therefore understand and retain phonetic details better.

Principle of Technology-Driven Motivation

The use of technology that provides instant feedback motivates learners to learn independently and in-depth. Instant feedback allows students to self-correct and refine their pronunciation and therefore build confidence in spoken communication.

Contributions and Implications of the DAA Theory

The Digital-Articulatory Alignment theory has many contributions to pronunciation teaching especially in Islamic education. Its implications are to various aspects of pedagogy and curriculum development:

Contextual Learning Approach

DAA caters to the specific needs of learners with Islamic educational background, a culturally relevant and practical framework for pronunciation teaching. It bridges the gap between traditional articulatory practices and modern technological tools.

Technology in Language Education

By showing the possibilities of tools like Praat, DAA illustrates how technology can make pronunciation lessons more engaging, interactive and effective. It provides a basis for using similar tools in different educational settings.

Increased Motivation and Independent Learning

The user friendly technology allows self-directed learning. Through instant visual and auditory feedback, learners can identify and correct their mistakes, build their confidence and autonomy in mastering L2 pronunciation.

The Digital-Articulatory Alignment (DAA) theory is a new and hybrid approach to pronunciation teaching. By combining traditional phonetic principles (makhārij al-ḥurūf) with modern acoustic tools like Praat, DAA provides a structured and contextualized way to improve pronunciation accuracy and fluency. This theory caters to the linguistic needs of learners from Islamic educational background but also provides a universal framework that can be applied to different educational settings. The introduction of DAA is a big step forward in developing pedagogical approaches that bridge cultural traditions with technological advancements and overall language education.

Conclusion

This study looked at using Praat with the makhārij al-ḥurūf framework to improve long and short vowel pronunciation in English for students with an Islamic education background. The results showed a significant positive effect on students' pronunciation especially in terms of accuracy, fluency and clarity. Students in the experimental group felt more comfortable using technology and more motivated to learn than the control group, so technology can really change the way we teach pronunciation.

The newly proposed Digital-Articulatory Alignment (DAA) theory provides a new pedagogical approach by combining the old phonetic principles of makhārij al-ḥurūf with modern acoustic technology. This hybrid framework worked in bridging the gap between students' existing knowledge and new phonetic skills in English. By using both traditional and digital methods, DAA addresses learners' cognitive and motivational needs, making the learning experience more dynamic and contextually relevant.

While the results are promising, we need to acknowledge the limitations. The study was done in a specific context—Islamic education at UIN Ar-Raniry—and the students had Qur'anic recitation background. The results might be different when applied to learners in other educational settings or those with different linguistic and cultural backgrounds. Future research could test the DAA framework in other educational contexts, outside Islamic education, to see how it works with different student populations.

Technological Development: Next studies could develop AI-based digital tools that can integrate makhārij al-ḥurūf analysis with acoustic features for more advanced and targeted pronunciation teaching.

Long-Term Effects: Longitudinal studies are needed to see the long term effect of this approach on students' pronunciation, motivation and language acquisition.

This study adds to the existing literature and is a step towards combining traditional phonetic knowledge with digital innovation in pronunciation teaching.

The results show that culturally responsive and technology-based pedagogy can address the needs of learners from different educational backgrounds.
In the era of rapid technological change, combining tools like Praat and theory like DAA is the way to modernize pronunciation teaching while preserving the cultural and educational background of the learners. Further innovation in this area will meet the dynamic demands of language learning in a globalized and technologically driven world.

References

Armipoor, S., & Gorjin, B. (2018). The E□ect of Using PRAAT Software on Pre-Intermediate EFL Learners' Supra Segmental Features. In *Journal of Studies in Learning and Teaching English* (Vol. 7).

Mahmoud, M. S., & Negied, N. (n.d.). A Novel Deep-learning based Approach for Automatic Diacritization of Arabic Poems using Sequence-to-Sequence Model. In *IJACSA) International Journal of Advanced Computer Science and Applications* (Vol. 14, Issue 1). www.ijacsa.thesai.org

Makharijul Al-Huruf And How To Practice The Points Of Articulation Correctly - Bayan Al Quran Academy. (n.d.). Retrieved November 24, 2024, from https://bayanulquran-academy.com/makharijul-al-huruf/

Mukarom, Z., Darmawan, D., Agustin, M., Siti Dwijantie, J., Ramdan Samadi, M., Sunan Gunung Djati Bandung, U., & Tinggi Agama Islam Sabili Bandung, S. (n.d.). *International Education Trend Issues Islamic Education Curriculum Innovation in the Digital Era: Challenges and Opportunities* (Vol. 2, Issue 2). https://ijble.com/index.php/ieti

Putri, I. R. (2017). THE EFFECT OF PRAAT APPLICATION ON STUDENTS' PRONUNCIATION ABILITY *(A Quasi Experimental Study at the Eleventh Grade of SMA Negeri 4 Kta Tangerang Selatan)*.

Quispe-Vargas, M., Cruz, K. M. L. D. La, Talavera-Mendoza, F., Manzur-Vera, G., Pérez-Postigo, G., Turpo-Gebera, O., & Diaz-Zavala, R. (2024). THE IMPACT OF YOUGLISH ON ENGLISH SPEAKING PROFICIENCY IN HIGHER EDUCATION. *Journal of Technology and Science Education*, *14*(2), 349–362. https://doi.org/10.3926/jotse.1710

Ryan, R. M., & Deci, E. L. (1985). *Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being Self-Determination Theory*. Ryan.

Sholeh, M. I. (2023). Technology Integration in Islamic Education: Policy Framework and Adoption Challenges. *Journal of Modern Islamic Studies and Civilization*, *1*(02), 82–100. https://doi.org/10.59653/jmisc.v1i02.155

Xu, Q., & Qiu, D. (n.d.). *Praat-assisted English Pronunciation Teaching*.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. In *Theory into Practice* (Vol. 41, Issue 2, pp. 64–70). Ohio State University Press. https://doi.org/10.1207/s15430421tip4102_2